Eat Well, Live Well
with Spinal Cord Injury

A practical guide to help address secondary health complications in SCI through nutrition.

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MEDICAL DISCLAIMER

Eat Well, Live Well with Spinal Cord Injury discusses health care issues associated with spinal cord injuries (SCI). The information provided in this book is for educational and informational purposes only, and is not meant to offer medical diagnosis or advice, or substitute for medical or other professional health care treatment.

Many of the recommended vitamin, mineral and other nutrient dosages are higher than traditional recommended daily allowances (RDAs) and dietary reference intakes (DRIs). RDAs are defined as the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all healthy individuals. These intake levels, however, fail to address disease prevention, optimal nourishment and individual differences and needs, including those with chronic health conditions such as SCI. Studies also indicate that because adults with chronic SCI tend to have poor dietary patterns and nutrient deficiencies, coupled with their high prevalence of secondary health complications, they can have increased nutrient requirement levels above RDAs and DRIs. Therefore, this book often recommends higher therapeutic supplement dosages to provide necessary nourishment and health. These recommendations may not be pertinent for use in all situations. The recommendations do not guarantee a successful outcome and do not establish a standard of care.

The nutritional information and recommendations in each chapter are intended to provide you with a foundation of nutritional knowledge and helpful tips and strategies that you can use to complement your existing health care routine. The decision to implement any particular recommendation presented in this book must be made by a healthcare professional based on the healthcare professional's independent medical judgement, considering available resources and the situation and clinical data presented by the individual patient. Nothing contained in this book is to be considered medical advice for specific situations, nor as a substitute for the advice or professional judgment of a healthcare professional. Neither the authors of the book, nor PVA, nor any of the persons referenced in the acknowledgments, make any representation, warranty, condition or guarantee, and hereby expressly disclaims any such representation, warranty, condition or guarantee, express or implied, statutory or otherwise, with respect to the reliability, preciseness, completeness, accuracy, clinical efficacy or effectiveness of the information and recommendations made in this book or the studies referenced herein.

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Many thanks to our nutritional consultant, Darko Prce, M.Sc., CNP, RNCP, ROHP for sharing his professional knowledge and expertise. Darko holds a Master's degree in Clinical Nutrition and has studied and worked in the field of nutrition and alternative medicine for the past 20 years. In addition to creating and authoring professional modules for courses in the nutritional sciences, he is a faculty member at the Institute of Holistic Nutrition.

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This book is dedicated to Cooper Pulini, without whom this book would not have been possible.

FOREWARD

Eat Well, Live Well with Spinal Cord Injury is useful for every person who has had a spinal cord injury. After more than 40 years of active neurosurgical practice with an emphasis on spinal cord injury, I am in complete agreement with the authors' aim of advancing knowledge of nutrition as it will lead to the prevention of complications.

Spinal cord injury is one of the most complex conditions because it affects so many body systems – each of these systems needs careful attention by the injured person, their families, their caregivers, and their health care professionals. Knowledge and vigilance by the injured person are the most important ingredients for staying well and preventing complications. This book provides excellent advice about how to stay well after a spinal cord injury through careful attention to nutrition.

People with SCI have many allies in their quest to achieve good health. Family and rehabilitation doctors, physical medicine and other medical specialists are allies to maintaining good health, preventing complications, and treating those that do occur. This book is also a strong ally.

People with SCI must try to empower themselves with the ability to self-direct their nutrition and recognize early signs of things going wrong. Early recognition of skin, urinary, digestive and respiratory tract complications can be life-saving. This book teaches prevention and recognition, and thus, can also be life-saving.

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INTRODUCTION

A spinal cord injury (SCI) is one of the most traumatic events an individual will ever experience. It can happen to anyone, anywhere, anytime, and at any age. In a split second, every aspect of your life and your family's life is changed, forever. We know what you're going through because it happened to both of us.

We are nutritionists, whose lives have been personally touched by spinal cord injury. Joanne sustained a L1 paraplegia in a car collision at the age of 19 and Kylie's nephew Cooper sustained a C3-4 tetraplegia when he was just one and a half years old.

After spinal cord damage, not only is your body suddenly forced to cope with the direct impact of paralysis, but it must also deal with the psychological stress, physical pain, biochemical changes and hormonal imbalances that take place. Together these factors can contribute to the development of many common, recurring and potentially life-threatening secondary health complications, such as pressure sores, arthritis, osteoporosis, pain, fatigue, impaired respiratory and immune function, bladder infections, chronic constipation, cardiovascular disease and obesity.

It is common for individuals with spinal cord injury to experience multiple nutrient deficiencies. These secondary health complications then place additional demands on your body for increased calories, protein, vitamins and minerals. Therefore, eating the right foods becomes even more crucial to meet your body's increased nutrient needs right after injury, during rehabilitation and throughout your life.

Food has the amazing ability to help restore balance in your body and enhance your body's inherent healing potential. Practicing good nutrition, along with regular exercise and a healthy lifestyle, can help protect you from developing secondary health complications.

When we learned of the high risk of developing life-impairing, post-injury complications, we sought out SCI–related nutritional research and information. Disappointingly, we found that despite the prevalence, awareness and negative consequences of these secondary health complications, there is limited information available focusing on nutrition and its impact on preventing, addressing and managing them. We knew that if we were having trouble finding this information, so were others. That's why we decided we needed to research and write this book.

Eat Well, Live Well with Spinal Cord Injury is a comprehensive, practical nutritional guide written specifically for individuals with spinal cord injuries, as well as their families, friends, caregivers, health and medical professionals.

It is our hope that this book will focus attention on the important therapeutic role nutrition plays in the lives of individuals with SCI, and inspire future research in the area of nutrition and SCI. Most importantly, however, we hope this book will help empower you to have greater control over your health and enhance your independence in an easy, practical and cost-effective way.

– Joanne and Kylie

Before Getting Started

What is nutrition?

Quite simply, nutrition is using nutrient-dense, fresh, whole foods to nourish your body to enable it to live, grow, heal and stay healthy.

Why is nutrition important?

There is a well documented link between diet and disease. Today's standard Western diet is based on convenience, cost and availability. The majority of foods consumed today are highly processed and stripped of vital nutrients and fiber.

Your body is constantly breaking down and rebuilding itself. If you do not give yourself the proper nutrients, it can impair your body's ability to function normally. Your cells won't work properly, tissues may get weak, and then you become more susceptible to infections, illness and the development of diseases such as cardiovascular disease, diabetes and cancer.

Why is nutrition critical for individuals with SCI?

As a result of spinal cord injury (SCI), individuals experience dramatic changes in body composition and are susceptible to nutrient deficiencies and malnutrition. Many of the medications taken by individuals with SCI can further deplete the body of nutrients, and may have adverse consequences on their health. On top of this, individuals with SCI are at high risk of developing numerous secondary health complications, such as urinary tract infections, chronic constipation and/or diarrhea, obesity, pressure sores, osteoporosis and arthritis, which in turn places an extra demand on the body for specific nutrients.

Nutrition has the power to help rebalance your body, prevent the development of many common and recurring secondary health issues, and achieve overall well-being. Practicing good nutrition also enables you to enhance your bodily functions, which can lead to greater independence and quality of life.

What are 'whole foods'?

Whole foods represent foods in their original, natural form, just as they were grown. For example, let's look at a kernel of wheat as it sits on top of its stalk in a farmer's field. In its whole form, it is comprised of three parts called the germ, endosperm and bran. Eaten whole, as Mother Nature intended, it offers your body the right balance of minerals, vitamins, proteins, starches, healthy fats and fiber, which allows it to be effectively digested, absorbed and utilized by your cells. However, to increase its shelf life, wheat is processed. The germ and bran are removed, along with almost all of the essential nutrients and beneficial fiber needed to maintain your health. Usually all that's left is the endosperm which is made into white flour. This processed flour is then transformed into high-calorie, nutrient-void breads, bagels, muffins and cakes, etc. If you eat only processed grains, it can contribute to nutrient deficiencies.

Eating foods in their whole state is the only way to ensure that the nutritional benefit they offer is actually delivered to the cells of your body. Try to look at what is available in grocery stores and restaurants in terms of whether they are foods or 'food products' (e.g. steel-cut oatmeal vs. puffed wheat sugar-coated cereal).

If you eat whole foods why do you need nutritional supplements?

The first and most important step towards improving your health is changing your diet. Choosing to eat natural whole foods can keep you looking good and feeling great. Changing your diet and lifestyle can result in dramatic changes to your body and its ability to function. For example, you may have more energy, sleep better, have reduced pain and fewer infections. Your digestion is likely to improve, bowel conditions may start to disappear and you might find that you no longer have unhealthy cravings for processed foods that contain sugar, white flour, trans fats and additives.

However, if you live with a chronic health condition, such as SCI, you are at risk of vitamin and mineral depletion from the injury, long-term stress and medications. Common SCI-related secondary health conditions also place increased demand on your body for nutrients. Supplementation is a key step in rebalancing your body by addressing nutrient deficiencies. Eating nutrient-rich whole, foods may not be enough to address your increased demand for nutrients or to reverse your potential deficiencies.

Why are some supplement dose recommendations in this book high?

In order to repair damaged and deficient tissues, you may need an increased amount of nutrients. This book recommends what are considered therapeutic doses of mineral, vitamin and herbal supplements. These doses are specifically directed to the rebuilding of tissues, increasing tissue function, and improving brain and body chemistry.

Therapeutic doses are much greater than what is traditionally recommended. Conventional dosages were developed for the average healthy individual, but may not be sufficient to maintain total overall health or address specific conditions that affect individuals with SCI. For example, the traditional recommended amount of Vitamin C is measured as the amount needed to prevent scurvy. However, studies show that higher doses of Vitamin C are important for maintaining skin integrity, for a healthy immune system, and to reduce the risk of cancer and cardiovascular disease.

The therapeutic doses of supplements recommended in this book are considered safe. However, some nutritional supplements can adversely impact some health conditions or may interact with medications. **At the end of each chapter of this book you will find a chart listing contraindications and special considerations associated with each recommended nutritional supplement. We strongly advise that you discuss any changes in your diet or any introduction of new supplements with your health care professional before starting.**

What are carbohydrates?

Carbohydrates provide your body with the energy it needs for your tissues, muscles, nerves and brain to function properly. No matter what kind of carbohydrates you eat, they are all eventually broken down in your body into glucose. Glucose is what provides your body with energy.

Plant foods are the source of almost all carbohydrates. They are found in mineral-rich and vitamin-rich vegetables, fruits, grains and legumes (beans & peas). The only animal foods that contain carbohydrates are dairy products in the form of the milk sugar called lactose.

People often avoid eating carbohydrates because they believe they contribute to weight gain. The reality is some do and some don't – that's why it's important to know the difference between good carbohydrates and bad carbohydrates.

Good carbohydrates – ***whole vegetables, fruits, grains & legumes.***

These contain fiber and many other nutrients to help give you long-lasting energy, control your blood sugar levels, and maintain your health and ideal body weight. Eating the right amount of these carbohydrates will not make you fat.

Bad carbohydrates – ***refined sugars found in soda, cookies and candy, as well as processed grains, such as white bread & white pasta.***

These will contribute to weight gain because they are stripped of fiber and nutrients. Unfortunately, our Western diet primarily consists of these bad carbohydrates, so it's important to make an effort to avoid these and focus on the good ones.

What is Fiber?

Fiber is the indigestible matter found in plants. It's necessary to help balance blood sugar levels and carry toxins out of the body and it's critical to the proper functioning of your bowel. Fiber is found in good carbohydrate foods, and there are two main types of fiber:

Soluble Fiber – forms a gel-like substance. It helps prevent and alleviate constipation, and slows the rate of digestion and absorption to help stabilize blood sugar levels; and studies show it can help maintain healthy cholesterol levels. Good food sources of soluble fiber include ***barley, dried beans, peas, carrots, oats, apples, apricots, bananas, cranberries, blueberries, blackberries, figs, grapes, peaches & prunes.***

Insoluble Fiber – passes through the intestines relatively unchanged and adds bulk to your stool. It helps push matter through your colon to relieve constipation, as well as helps reduce the risk of developing diverticulitis and hemorrhoids. Good food sources of insoluble fiber include ***seeds, wheat bran, whole grains and the skins of many fruits and vegetables such as raw green leafy vegetables, Brussels sprouts, cabbage & sweet potatoes with their skin.***

What is Protein?

Protein is essential for life. It plays critical roles in:

- Making tissue, including muscle, skin, hair & nails
- Producing enzymes, which control almost all chemical reactions in your body
- Making hormones, which act as chemical messengers in your body
- Making antibodies, which boost your immune system and protect your body from infection
- Converting to glucose to act as an energy source if there is an inadequate supply of carbohydrates

Proteins are made up of building blocks called amino acids. There are 22 different amino acids, all of which are necessary for good health.

Foods such as chicken, turkey, beef, pork, fish, eggs, nuts, seeds & legumes (beans & peas) are rich sources of protein.

What are fats?

Many people are afraid of eating fat; however, not all fats are bad. In fact, we need good fats for:

- Maintaining healthy skin
- Making hormones
- Lubricating joints
- Preventing cardiovascular disease
- Improving wound healing
- Decreasing inflammation
- Maintaining the health of your brain and nervous system (60% of your brain is made of fat, so you need good fats to support optimal brain function)
- Carrying Vitamins D, E, K & A throughout your body
- Making foods taste delicious and giving you that satisfied feeling after you eat
- Losing weight ...yes, we need good fats to lose fat!

There are several different types of fat. It's important for you to know the difference between good fats and bad fats so that you can choose to eat the right ones.

Good fats

Essential fatty acids – are called essential because they cannot be produced by your body and must be obtained from your diet. There are two different types of essential fats:

Omega-3 – is an extremely healthy fat that helps to reduce inflammation, prevent cardiovascular disease and support brain function.

Great food sources of omega-3 fats are: fish (such as salmon, mackerel, sardines and trout), flax seeds and walnuts. Omega-3s can also be taken as a supplement in the form of flax seed oil or fish oil.

Omega-6 – supports normal health and development, as well as provides good heart health benefits. However you must be careful not to eat too much of these. Omega-3 and omega-6 fats compete with each other, and if you have a diet that primarily consists of omega-6s, it can cause inflammation in your body, which can contribute to allergies, increased blood pressure, blood clotting and pain.

Sources of omega-6 fats include vegetable oils, such as: corn, soybean, safflower and sunflower oils, and many processed foods, such as: crackers, cakes, salad dressings, mayonnaise & margarines.

Non-essential fatty acids – are fats that are found in foods and can also be produced by the body, which is why they are referred to as non-essential.

Omega-9 – this fat is especially important in helping to maintain healthy cholesterol levels, protecting against heart disease and supporting the immune system.

Good sources of omega-9s are: avocados, olives & olive oil.

Ideally, you should be consuming a ratio of 4:1 omega-6 to omega-3 fats; however, it is estimated people are consuming 10 to 20 times more omega-6s than omega-3s.

What is the cause of this overabundance of omega-6 consumption?
The high use of these oils in processed and packaged foods.

Saturated fats – are naturally occurring fats found in both animal and plant foods.

For many years these fats have been given a bad rap, but the latest research shows that you need these fats to maintain your cell membranes, produce hormones and produce energy. The key is to eat these fats in moderation. It is only when you eat these fats in excess (which is a common problem in Western society) that they can contribute to conditions such as high cholesterol and heart disease. It is recommended that saturated fats make up no more than 10% of your daily calories.

Foods high in saturated fat include: eggs, poultry, meat, dairy products such as cheese, coconut oil, coconut milk, palm oil & cocoa butter.

Bad fats

Trans fats – are chemically and structurally altered man-made fats. There is nothing natural about these fats and they should be completely avoided.

Trans fats do not spoil as quickly as natural fats, which is why they are so widely used in processed and packaged foods to increase their shelf life. While this may be beneficial to food manufacturers, trans fats are certainly not beneficial to your health. For example, these fats contribute to heart disease and neurological disturbances, increased levels of LDL cholesterol, inflammation and cell membrane defects. Trans fats also displace the good fats in your body.

Trans fats are found in foods such as: cookies, crackers, pastries, candy bars, muffins, microwave popcorn, snack foods, salad dressings, margarine, potato chips & other fried fast food.

To eliminate these bad fats from your diet, read food labels carefully. If you see the ingredients trans fats, hydrogenated oil and/or partially hydrogenated oil listed on any food label, do not eat it.

What are vitamins?

Vitamins are chemical compounds that you must obtain from plants and animals because your body cannot manufacture them. Vitamins serve crucial functions in almost all bodily processes such as:

- Regulating metabolism
- Producing hormones
- Helping enzymes function
- Maintaining a healthy nervous system
- Improving resistance to illness & disease

Vitamins are categorized into two groups:

Water-soluble vitamins – these vitamins dissolve easily in water and can be taken with or without food. Water-soluble vitamins are used rather quickly by the body, so it is recommended that you take them in divided doses throughout the day. Any excess of these vitamins is flushed out in your urine. Vitamin C and B vitamins are water soluble.

Fat-soluble vitamins – these vitamins must be taken with food containing fat in order to be absorbed in the intestines and utilized properly by your body. Fat-soluble vitamins last longer in the body, so there is a chance of taking too many of these vitamins. Read dosage recommendations carefully to avoid any potential toxicity. Vitamins A, D, E & K are fat soluble.

A deficiency in any vitamin can lead to distinct symptoms and disease. If you are taking vitamin supplements, be sure to take them with meals, unless otherwise specified. Your body will absorb them more readily when eaten with food.

What are minerals?

Approximately 4% of your body mass consists of minerals. They are naturally occurring elements found in the earth and you ingest them from the water you drink and the plants and animals you eat. Minerals make up many of the tissues in your body. Here are some roles they play:

- Ensuring the proper formation of blood & bones
- Maintaining healthy nerve function
- Regulating muscle tone
- Regulating heart rate & blood pressure

Minerals are classified into two groups:

Major minerals - Minerals that your body requires more than 100 mg a day of to maintain health.

These include minerals such as sodium, potassium, phosphorus, calcium, magnesium & sulfur.

Trace minerals - Minerals that your body requires less than 100 mg a day of to maintain health.

These include minerals such as iron, zinc, copper, selenium, chromium & iodine.

In order for minerals to be absorbed, there must be:

- Sufficient stomach acid to break them down
- Adequate protein consumed, because proteins (amino acids) bind to minerals and enable them to be absorbed

A lack of any mineral in your diet may result in various illnesses. If you are taking mineral supplements, be sure to take them with meals, unless specified otherwise. Your body will absorb them more readily when eaten with food.

What are antioxidants?

Antioxidants protect you from free radical damage. Free radicals are unstable molecules that cause damage to your tissues. This damage can be very serious and, if not kept under control, lead to pre-mature aging and a host of conditions and illnesses.

What causes/contributes to free radical development:

- Normal bodily processes (e.g. digestion & breathing)
- Trans fats
- Alcohol
- Radiation
- Toxic chemicals
- Cigarette smoke
- Air pollution

While many foods contain antioxidants, they are often not enough to neutralize the damage that can be caused by years of exposure to environmental elements or consuming certain foods. Taking antioxidants is necessary to protect yours health.

What do ENRICHED and FORTIFIED mean?

Enriched – means vitamins and minerals that were originally present in food were removed during processing, then added back to the food during another stage of processing.

Fortified – means vitamins and minerals were added to food that were never there in the first place. For example, adding Vitamin D to orange juice. Be aware, often these added vitamins are synthetic.

POWERFUL ANTIOXIDANTS:

- **Vitamin A**
- **Vitamin C**
- **Vitamin E**
- **Zinc**
- **Selenium**
- **Alpha-lipoic acid**

What are probiotics?

Probiotics are 'good bacteria.' Your intestines are home to several hundred trillions of bacteria, belonging to more than 400 species.

Probiotics play critical roles in:

- Breaking foods down properly
- Stimulating bowel function
- Producing B & K vitamins
- Boosting your immune system

Your body's ideal healthy bacterial balance is 85% good bacteria to 15% bad bacteria (you can never completely eliminate all bad bacteria from your body). However, this balance is often upset by an improper diet or the ingestion of antibiotics.

When you don't have enough good bacteria in your gut, not only are the above health benefits compromised, but your intestines can become colonized by toxin-producing bacteria, which can lead to malabsorption of fats, carbohydrates, protein, folic acid and Vitamin B12.

You can get probiotics from fermented foods such as sauerkraut and yogurt, or take probiotic supplements.

What are herbs?

Herbs are plants, or specific parts of plants like the root, leaf or bark, that have therapeutic actions on the body. For example, herbs can help reduce inflammation, remove excess water (diuretics), assist digestion and stimulate circulation.

Herbs can have very effective results, but need to be taken with great care. Some herbs can have an impact on certain health conditions or interact with medications. It is important to ensure that the effectiveness of any prescription medications will not be adversely affected by the action of any herbs being taken. Speak to your doctor before taking any herbal supplements.

Pharmaceutical drugs are often derived from herbs. For example, aspirin is derived from the willow tree.

How important is water?

Good clean water is essential to life.
It's needed by all of your body systems to function properly, carry vital nutrients to all of your cells, remove waste and help your body heal. While beverages such as soda, coffee, alcohol and even fruit juices all contain water, **they are not substitutes for the real thing.**

The best water to consume is pure spring water because it contains the full spectrum of minerals your body needs. Tap water contains these minerals but, depending on the treatment of water in your area, it may also contain additives such as chlorine and fluoride, both of which can have negative effects on the body.

If spring water is unavailable, try to drink filtered water, which has had toxins and other impurities removed. Preferred systems are carbon or reverse osmosis filter systems. Avoid distilled water because it can pull minerals from your body, as well as water stored in plastic bottles as chemicals from the plastic can seep into the water, potentially disrupting your hormone balances.

What are food allergies & intolerances?

Food allergies and intolerances can appear as we age, but also commonly occur after traumatic events such as SCI.

Food allergies – create an antibody response to a particular food or food component, for example, a naturally occurring protein such as casein found in milk and gluten found in wheat. Allergies are identified relatively easily, by such means as anaphylactic shock or an immediate break-out in hives.

Food intolerances – are the inability to break down food properly, and as a result they cause negative reactions. Intolerances can also include drinks, food additives and preservatives. It can take anywhere from half an hour up to 72 hours for symptoms of an intolerance to appear after eating or drinking the food in question. Thus, finding the problem-causing food may be difficult to determine.

Food intolerances can show up in the following ways:

- **Skin –** rashes, hives, dermatitis & eczema
- **Respiratory –** nasal congestion, asthma, mucus production & cough
- **Gastrointestinal tract –** mouth ulcers, abdominal cramps, gas, bloating, diarrhea & constipation
- **Neurological –** headaches, dizziness, tingling sensations & ringing in the ears
- **Psychological –** depression, mood disorders, anxiety, panic attacks, irritability, aggression & sleep disturbances
- **Cardiovascular –** abnormal pulse & elevated blood pressure
- **Immune/inflammatory and autoimmune reactions –** joint pain

Common food allergies and intolerances are: dairy, gluten-based grains (wheat, oats, rye, barley), soy, corn, sugar, yeast & eggs.

People who are unaware of their food intolerances are at increased risk of illnesses such as obesity and arthritis. Addressing food intolerances is continually recommended in the prevention and management of secondary complications in this book.

The best approach to determining if you have a food allergy or intolerance is to complete the Food Elimination Diet outlined in the Appendix.

What body systems should you know about before reading this book?

You have ten major body systems. The seven described below will be discussed throughout this book.

Nervous System – the main role of the nervous system is to relay electrical signals through the body. The nervous system also helps control processes such as digestion and circulation. The main organs include the brain, spinal cord and peripheral nerves.

Digestive System – the main roles of the digestive system are to break down and absorb nutrients. The main organs include the mouth, esophagus, stomach, small and large intestines.

Circulatory System – the main role of the circulatory system is to transport nutrients, gases (such as oxygen and CO2), hormones and wastes through the body. The main organs include the heart, blood vessels and blood.

Endocrine System – the main role of the endocrine system is to relay chemical messages throughout the body. Together with the nervous system, these chemical messages help control processes such as nutrient absorption, metabolism, stress and growth. Many glands secrete endocrine hormones, such as the hypothalamus, pituitary, thyroid, pancreas and adrenal glands.

Respiratory System – the main role of the respiratory system is to provide gas exchange between the blood and the environment: oxygen is absorbed from the air into the body and carbon dioxide is expelled from the body. The main organ is the lungs.

Urinary System – the urinary system eliminates waste products from the body and helps regulate the body's water and chemical balance. The main organs include the kidneys and bladder.

Immune System – the immune system defends the body from invading organisms that can cause illness or disease. Part of the immune system includes the skin and mucus membranes, which act as barriers to foreign invaders. Another part of the immune system includes white blood cells that respond to specific types of foreign invaders.

How To Use This Book

What you'll find in each chapter

Each chapter focuses on a specific secondary health condition.

The first section of the chapter explains what this condition is and why it develops after a spinal cord injury (SCI). Then, to give you a strong understanding of how nutrition can help prevent and manage these health issues, the roles of specific nutrients (foods, supplements and herbs) are discussed.

The second section contains easy-to-prepare, nutrient-dense recipes catering to each condition, which include many of the nutrients described in the chapter.

The end of each chapter contains a summary chart of all the nutrients detailed. This chart is a quick and easy reference for you to find out what foods these nutrients are found in, the recommended supplement dose, and any contraindications you should be aware of.

What to do if you have multiple secondary health complications?

If you have more than one secondary health complication and the same nutrient is recommended for each condition, ***do not combine these doses***. Instead, take the highest amount recommended and consult with your health care professional.

One Step at a Time

The first step to success is to not put pressure on yourself to try and change your entire diet all at once. This approach may result in feeling overwhelmed, and frustrated, and could lead to self-defeat.

The foods you eat and how you prepare them are habits that have developed over a lifetime, so it's not realistic to expect that you can transform them overnight. Furthermore, your body needs time to adjust to new foods, higher nutrient levels and increased fiber intake.

Start changing your diet one meal at a time and build from there over the next weeks and months. For instance, work on changing your breakfast over the course of the first couple of weeks. Once you've successfully done this, then move on to change your lunch or snack foods and so on.

CHAPTER 1

Nutrition for Digestion

- Nutrition if you use muscle relaxants (Antispasmodics)
- Nutrition to enhance peristalsis
- Nutrition for stomach ulcers
- Nutrition for reduced stomach acid secretion
- Nutrition for gastroesophageal reflux disease (GERD)
- Nutrition if you use antibiotics
- Nutrition for low digestive enzyme activity
- Nutrition for gallbladder problems & gallstones
- Nutrition for pancreatitis
- Nutrition for leaky gut
- Nutrition for candida

SCI and Digestion

Great health begins with a healthy digestive system.
If your body is unable to properly digest and absorb vitamins, minerals and other essential nutrients from food, it can cause numerous nutritional deficiencies. This in turn can cause your body to not function to its maximum potential and contribute to illness and disease.

The most healthy, wholesome, well-balanced diet will go to waste if your body is unable to digest and absorb the foods you eat. Therefore, good digestion is the foundation to maintaining your overall health and helping to prevent illness.

It is well documented that a large percentage of people with spinal cord injury (SCI) have multiple nutrient deficiencies and show signs of malnutrition. These deficiencies can contribute to the development of many common, recurring and potentially life-threatening secondary health complications associated with SCI, such as a weakened immune system, constipation, pressure sores, and delayed wound healing, as well as cardiovascular and respiratory disease.

There are three primary functions of the digestive system:

1) Digestion of food
2) Absorption of nutrients
3) Elimination of waste

This chapter will focus on 11 direct and indirect gastrointestinal disorders (specifically involving the digestion and absorption processes) which can occur as a result of SCI. It will explain why these disorders commonly occur and recommend foods, herbs & supplements to address and help prevent them. The elimination process is discussed in Chapter 2 - Neurogenic Bowel.

Common Conditions Post-SCI

It is very common for people with SCI who may have had few or no symptoms of indigestion, malabsorption, reflux, gas, bloating or gallstones pre-injury to suddenly be experiencing chronic problems with these conditions post-SCI. When the digestive process is compromised, every cell in the body is affected.

Common nutrient deficiencies experienced by people with SCI

Below is a list of common nutrient deficiencies people with SCI experience, the role they play in your health and how these deficiencies can contribute to the development of common SCI-related secondary health conditions:

COMMON DEFICIENCY	ROLE IN BODY	LACK CAN CONTRIBUTE TO
Vitamin A	• required for strong immune system • collagen production/skin healing • antioxidant	• increased susceptibility to infection • delayed wound healing
Vitamin B1	• important role in nerve cell function • helps build and maintain the protective covering around nerve cells called the myelin sheath • essential for energy production	• depression • fatigue • constipation
Vitamin B2	• energy production	• fatigue
Vitamin B6	• plays an important role in over 60 metabolic reactions in the central nervous system • involved with mood and energy	• depression • glucose intolerance • impaired nerve function • insomnia
Vitamin B9 (folic acid)	• involved in manufacturing DNA and neurotransmitters • protein metabolism	• poor wound healing • diarrhea • anemia • depression • insomnia • irritability • fatigue • osteoporosis
Vitamin C	• essential for collagen production/skin integrity • liver detoxification • immune health • supports adrenal gland function • powerful antioxidant	• pressure sore development and/or poor wound healing • weakened immune system/ susceptibility to illness • depression • cardiovascular disease • constipation
Vitamin D	• critical for the absorption of calcium and bone health • supports immune system	• osteoporosis • depression • weakened immune system/ susceptibility to illness
Vitamin E	• powerful antioxidant • immune health	• free radical damage, which can contribute to cardiovascular disease and poor wound healing • muscle weakness and poor coordination
Vitamin K	• essential for normal blood clotting • bone health	• osteoporosis • compromised blood clotting
Calcium	• critical for strong bones • required for nerve transmission • cardiovascular function	• osteoporosis • muscle cramps • high blood pressure

Common nutrient deficiencies people with SCI experience (continued)

COMMON DEFICIENCY	ROLE IN BODY	LACK CAN CONTRIBUTE TO
Magnesium	• involved in the production of energy, nerve conduction, muscle contraction and cardiovascular function	• heart disturbances • anxiety • fatigue • physical weakness • problems with nerve conduction and muscle contraction • muscle cramps • insomnia • susceptibility to stress
Potassium	• involved in cardiovascular function • regulation of water balance • muscle and nerve function • kidney and adrenal function	• heart disturbances • edema • muscle weakness • fatigue • irritability
Zinc	• critical to the entire body's immune and repair process • skin health	• decreased healing time of pressure sores • poor immune function/recurrent infections • poor skin condition
Fiber	• necessary for good digestion/bowel function • maintaining balanced cholesterol levels • maintaining balanced blood sugar levels	• constipation and bowel obstruction • diarrhea • gastrointestinal issues • fatigue • obesity • high cholesterol

The root cause of nutritional deficiencies (such as the ones listed in the chart) can often be related to poor digestive function; individuals with SCI are at high risk of developing multiple gastrointestinal issues. However, with good nutrition and a healthy lifestyle, most, if not all, gastrointestinal disorders can be reduced or avoided by following the steps in this chapter.

Digestive Issues and SCI

Your digestive tract is 25-35 feet long. It is a complex, integrated system that consists of your mouth, esophagus, stomach and small and large intestines, as well as your salivary glands, liver, gallbladder and pancreas. Each system affects the others, so if one is not working well, it will decrease the function of the others and negatively impact your overall digestive process.

Your nervous and digestive systems are very closely interconnected. The nervous system connects the walls of your intestines to every corner of your body, and each of your organs has a supply of nerves connected to your intestines. Your gut's nerve supply is so complex that it has a network of over 100 million neurons that communicate with your brain and your immune system, affect your mood and emotions, and control your digestion.

Digestion is regulated by your autonomic nervous system, as well as hormones and other chemicals that control the movement and secretions of your digestive system. There are two arms of the autonomic nervous system – the parasympathetic nervous system and the sympathetic nervous system. The parasympathetic nervous system typically stimulates digestion, while the sympathetic system inhibits it.

Your autonomic nervous system may be affected after SCI, which can negatively impact peristalsis (the muscular contractions that propel food through the intestines). This in turn can slow the movement of food through your intestines, as well as cause gas, bloating and constipation.

The nervous system associated with your gut is so extensive that in 1996 Dr. Michael D. Gershon referred to the gut as our 'second brain.' So it is no wonder that an SCI significantly affects and impairs the digestive system.

After sustaining an SCI, many people are also suddenly consuming a number of prescription and over-the-counter medications. While necessary, many of these medications can negatively impact your digestive function and deplete certain nutrients from your body.

It is very common for individuals with SCI who had few or no symptoms of indigestion, malabsorption, gas, bloating, gallstones or reflux pre-injury to suddenly experience chronic problems with these conditions post-injury. Potentially making matters worse (depending on level of injury and loss of sensation), many individuals may not even be aware that they are experiencing gastrointestinal issues that could be contributing to other serious health problems.

It is important for you to be aware of these unique digestive risk factors, by paying close attention to your digestion and any potential signs of dysfunction. In doing so, you can make the necessary changes needed to support your digestion, and in turn, help prevent secondary health complications from developing.

Nutrition if you use muscle relaxants (antispasmotics)

Muscle relaxants are commonly used by individuals with SCI to help reduce spasms; however, they can also reduce the flow of your saliva. When your saliva flow is decreased it can not only lead to an uncomfortable condition referred to as dry mouth, but it can also affect your body's digestive and defense systems.

Saliva contains two very important substances:

- **Amylase** – a digestive enzyme (enzymes are proteins that help break down food into smaller pieces) which begins digesting starches into smaller sugars in your mouth
- **Antibodies** – help protect your digestive system and your entire body by destroying bacteria that may come in contact with your mouth

If saliva (the beginning of your digestive process) is inhibited, it can put an additional burden on the rest of your gastrointestinal system, potentially leading to issues such as gas and bloating.

If you are taking these muscle relaxants (antispasmotics) you need to do the following:

1 Chew your food well

This assists in the breakdown of food and reduces the burden on the rest of your digestive system.

2 Drink 6-8 cups of fluids/water every day

Drinking 6-8 cups of water, herbal tea or diluted juice will help produce essential digestive secretions, such as stomach acid, needed for optimal digestion. It also helps flush any harmful bacteria from your body.

Peristalsis
is the involuntary, wave-like muscular contraction that propels food through your entire digestive tract.

The gastrocolic reflex
is an automatic reflex of the large intestine (bowel) in response to food entering the stomach.

Nutrition to Enhance Peristalsis

In able-bodied individuals peristalsis occurs throughout the day, but is also stimulated by the gastrocolic reflex which occurs about 15 minutes after eating or drinking. Depending on the level and severity of your SCI, the gastrocolic reflex and peristalsis may be impaired, which chronically slows the movement of digested matter and waste through your digestive system.

Decreased peristalsis and the stagnation of digested food in your intestines can contribute to:

- **Bacterial overgrowth** – potentially increasing your risk of illness
- **Increased fermentation** – the process where bacteria in your gut break down any undigested carbohydrates
- **Increased putrefaction** – the rotting of foods, such as proteins, in your gut

The by-products of fermentation and putrefaction are foul-smelling gases and toxins. This can contribute to chronic gas, bloating and abdominal discomfort – all common gastrointestinal problems for individuals with SCI.

On average, people pass gas 10-15 times a day, but excessive amounts of bloating and gas, as often experienced by individuals with SCI, are indications that something in the digestive system is out of balance.

There are several ways to naturally help stimulate peristalsis and support movement of digested food through your gut. These recommendations have none of the undesirable side effects caused by prescription medications, which are often used by individuals with SCI to increase the motility of the gastrointestinal tract.

Here are some simple and effective ways to help enhance peristalsis as well as reduce gas and bloating:

1 Eat and drink carminatives

Carminatives are foods and herbs that help reduce gas and relax intestinal muscles to allow gas to pass.

- ***Drink fresh ginger or peppermint tea***
- ***Chew on fennel and anise seeds***

2 Drink 6-8 cups of fluids/water a day

Water is essential in helping move matter more easily through your digestive tract. Keeping your body well hydrated by drinking 6-8 cups of water, herbal tea or diluted juice every day will help keep things moving. It's best to drink most of your fluids away from meals and only small amounts during meals.

3 Increase fiber

Increasing fiber in your diet is another effective way to help support peristalsis. Fiber, the indigestible matter in plants, helps create bulk in your stool, and keeps it moist and pliable to move more easily through your intestines.

Increase your fiber by eating more fruits with their skin (e.g., apples & pears), vegetables, peas, beans, lentils, oats & other whole grains. Or try taking a fiber supplement, such as whole husk psyllium or ground flax seeds.

4 Eat small, frequent meals

Eating stimulates the gastrocolic reflex and peristalsis, so consuming smaller, more frequent meals also helps to naturally support movement through your digestive tract.

5 Reduce/eliminate refined carbohydrates & processed foods

Reduce your intake of high glycemic foods (foods that increase blood sugar quickly). Foods that are high in simple or refined carbohydrates, such as white bread/bagels, white rice, white pasta, fiber-less cereals, baked potatoes, French fries, cakes, donuts, pastries, cookies, soda and candy can slow the motility of your intestinal tract. Specifically, when blood sugar levels rise too rapidly, sections of your small intestine (the duodenum and jejunum) propel digested matter through them at a slower rate.

Refined/processed breads, pasta and rice can act like glue in your gut, becoming very sticky, causing bowel transit time to slow even more. So avoid or eliminate processed foods as much as possible!

Nutrition for Stomach Ulcers

Your body produces a layer of slippery mucus to protect the lining of your intestinal track from highly acidic stomach acid and micro-organisms (such as fungi, bacteria and viruses).

After SCI, this protective mucus barrier is susceptible to degradation, which means not only can microorganisms penetrate your intestinal lining, making you more susceptible to illnesses, but corrosive stomach acid can damage your intestinal lining and lead to the development of ulcers and/or gastrointestinal bleeding.

Stomach ulcer symptoms:

- Abdominal discomfort approximately 45 to 60 minutes after eating
- Burning or aching that is usually relieved by taking antacids
- Abdominal tenderness

Stomach ulcers have been identified as one of the most common disorders of the digestive system during the first 4 weeks after SCI.

– Lee & Ostrander,
The Spinal Cord Injured Patient

There are several factors that make individuals with SCI highly susceptible to the deterioration of the mucosal lining of the intestines, which can ultimately lead to ulcer development:

- **NSAIDS (Non-steroid anti-inflammatory drugs)** – while NSAIDS are used to address the pain and inflammation often experienced after SCI, they can also cause damage and inflammation to the lining of the digestive tract by blocking small protein messengers called prostaglandins. There are different types of prostaglandins that circulate throughout the body. Some prostaglandins cause pain and inflammation while others can lead to healing and repair. NSAIDS block all prostaglandins. Therefore, taking these medications might help eliminate pain, but they can also eliminate your body's ability to heal itself.
- **Nutrient deficiencies** – individuals with SCI are often deficient in numerous nutrients, including Vitamins A, C and E, all of which are necessary for maintaining the health of the intestinal wall and protective mucosal layer. NSAIDS also deplete Vitamin C.
- **Steroids** – long-term use of steroidal drugs, often used by individuals with SCI who experience chronic pain, can contribute to stomach and duodenal ulcers.

- **Stress** – causes the sympathetic nervous system to dominate over the parasympathetic nervous system. When this happens there is a decrease in blood flow to the gut. Good blood flow is necessary for maintaining the mucosal lining of the stomach. When blood flow is reduced during stress, the mucosal lining can deteriorate, making individuals more susceptible to ulcers.
- **H. pylori bacteria** – the increased susceptibility to the breakdown of the gastrointestinal lining makes individuals with SCI more vulnerable to a bacterium called H. pylori. This common bacterium can damage the protective mucus lining of the stomach and small intestine. Ideal conditions for H. pylori to flourish in are low stomach acid and low antioxidant levels (Vitamins A, C and E). Individuals with SCI are highly vulnerable to both of these conditions.

There are several nutrients that can help improve the strength and integrity of the intestinal lining and help reduce the development of ulcers:

1 Drink 6-8 cups of fluid/water a day

Water is essential to the production of the mucus lining in the intestines.

Drinking 6-8 glasses of fluid/water a day will help maintain this protective layer.

2 Eat foods rich in zinc, Vitamins A, C & E, glutamine & flavonoids

- **Vitamins A, C & E** – help repair and increase the strength of the intestinal lining, as well as enhance resistance to H. pylori.

These vitamins can all be taken in supplement form, or you can focus on eating foods rich in these vitamins such as sweet potato, carrots, spinach, broccoli, butternut squash, red/green peppers, broccoli, papaya, strawberries, Brussels sprouts, almonds, sunflower seeds & olives.

- **Zinc –** helps increase mucus production in the intestinal lining.

Zinc can be taken in supplement form or in foods such as pumpkin seeds, sesame seeds, oats & yogurt.

- **Glutamine –** this amino acid accelerates the repair time of ulcers.

Glutamine can be consumed by drinking fresh cabbage juice, eating chicken, fish & eggs, or taking it in supplement form.

- **Flavonoids –** are what give fruits and vegetables their vibrant colors. Flavonoids have many anti-ulcer activities as they help reduce inflammation, promote healthy arteries, help repair cellular damage and inhibit the H. pylori bacterium.

Flavonoid-rich foods include apples, red grapes, blackberries, blueberries, pomegranates, broccoli, cabbage & strawberries.

3 Increase your fiber

Fiber is associated with reduced rates of ulcers.

Fiber is found in fruits (such as apples, pears & berries) and vegetables (such as broccoli, carrots & spinach), legumes & whole grains.

4 Eat oats

Oats have demulcent properties, which means they help soothe inflamed and damaged tissues. Eating oatmeal on a regular basis can be highly beneficial.

5 Drink aloe vera juice, meadowsweet, marshmallow root and/or slippery elm bark tea

- **Aloe Vera** - in cases of gastrointestinal bleeding. Aloe vera is a plant that is filled with a gel, which contains compounds that act as astringents to help stop bleeding. This juice is also soothing to an inflamed and irritated intestinal lining.

  Aloe Vera can be taken in a pill, juice or tea form.

- **Meadowsweet** - contains many substances that help protect the mucus lining of the intestines. It acts as a natural anti-inflammatory helping to relieve an irritated intestinal lining and alleviate gas.
- **Marshmallow Root** - has a soothing effect on the gastrointestinal tract
- **Slippery Elm Bark** - has a soothing effect on the gastrointestinal tract

6 Take the supplement: DGL licorice

- **DGL licorice** - this herb helps reduce inflammation, enhances blood flow to cells in the intestinal tract and promotes mucus secretion.

> *Studies show that DGL licorice is more effective at addressing ulcers than conventional antacid medications. Antacids deplete vitamin D, folic acid, B12 and the minerals calcium, iron and zinc. It also reduces stomach acid production, which in turn inhibits the digestion of proteins and minerals. DGL does not have these negative side effects.*
>
> – Murray & Pizzorno, Encyclopedia of Natural Medicine

7 Identify & avoid any food intolerances

Food intolerances can contribute to intestinal irritation, inflammation and damage. Milk, wheat, eggs and corn are some of the most common food intolerances.

To help determine if you have a food intlerance, see the Food Elimination Diet in the Appendix.

Nutrition for reduced stomach acid secretion

Any kind of autonomic nervous system dysfunction, as experienced by individuals with SCI, can decrease your production of stomach acid, also known as hydrochloric acid (HCL).

When your HCL secretions are low, your entire digestive system will be weakened. Proper levels of stomach acid are essential for:

- **Breakdown of proteins** – HCL helps break proteins down into amino acids, which are the building blocks of every cell in your body and critical for growth and tissue repair. This is important for individuals with SCI because protein is needed for wound healing, muscle building, liver detoxification and antibody production, required for a healthy immune system.
- **Vitamin B12 absorption** – inadequate HCL secretion can lead to poor absorption of this vitamin. B12 is commonly deficient in individuals with SCI. Reduced levels of this nutrient can result in weakness, fatigue and nervous system problems.
- **Mineral absorption** – insufficient HCL levels can cause mineral deficiencies, and this in turn can lead to a host of health problems. Essential minerals such as calcium, magnesium and zinc are necessary to help prevent the development of serious and potentially life-threatening SCI complications such as osteoporosis, cardiovascular disease and pressure sores.
- **Support the immune system** – HCL helps to kill microbes that are ingested with food.
- **Proper stomach emptying time** – when your HCL levels are very low, stomach emptying time can be delayed. When this happens, bile can be regurgitated from your small intestine up into your stomach. Bile can be highly irritating to the stomach lining and cause discomfort. Studies indicate that in the initial weeks following SCI, there is significant slowing of stomach emptying.

  – Bono, Spinal Cord Medicine Principles and Practice

- **Secretion of pancreatic juice** – if the food leaving your stomach is not made acidic enough by sufficient levels of stomach acid, your pancreas will not secrete sufficient amounts of pancreatic juice to help break down carbohydrates, fats and proteins.Your gallbladder will also not secrete sufficient amounts of bile into the small intestine to help emulsify fats. The decreased secretion of pancreatic enzymes and bile can also contribute to fermentation, putrefaction, gas and bloating, as well as inflammation and the development of food allergies. These conditions not only put extra burden on your digestive system, but the fermentation by-products and gases may be absorbed from your intestinal tract into your bloodstream. These toxic wastes are then carried throughout the body, putting additional burden on the liver and kidneys to detoxify.

Without enough bile, fats are not sufficiently emulsified. As a result, fats combine with minerals and can contribute to the development of constipation, a very common secondary health complication for individuals with SCI.

Toxic waste products irritate the nerve endings in your gut, which are connected to other organs and membranes throughout your body. Because of this irritation, irregular nerve impulses are sent to organs or other areas of your body which can cause discomfort or pain.

Symptoms of low HCL

- Constipation or diarrhea immediately after eating
- Indigestion
- Undigested food particles in stool
- Weakened immune system
- Stools poorly formed, pale, greasy & floating
- Candida
- Allergies
- Weak cracked fingernails
- Bloating, belching, burning & gas
- Sense of fullness after eating
- Nausea after taking supplements
- Poor wound healing
- Iron deficiency
- Acne
- Bad breath
- Indigestion

The production of HCL naturally decreases as you age, so it's important to support your digestive system as you get older.

Given the importance of maintaining appropriate HCL levels, there are several ways that you can help support adequate stomach acid levels and proper digestion:

1 Drink apple cider vinegar diluted in water

Vinegar is very similar to the stomach acid your body makes. Consuming apple cider vinegar diluted in water prior to meals is a simple and cost-effective way of increasing acidity.

2 Take HCL supplements

Take 1-2 HCL supplements, in the form of betaine hydrochloric acid, at every main meal to help break down protein and absorb minerals.

3 Drink 6-8 cups of fluid/water a day

Drinking water, particularly filtered, room temperature water, helps your body produce HCL – so keep yourself well hydrated. However, it is important not to drink too much with meals, especially ice cold or carbonated beverages, as this will slow down the digestion process. Herbal teas and fresh lemon juice in water can be included as part of your fluid intake.

4 Eat small meals more often

Large meals put greater demand on your digestive system. Smaller meals are easier for your body to digest.

5 Decrease intake of red meat, dairy products, processed foods & coffee

All of these foods contribute to low HCL production, so minimize or eliminate these from your diet.

Diseases associated with low stomach acid:

- Addison's disease
- Celiac disease
- Eczema
- Hepatitis
- Osteoporosis
- Rheumatoid arthritis
- Asthma
- Diabetes
- Gallbladder disease
- Chronic hives
- Pernicious anemia
- Hyperthyroidism / hypothyroidism

Nutrition for gastroesophageal reflux disease (GERD)

GERD is the condition in which stomach acid, bile and partially digested food in the stomach back up into the esophagus. Normally, the esophageal sphincter muscle pinches itself shut and prevents these substances from going back up, but if this sphincter is not functioning properly, these fluids can seep up into your esophagus causing burning. This burning sensation is often referred to as heartburn.

"Gastro" refers to the stomach.

"Esophageal" refers to the esophagus (the tube that carries food from the mouth to the stomach).

"Reflux" means to back up or flow backwards.

Individuals with SCI are at greater risk for developing GERD for several reasons:

- Reduced diaphragm strength which can affect esophageal sphincter pressure
- Delayed gastric emptying (food leaving the stomach into the small intestine)
- Immobilization and reclined positioning in the wheelchair
- Medications individuals with SCI commonly take, such as antispasmodics, tricyclic antidepressants, calcium channel blockers and meperidine

Symptoms of GERD

- Burning sensation above stomach
- Belching
- Sour taste in mouth
- Excessive salivation
- Regurgitation

Nutritional recommendations to help reduce GERD symptoms include the following:

1 Eat plenty of fiber

GERD is not common in people who eat high fiber diets, so eating plenty of fruits, vegetables, legumes and whole grains may help you avoid this condition.

2 Take HCL supplements

Symptoms of heartburn are often caused by too little stomach acid as opposed to too much. Supplementation with HCL at every meal has shown to help decrease these symptoms. Taking HCL supplements ideally with enzymes and bile will help ensure proper digestion and absorption of food and potentially help prevent partially digested foods from traveling back up into your esophagus.

3 Take probiotics

Taking daily probiotic supplements containing 'good' bacteria helps to maintain a healthy intestinal flora balance.

4 Drink warm water & lemon juice and/or cabbage juice

- **Warm water with fresh lemon juice –** before meals helps stimulate stomach acid production (warm water is preferred over cold or ice water because these decrease the digestive process).
- **Cabbage juice –** helps relieve heartburn. Cabbage contains a high content of glutamine, an amino acid that has an affinity for repairing the intestinal lining.

5 Drink herbal teas

- **Slippery elm bark, marshmallow root or meadowsweet teas –** are very soothing to the lining of the intestinal tract and can help relieve symptoms of heartburn.
- **Fresh ginger tea –** can help relieve symptoms of gas, bloating and discomfort.

6 Don't overeat

Eating large, heavy meals can cause gastric juices to flow up into your esophagus. Therefore, eating smaller, more frequent meals throughout the day is recommended.

7 Reduce/avoid carbonated drinks, fried foods, chocolate, peppermint, alcohol and coffee

Eating these can either increase abdominal pressure or decrease the tone of your esophageal sphincter contributing to GERD.

Antacids, proton pump inhibitors (PPIs) or H2 blockers

Antacids neutralize stomach acid, while PPIs and H2 blockers reduce gastric acid production. Individuals with SCI often use these to relieve the heartburn symptoms associated with GERD. These types of medications are commonly used because there is a widely accepted misconception that heartburn is caused by too much stomach acid, when in fact, the most frequent cause of heartburn is not enough stomach acid.

Taking these medications may temporarily relieve symptoms, but this only reinforces the root cause of the problem by lowering stomach acid further, leading to digestive dysfunction, nutrient deficiencies, and making an already under-active stomach weaker. Therefore, it may be beneficial to address GERD on an ongoing basis with the more natural methods described above.

Optimal stomach acid pH ranges between 1.5 and 2.5; however, the use of antacids, PPIs and H2 blockers can raise the pH to above 3.5. This increase in pH inhibits the action of digestive enzymes involved in protein digestion, decreases absorption of folic acid, Vitamins B12 and D, calcium and iron, and can be irritating to your stomach lining.

Nutrition if you use antibiotics

Optimal digestion depends on healthy levels of intestinal flora, also known as 'good' bacteria because they perform the following roles:

- Good bacteria, such as Lactobacillus acidophilus, attach to your intestinal lining to help prevent parasites or other pathogens from taking hold in your gut
- Produce lactic acid, which helps make the intestines unsuitable for pathogens to thrive in
- Produce hydrogen peroxide, which kills candida (candida is an overgrowth of yeast that individuals with SCI are susceptible to due to long-term antibiotic use)
- Enhance peristalsis
- Increase absorption of minerals, such as calcium, copper, iron and magnesium
- Help make B vitamins and Vitamin K help maintain the health of your intestinal tract
- Help prevent and treat antibiotic-associated diarrhea

Individuals with SCI who undergo surgery are often given antibiotics to avoid the development of potentially life-threatening infections. Many individuals with SCI also continue to take antibiotics on an ongoing basis to treat chronic conditions such as bladder infections and pressure sores. While short-term antibiotic use is critical to help fight serious infections, long-term use can be detrimental to your digestive and immune systems, predisposing you to further infections.

Antibiotics mean "anti-life." While they are very effective at destroying bad, often life-threatening bacteria, chronic antibiotic use can lead to resistant strains of bacteria that will need to be treated by different types of antibiotics, creating a vicious cycle of dependency. Most antibiotics cannot distinguish the difference between good bacteria and bad bacteria, so when you take them you wipe out the good with the bad, upsetting the ideal 85:15 good bacteria: bad bacterial ratio of your intestinal flora.

Stress, NSAIDs & steroid medications also upset the delicate balance of intestinal flora, thereby further compromising your digestive and immune functions.

1 Eat fermented foods

Fermented foods are high in good bacteria. Fermenting is the process where good bacteria is used to break down carbohydrates and proteins in foods to help preserve them.

Fermented foods include yogurt, kefir, sauerkraut, miso & pickled vegetables.

2 Take probiotic supplements

If you have taken a course of antibiotics, it is essential that you take probiotic supplements for 2 to 3 months to help repopulate your gut with good bacteria. Probiotics, meaning "for life," are live micro-organisms or 'good bacteria', similar to those naturally found in your gut.

There are many different bacterial species that live in your intestines and each prefer different locations within your gut to perform their various roles. When taking probiotic supplements, it is important to take ones with at least 8 billion active micro-organisms containing at least several different species, such as lactobacillus acidophilus and bifidobacterium.

Nutrition for low digestive enzyme activity

The stress that many individuals with SCI experience not only contributes to decreased peristalsis, reduced HCL secretion, diminished mucosal lining and depleted intestinal flora, but also puts individuals with SCI at higher risk of insufficient digestive enzyme activity.

Digestive enzymes called protease, amylase and lipase help further digest proteins, carbohydrates, and fats, respectively. When you are stressed, physiological changes occur, which in turn make your digestive enzymes less effective. When this happens, the digestion of fats, proteins and carbohydrates may all be reduced. This in turn can have adverse effects on every cell in your body.

Symptoms of insufficient enzyme activity

- Gas
- Constipation
- Chronic allergies
- Colds
- Sinus infections
- Bloating
- Discomfort after eating/heartburn
- Chronic fatigue
- Diverticulitis
- Irritable bowel syndrome

If your digestive enzyme activity is insufficient, your pancreas will have to work harder to produce more digestive enzymes to meet the demands of the foods you eat. **To reduce the burden on your pancreas and help your body digest and absorb nutrients, do the following:**

1 Eat lots of fresh raw fruits & vegetables

Raw fruits and vegetables contain food enzymes. Food enzymes. however, are very sensitive to temperature and will be destroyed if they are heated over 118 degrees F, so eating them in their raw state is the best way to assist your digestive function. Juicing helps to liberate enzymes from fruits and vegetables.

Enzymes are found in abundance in avocados, papaya, bananas & pineapple.

2 Eat lots of green leafy vegetables

Green leafy vegetables help your digestive enzymes function optimally by creating a more favorable alkalinized environment.

Eat lots of green leafy vegetables, such as spinach, cabbage, collard greens, kale & Brussels sprouts.

3 Drink 6-8 cups of fluid/water a day

Water helps digestive enzymes function more efficiently; however, drinking too much water *during* meals can reduce enzyme effectiveness.

It is recommended that you only sip liquids during meals and drink the majority of your water away from meals.

4 Take digestive enzyme supplements

Digestive enzymes (amylase, protease and lipase) can also be taken with meals to help digest your food.

Nutrition for gallbladder problems & gallstones

The gallbladder is a 3-4 inch, pear-shaped organ located on the right side of your body, just below your liver. Its role is to store the 2 cups of bile produced by your liver each day and, when stimulated to contract and release the bile into the small intestine. Once released, bile plays a multitude of roles in your digestion, including:

- Emulsifying fats, meaning it breaks down fat globules into smaller fat droplets, thereby increasing the surface area for the fat-splitting enzyme (called lipase), which helps to break them down even further
- Neutralizing acidic food to prevent it from burning the lining of your intestine
- Keeping your small intestine free of microorganisms
- Reducing bloating
- Stimulating peristalsis
- Helping prevent constipation by incorporating water into your stool

There are 4 types of gallstones: cholesterol, pigment, mixed (contains cholesterol, bile salts, bile pigments and inorganic salts of calcium), and mineral.

Studies reveal that gallstones after SCI are most often cholesterol stones, which form when there is an elevation of cholesterol in the bile.

Individuals with SCI have an increased prevalence of cholelithiasis (which is the formation of gallstones). Studies indicate that there is a threefold increased prevalence of gallstones in people with SCI compared to able-bodied counterparts. This risk is so significant that some researchers believe cholelithiasis should now be considered a secondary complication of SCI.

– Ketover, Ansel et al., 1996 – Rotter & Larrain, 2003

Gallstones can significantly impair your digestive system by inhibiting or blocking the bile duct where bile is released. The gallbladder then becomes inflamed and is not able to perform its role of releasing sufficient amounts of bile into the small intestine. In extreme cases of inflammation, surgery is required to remove the gallbladder, which significantly decreases the amount of bile reaching the small intestine.

Anyone who has had their gallbladder removed needs long-term digestive support with digestive enzymes containing bile salts.

Symptoms of insufficient bile reaching the small Intestine

- Consistent gas and bloating from fatty foods
- Fat/greasy foods cause nausea or headaches
- Onions, cabbage, radishes and cucumbers cause bloating or distress
- Constipation
- Chronic bad breath or bad taste in mouth
- Excess body odor
- Clay-colored stools

Symptoms of an inflamed gallbladder

- Pain in the upper right side of the abdomen
- Pain below the breastbone that shoots into the right or left shoulder
- Nausea
- Vomiting
- Shaking/chills
- Urine may be tea – or coffee-colored

When your small intestine does not receive sufficient amounts of bile, fat is not emulsified and digested properly. This can in turn lead to deficiencies in omega-3 & omega-6 fatty acids, as well as the fat-soluble Vitamins D, E, K and A.

These vitamins also happen to be 4 of the nutrients that individuals with SCI are commonly deficient in. They play important roles in the prevention and management of several SCI-related secondary health complications, such as osteoporosis, cardiovascular disease and pressure sores.

Deficient bile output can contribute to constipation, as improperly digested fat combines with minerals creating stool that is more difficult to pass.

Why is there a higher risk of gallstones with SCI?

While it is known that individuals with SCI are at higher risk of developing gallstones, it is not exactly clear why. The following are several theories:

- Changes in nerve innervation of the gallbladder may alter its ability to contract and release bile properly.
- The sympathetic nerve supply to the gallbladder acts to relax it so that it can fill with bile. If it is unable to fill to its maximum volume due to changes in the sympathetic nerve supply, the bile may become more concentrated, ultimately resulting in gallstones.
- Studies indicate that extremely low calorie intake and rapid weight loss, which often happens immediately following SCI is a risk for gallstone development.
  – Scott et al., 1996
- Obesity, can cause an increase in the secretion of cholesterol in bile, contributing to the formation of stones.
- There is a significant correlation between slow bowel transit time and increased levels of an acid produced in the intestines called deoxycholic acid. A higher level of deoxycholic acid has been associated with people who have gallstones.
- Gastrointestinal tract dysfunction – 99% of bile acids are created during the digestion process and re-absorbed in the small intestine. If absorption functions are impaired, there will be decreased re-absorption of bile acids, therefore reducing the bile acid pool and the rate of bile secretion. This can result in an increased risk of gallstones.
- Diets high in refined/processed carbohydrates and low in fiber lead to a reduced production of bile acids by the liver and a lower bile acid concentration in the gallbladder, which tends to produce bile that is more supersaturated with cholesterol. Bile that is supersaturated with cholesterol contributes to gallstone formation. Low fiber consumption also reduces the absorption of deoxycholic

Cholesterol-lowering drugs

These drugs may increase the risk of gallstones as they lower blood cholesterol levels but increase levels of cholesterol in the bile.

The good news is there are many nutritional ways to help reduce the risk of developing gallstones:

1 Increase fiber

Fiber helps decrease the formation of deoxycholic acid by binding to it and excreting it from your body. Fiber has been shown to both prevent and help reverse gallstones, ***especially water-soluble fiber found in fruit, ground flax seeds and oat bran.***

2 Increase lecithin in your diet

Increasing lecithin in your diet helps increase the concentration of lecithin in the bile. This in turn helps increase the solubility of cholesterol, which can help reduce gallstone development. Taking supplements of lecithin, a natural fatty substance found in ***high concentrations in eggs and beef liver,*** may also help reduce the risk of gallstone formation.

3 Take choline & methionine supplements

Gallbladder problems are often indicative of some type of liver dysfunction **(refer to Chapter 10 on Nutrition for the Liver)**. These two nutrients are helpful in reducing gallstone formation as they assist in decreasing fat in the liver and thus help to maintain healthy bile concentrations.

4 Eat good fats

Fish oil, either from fresh fish or fish supplements, may also play a role in inhibiting gallstone formation as it helps to maintain healthy bile concentrations.

5 Eat more foods rich in Vitamins C and E

A deficiency in these vitamins is related to the presence of gallstones. Supplementing with Vitamin C has been shown to help reduce cholesterol stone formation, the type of gallstones commonly found in individuals with SCI.

Foods high in Vitamin C include broccoli, Brussels sprouts, red/green peppers, strawberries, papaya & pineapple.

Foods high in Vitamin E include sunflower seeds, almonds, olives & olive oil.

6 Take HCL supplements

Decreased stomach acid secretion is another significant contributing factor to gallstone formation. Studies indicate that almost half of people who develop gallstones also have low HCL. Therefore, supporting HCL production is very important in reducing the risk of gallstone development.

7 Take herbs – milk thistle & dandelion root

These herbs can help increase bile secretion by the liver, as well as the solubility of bile, thus decreasing the risk of gallstones.

8 Reduce/avoid sugar, coffee & processed foods

- **Sugar/processed foods –** high sugar consumption is associated with an increased risk of cholelithiasis.
- **Coffee –** if you have gallstones, it is recommended that you reduce or avoid coffee as it can stimulate gallbladder contractions, which can set off gallbladder attacks.

9 Identify & avoid food intolerances

Food intolerances are correlated with an increased risk of gallstone development. It is believed that eating foods that don't agree with your body can cause swelling of bile ducts, resulting in impaired bile flow from the gallbladder. Therefore, reducing all known food intolerances such as dairy and wheat may help reduce this risk. **(See Appendix for Food Elimination Diet.)**

Nutrition for Pancreatitis

Individuals with SCI have an increased risk of pancreatitis (inflammation of the pancreas) during the acute stage of spinal injury. It is believed that during the initial stages of spinal trauma, sympathetic and parasympathetic imbalances may result in hyperstimulation of the sphincter of Oddi (a valve that allows pancreatic juice to flow from the pancreas into the small intestine). This may lead to a decline or complete stoppage of pancreatic juice from flowing into the intestines, which can cause a backup of secretions, as well as pancreatic damage. Low secretion of pancreatic enzymes can lead to insufficient digestion, production of toxic substances, nutritional deficiencies and allergies.

– Bono, Spinal Cord Medicine Principles and Practice

Symptoms of pancreatic insufficiency:

- Abdominal bloating/discomfort
- Gas
- Indigestion
- Constipation
- Passing of undigested food in stool
- Allergies
- Low immune function
- Vitamin and mineral deficiencies

1 Take pancreatic enzymes supplements

These contain the enzymes amylase, lipase and protease to help digest carbohydrates, fats and proteins. Take them with every main meal.

2 Take pancreatic glandulars

These contain pancreatic tissue to help support this gland.

Nutrition for leaky gut

The multiple gastrointestinal conditions described previously, whether experienced by themselves or in combination with one another, all contribute to poor digestion. When individuals with SCI have digestive dysfunction of any kind, they are at risk of developing a condition called “leaky gut”, which refers to increased intestinal permeability.

A healthy intestinal lining is extremely tight-knit allowing only properly digested food particles to pass through it and be absorbed into your bloodstream. The intestinal lining also acts as a barrier to keep out harmful bacteria and other unwanted substances. However, when the intestinal lining is irritated and/or inflamed due to conditions such as stress, low HCL, diets high in processed foods, and chronic use of NSAIDs, these tight-knit junctions form gaps, allowing larger molecules of food and other undesirable substances, like bacteria to “leak” into your bloodstream.

You might not think that a slightly undigested food particle leaking into the blood would be a problem, but it is. When abnormally large food molecules enter your bloodstream, they can contribute to:

- Severe digestive distress
- Your immune system interpreting these substances as foreign and initiating an allergic response
- Irritation, inflammation and tissue damage in other areas of your body
- Autoimmune conditions

Leaky gut is associated with the following conditions: malabsorption, food sensitivities, arthritis, allergies, Crohn’s disease, celiac disease, asthma, bronchitis, eczema, psoriasis, irritable bowel syndrome & inflammatory joint disease.

Symptoms of leaky gut

- Abdominal pain
- Diarrhea
- Asthma
- Arthritis
- Chronic joint/muscle pain
- Autoimmune diseases, such as rheumatoid arthritis and lupus
- Recurrent bladder infections
- Muscle pain
- Fuzzy thinking
- Gas
- Constipation
- Indigestion
- Bloating
- Anxiety
- Fatigue
- Skin rashes

Leaky gut also impairs your body’s ability to absorb essential fatty acids, Vitamins A, D, E, B12, folic acid, copper, iron, magnesium, selenium and zinc. In order to restore balance, the following actions are recommended:

1 Take digestive enzymes

These help to ensure that food is digested properly. Take with every main meal.

2 Eat foods high in Vitamins A, C & E

These vitamins help repair your gut. It is important to take additional supplements of all of these as they have powerful reparative properties.

Foods high in Vitamin A include sweet potato, carrots, spinach, kale, red peppers & butternut squash.

Foods high in Vitamin C include broccoli, Brussels sprouts, red/green peppers, strawberries, papaya & pineapple.

Foods high in Vitamin E include sunflower seeds, almonds, olives & olive oil.

3 Take glutamine

This amino acid has an affinity for repairing the intestinal lining.

Fresh cabbage juice contains high amounts of glutamine and can be consumed on a daily basis.

4 Take a multivitamin

Helps ensure all basic nutrient needs are met.

5 Eat good fats

These help repair the intestinal lining and reduce inflammation.

Good fats are found in fish, almonds, walnuts, avocados & flax seeds.

6 Take a high potency probiotic

Good bacteria help restore your intestinal flora balance.

7 Drink slippery elm bark or marshmallow root tea

These herbs help to soothe the damaged gut.

8 Identify & avoid all food intolerances

Complete the Food Elimination Diet (see Appendix).

A leaky gut is raw, inflamed and irritated, and needs time to rest. When all food irritants are eliminated and you give yourself the correct nutrients, your gut has the amazing ability to repair itself within 3 to 5 days. However, if damage is extensive and there are deep gaps formed in your intestinal wall, healing will take longer.

Nutrition for Candida

Candida is an overgrowth of yeast. Individuals with SCI are susceptible to this gastrointestinal condition due to stress, poor diets, antibiotic use, NSAID and steroid use, nutrient deficiencies, weakened immune system, and low HCL, as well as reduced pancreatic enzymes and bile secretions.

Candida is a yeast that harmlessly resides on your skin and in your mouth, as well as in the urogenital and intestinal tracts. When there is a healthy balance of good bacteria in your gut, they assist with the digestion of food and production of vitamins. However, when your balance of good bacteria is destroyed through stress and antibiotic use, etc., yeast can quickly flourish. An overgrowth of yeast can cause infections in your mouth, skin and vagina, and form spider-like structures called myceles, which can penetrate through the intestinal wall and enter your bloodstream.

Mycele damage to the intestinal lining can contribute to the development of leaky gut and all of its associated conditions. When candida colonizes the digestive tract, it can produce toxins that are absorbed into the bloodstream, which can impact your immune system, hormone balance and thought processes. Once in the blood, it can also lead to inflammation and allergic reactions; it can mutate and hide from the immune system, potentially affecting tissues all over your body.

Symptoms of Candida

- Bloating
- Anxiety
- Depression
- Endometriosis
- Fuzzy thinking
- Low blood sugar
- Fatigue
- Gas
- Mood swings
- Coated white tongue
- Vaginitis
- Insomnia
- Bladder infections
- Toe or fingernail fungus
- Indigestion
- Constipation and/or diarrhea
- Chronic sore or scratchy throat
- Chronic infections or rashes
- Chemical and food sensitivities
- Cravings for refined carbohydrates

Antifungal drugs only temporarily destroy yeast overgrowth. Diet can play a critical role in helping to prevent and destroy the overgrowth of this fungus.

1 Eliminate/reduce sugar and foods and drinks that feed yeast

Candida thrives on simple carbohydrates, especially sugar, so candida can cause cravings for bread, wheat, starches, sugar and yeast-containing foods, such as cheese and beer. Eliminating wheat, simple carbohydrates such as sugar, and milk products (milk contains a natural sugar called lactose which also feeds candida) for at least 8-12 weeks is absolutely necessary.

It is advised to avoid the foods in the left-hand columns of the following chart and replace them with the ones in the right-hand columns.

FOODS TO AVOID:		FOODS TO CONSUME:	
• Sugar • Yogurt • Cheese • Quinoa • Barley • Oats • Corn • Buckwheat • Amaranth • Couscous • Fruits • Vinegar • Alcohol	• Milk • Ice cream • Butter • Wheat • Kamut • Rye • Rice • Spelt • Wild rice • Dried fruit • Fruit juice • Yeast-fed breads	• Fish • Chicken • Beef • Eggs • Beets • Asparagus • Sweet potato • Dark green leafy vegetables	• Nuts – almonds, walnuts, pecans, hazelnuts, brazil & macadamia nuts • Seeds – sesame, pumpkin & sunflower seeds • Nut butters – almond & cashew

2 Take probiotics

This will help re-establish a healthy balance of good bacteria in your gut.

Eat fermented foods such as yogurt, miso & sauerkraut and take probiotic supplements.

3 Take a fiber supplement

Fiber helps maintain good bowel function and helps ensure you rid your intestines of toxins produced by the candida.

Psyllium husk and ground flax seeds are good fiber sources.

4 Take a multivitamin

This will help ensure all your nutrient needs are met and help boost your immune system.

5 Eat foods rich in Vitamins A & C

These vitamins help boost your immune system.

Vitamin A-rich foods include sweet potato, spinach, carrots & kale.

Vitamin C-rich foods include papaya, red peppers, broccoli & strawberries.

6 Support your thymus gland

This pink-grey organ lies underneath the top of your breast bone and processes a type of white blood cell known as T-lymphocyte, which helps govern your immunity. Taking thymus glandulars, made from thymus tissue, has shown to be helpful in restoring and enhancing immune function, which can often become compromised when you have candida.

7 Support liver function

Enhancing your detoxification process is a critical factor in addressing candida.
See Chapter 9 on Nutrition for the Liver for optimal liver function.

8 Take natural antifungal agents

After following the dietary recommendations above for a minimum of two weeks, you can then introduce antifungal agents. These are effective at helping kill off yeast. Begin taking low doses of these antifungal substances and then gradually increase the dose over one month to recommended therapeutic dosages.

Garlic, grapefruit seed extract, oil of oregano, thyme oil, the herb Pau d'Arco & caprylic acid (made from coconuts) are all natural antifungal agents.

The recommendations for optimizing HCL, bile and pancreatic secretion also help inhibit the overgrowth of candida. It is recommended that you follow the supplement recommendations for leaky gut in order to help heal your intestinal lining.

Treating the surface symptoms of any gastrointestinal issue may bring temporary relief, but it provides very little in the way of long-term effects because the fundamental imbalance in your body remains unchanged. Addressing the root problem in your gastrointestinal tract through nutrition can help establish a balanced digestive system and help improve your overall health and quality of life.

Quinoa salad

Quinoa is a delicious seed that is very easy to digest. It is gluten-free so it doesn't add extra burden to your intestinal tract. This recipe is great to have for left overs. ***Servings: 8***

Ingredients:

- 1 teaspoon of extra virgin olive oil
- 2 cups of quinoa (well rinsed and drained)
- 1 small zucchini, chopped
- 2 teaspoons of fresh cilantro, chopped
- 1 teaspoon of fresh lemon juice
- Sea salt for taste
- 1 medium onion, peeled and chopped
- 1 teaspoon of freshly grated lemon zest
- 1 3⁄4 cup of low sodium chicken/vegetable stock
- 2 teaspoons of fresh parsley, chopped
- 1 teaspoon of fresh lime juice

Directions:

1. Place olive oil in a large skillet and heat over medium heat, add onion and cook
2. Add quinoa and cook for 5 minutes until grains become slightly toasted (this helps to bring out the flavors)
3. Add stock, lemon zest and zucchini, bring to a boil, then reduce heat and let cook
4. Cover for 20 minutes until a small sprout pops out from the grain (that is when you know it is done)
5. Remove from heat and let stand for 10 minutes
6. Fluff with fork and add cilantro, parsley, lime & lemon juice, and season with sea salt

NUTRITIONAL CONTENT:

Proteins: 8 grams
Carbohydrates: 33 grams
Fats: 3 grams
Calories: 186

Tummy tamer smoothie

This refreshing smoothie contains enzymes, fiber, Omega-3 fats and probiotics. It supports digestion, increases the absorption of nutrients and reduces gas and bloating.
Servings: 1

Ingredients:

- 1 cup of plain Greek yogurt
- 1⁄2 cup of applesauce or cut-up apple
- 1 teaspoon of cinnamon
- 1⁄2 inch of ginger root, grated
- 1 freshly squeezed lime and/or lemon
- 1 tablespoon of ground flax seeds
- 1⁄2 cup of pineapple

Directions:

Place all ingredients in a blender and mix. Add further cinnamon if desired.

NUTRITIONAL CONTENT:

Proteins: 20 grams
Carbohydrates: 37 grams
Fats: 3 grams
Calories: 245

Pureed apple and squash soup

This hearty soup helps regulate digestive function, decreases gas and helps fight off bad bacteria. ***Servings: 4***

Ingredients:

- 2 tablespoons of extra virgin olive oil
- 1 small onion, finely chopped
- 1 apple, cored, peeled and finely chopped (or 1 cup of unsweetened applesauce)
- 1 cup of unsweetened apple cider
- 1 teaspoon of ground ginger
- 1 teaspoon of ground cinnamon
- 3 1⁄2 cups of low sodium vegetable stock
- 3 acorn squash

Directions:

1. Cut squash in half and remove seeds. Bake in an oven at 400F/205C until soft
2. In a large pot, heat oil and cook onion until soft
3. Add apple and apple cider, and cook until apple is soft
4. Add the ginger, cinnamon and vegetable stock and bring to a boil
5. Stir in the baked squash and cook until heated through (about 8 to 10 minutes)
6. Reduce heat and simmer until thickened
7. Puree the mixture and season with salt
8. Serve in bowls and add Greek yogurt to garnish

NUTRITIONAL CONTENT:

Proteins: 3 grams
Carbohydrates: 44 grams
Fats: 0.5 grams
Calories: 266 cal

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Alkalinizing foods	Decreased digestive enzyme activity	Spinach, kale, peas, asparagus, carrots, cabbage, beets, almonds, apple, dates, pear, banana & avocado	NA	NA
Aloe vera	Ulcers	Fresh aloe vera plant: cut off the bottom of one of the leaves and squeeze the juice from the fresh cut leaf into a glass. Add water to the glass and mix until a consistent liquid is formed Drink 10 to 20 minutes before you eat a meal	Start drinking aloe vera gel (approx. 1 teaspoon) 3 to 4 times a day Slowly build this up to 3 or 4 tablespoons, 3 to 4 times a day on an empty stomach Once the pain & bleeding has subsided, continue to take a maintenance dose of 2 tablespoons 2 times a day on an empty stomach to avoid ulcers returning	Consult with your health care professional if you are diabetic or taking diabetic medication, as aloe vera can decrease blood sugar levels Diarrhea caused by the laxative effect of aloe vera can decrease the absorption of many drugs It is recommended that aloe vera should not be taken with conditions such as appendicitis, inflamed intestinal disorder, Crohn's disease and ulcerative colitis or if you are taking antiarrythmic medicine, corticosteroids, licorice, diuretics or drugs with cardiac glycosides Taking an overdose of aloe vera supplements could result in intestinal spasms, dehydration or stomach cramps
Anise seeds	Gas	Can be used in a tea or simply chewed Up to 1 teaspoon a day	NA	Large doses may cause nausea or headaches
Apple cider vinegar	Low HCL	Dilute 1 teaspoon of vinegar in water and drink with each meal If you cannot tolerate the apple cider vinegar drink, you can try freshly squeezed lemon juice and water instead	NA	If you have stomach ulcers or heartburn, this may cause burning. If you experience burning, immediately neutralize the acid by drinking a glass of milk
Caprylic acid	Candida	NA	1000 - 2000 mg a day with food	This is readily absorbed in the intestines, so it is important to take time-release or coated capsules
Choline	Gallbladder	Beef, sardines, chicken, scallops, eggs & turkey	1000 mg a day	Choline in the form of phosphatidylcholine should not be taken by people with depression unless under physician supervision as it can worsen symptoms
Dandelion root tea	Gallbladder	As a tea – drink 2-3 cups a day (1 teaspoon per cup of hot water)	NA	Taking dandelion with antibiotics might decrease the effectiveness of some antibiotics Do not take with potassium (water pills) or lithium based medications People who are allergic to ragweed and related plants (daisies, chrysanthemums, marigolds) are likely to be allergic to dandelion. If you have allergies, be sure to check with your health care provider first before taking dandelion

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Digestive enzymes (containing HCL, bile & enzymes)	Low HCL Decreased digestive enzyme activity GERD Leaky gut Gas/bloating Gallbladder removal Candida Insufficient pancreatic secretion	Juicing fresh fruits and vegetables helps to liberate enzymes from food that can help improve digestion If you can't juice, eat raw fresh fruits and vegetables	Take 1 to 3 pills at every meal **Steps to take when starting digestive enzymes supplement specifically for low HCL:** 1. Take one tablet with one of your main meals – if this does not alleviate symptoms, take 2 digestive enzymes at next main meal 2. Continue to increase the dose until you have reached seven tablets or until you feel a warmth in your stomach – whichever comes first. A feeling of warmth in the stomach means that you have taken too much HCL for that meal and you need to take one less at next meal 3. Continue with this until you get the warm feeling in the stomach and continue to drop by 1 pill again	If you experience burning, this indicates you now have too much stomach acid; cut back by one pill Look for digestive enzyme capsules containing at least three basic enzymes: amylase, protease and lipase Stomach acid supplements should never be taken in the presence of an ulcer
DGL licorice	Ulcers	This does not refer to licorice candy	DGL licorice is a special extract of the licorice root Take 380 mg tablets between meals, 2-4 pills a day Chewable tablets are shown to be the best form of DGL, as it works better when mixed with saliva	Do not use if you have high blood pressure
Omega-3 essential fatty acids	Ulcers Gallbladder Leaky gut GERD Candida	Ground flax seeds, flaxseed oil, walnuts, sardines, salmon, mackerel, tuna, anchovies & halibut	Fish or flaxseed oil: 2-4 1000 mg capsules or tablespoons of flax or fish oil a day in divided doses	Omega 3 has blood thinning properties. Consult with your health care professional if you are on blood thinning medication. Stop taking 2 weeks prior to surgery Fish oils can increase the risk of mania in patients with bipolar disorder People who have hypersensitivities or allergies to fish or shellfish may also be allergic to fish oil supplements. Signs of an allergic reaction include a rash or hives, difficulty breathing and swelling of the throat, face or mouth. An allergic reaction to fish oil should be considered a medical emergency
Fennel seeds	Gas	Can be used in tea or simply chewed 1 teaspoon a day	NA	Fennel may mimic the action of a hormone called estrogen when used medicinally. For this reason, people with hormone-sensitive health conditions, such as uterine fibroids, endometriosis and reproductive cancers, should not take fennel People allergic to plant members of the Apiaceae family, including mugwort, carrots and celery, should not take fennel

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Fiber - Insoluble	Overall healthy digestion Peristalsis	Insoluble fiber – Wheat bran, oats, brown rice, whole grains, vegetables with skin on, broccoli, spinach & carrots	1-2 tablespoons whole husk psyllium a day	Always consume fiber supplements with a glass of water When you increase dietary fiber, it may initially cause gas and bloating until the body adjusts Fiber may interfere with absorption of medications and supplements, and therefore it is best to take 2 hours apart
- Soluble	Gallbladder GERD Candida Ulcers	Soluble fiber – Oats, apples, pears, berries, beans, peas, lentils, squash & avocados	1-2 tablespoons of ground flax seed a day	Do not exceed 30 grams of fiber a day Fiber supplements in pill form should not be taken by people with esophageal disorders as the fiber can expand and cause obstruction Individuals who have had bowel spasms, history of colitis or inflammatory bowel diseases should use caution when taking fiber supplements
Flavonoids	Ulcers	Dark berries, apples, red grapes, spinach, tomatoes, red onions, red peppers & eggplant	2000-3000 mg a day	The flavonoid quercetin may interfere with antibiotics
Food enzymes	Impaired digestion and absorption Decreased enzyme activity	Raw fruits and vegetables especially pineapple, papaya, avocado, banana, grapes, mangoes, olives, dates & raw honey	1-2 plant enzymes with every main meal	Do not take in the presence of peptic ulcers
Garlic	Candida	1-2 raw garlic cloves a day	10 mg allicin a day	Check with your health care professional if you are taking blood thinning medications or protease inhibitors before taking garlic supplements
Ginger root tea	Gas/bloating	Add a few slices of ginger root to a cup of hot water. Let steep for 10 minutes and drink or add to juices	NA	Ginger may interfere with or enhance the effects of blood thinners, barbiturates, beta-blockers, insulin and other diabetic medications Due to blood thinning properties, it should not be taken before surgery Should not be taken if you have kidney disease Can be irritating to the intestinal mucosa, so should be taken with or just after meals
Glutamine (amino acid)	Ulcers Leaky gut Candida GERD	Chicken, eggs, fish & cabbage Fresh cabbage juice – 1 litre a day for two weeks	5-40 g a day for 4 weeks Best to take on an empty stomach with juice as amino acids compete for absorption	Large doses can soften stool. Take smaller doses first and build from there You should not supplement if you have hyper ammonemia, liver or renal failure It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Grapefruit seed extract	Candida	NA	Day 1-3: 125 mg capsule 2 times a day Day 4-10: 125 mg capsule 3 times a day Day 11-28: 125 mg capsule 2 pills, 2-3 times a day	May cause headaches, itchiness, dry scalp, dizziness, nausea, abdominal pain, cough or sore throat Do not use if you are on blood thinning medications May cause allergic reactions – seek medical attention if you experience trouble breathing, rash or swelling of the mouth

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Lecithin	Gallbladder	Eggs & beef liver	100 mg capsule 3 times a day	May cause nausea, diarrhea and pain in the abdomen Do not take lecithin supplements if you are allergic to eggs or soy
Multivitamin	Candida Leaky gut	Eat a wholesome diet of fresh fruits, vegetables, eggs, nuts/seeds, fish, legumes & meat	As directed on label	May cause nausea
Marshmallow Root tea	Ulcers GERD	1 to 2 teaspoons of dried herb in 1 cup of boiled water, then steep for 10 minutes	NA	Marshmallow root may reduce blood sugar levels and/or have diuretic effects. Consult with a physician before taking marshmallow root supplements if you take blood thinning, diuretic or diabetic medications Marshmallow root may slow the absorption of medications or other supplements you may be taking. Therefore take several hours before or after taking other drugs or herbal remedies Stop taking marshmallow root at least 2 weeks before a scheduled surgery
Meadowsweet tea	Ulcers GERD	1 to 2 teaspoons of dried herb in 1 cup of boiled water, let steep for 10 minutes	NA	May increase effects of aspirin and other pain medications
Methionine	Gallbladder	Chicken, eggs, tuna, halibut & yogurt	1000 mg a day Best to take on an empty stomach with juice as amino acids compete for absorption	Do not use if you have cardiovascular disease or acidosis It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Milk thistle (Silybum merianum)	Gallbladder	NA	70 to 210 mg capsules of milk thistle 3 times a day before meals	Consult with your health care professional if you are taking the following medications: antipsychotics, antihistamines, cholesterol lowering medications, antianxiety, antiplatelet and anticoagulant drugs (blood thinners), oral contraceptives or cancer drugs May lower blood glucose levels. Those with diabetes on diabetic medication should have their blood glucose monitored
Oats	Ulcers	1⁄2 cup a day soaked steel-cut or rolled oats (avoid instant oatmeal as this is usually higher in sugar and contains less fiber)	NA	NA
Oil of oregano	Candida	NA	0.2 to 0.4 ml twice a day between meals, dilute with 1 cup of water	Side effects may include warm/burning sensation, upset stomach if the oil is not properly diluted in water, allergies or vomiting It may also inhibit the absorption of iron, therefore, if you are taking iron supplements, speak to your health care professional first before taking
Pancreatic glandular	Pancreatitis	NA	250 mg capsule 3 times a day	Look for glandulars that is freeze-dried, de-fatted (toxins removed from fat) and that have not used chemicals and heat in the processing

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Pau d'Arco	Candida	NA	500 mg capsules 2 pills 2-3 times a day	Can cause dizziness, nausea, vomiting and diarrhea Can interact with bloodthinning medications, It may also increase the risk of bleeding in people with hemophilia or other clotting disorders
Peppermint	Gas/bloating	Use fresh leaves to make as a tea or in a juice	NA	May cause lower esophageal sphincter to relax and contribute to heartburn/GERD
Probiotics	Overall Digestion GERD Ulcers Leaky gut Candida Gas/bloating	Fermented foods such as yogurt, kefir, sauerkraut, pickled foods, tempeh & miso	1-2 capsules a day on empty stomach at bedtime	If you are taking antibiotics you can take probiotics, but just ensure that they are consumed 2 hours apart. If you have completed a course of antibiotics you will need to continue probiotics for at least 2-3 months When purchasing a probiotics, make sure you look for the following: • Contains a minimum of 8 billion active micro-organisms • Contain at least several types of bacteria including Lactobacillus acidophilus and Bifidobacterium bifidus • Freeze-dried probiotics as this keeps the flora dormant until it enters your body • Keep stored in the fridge
Slippery elm bark	Ulcers GERD Leaky gut	Simmer 1 teaspoon in 2 cups of hot water for 20 minutes, strain and then drink	2-4 capsules 3 times a day for 3 weeks	If you are allergic to any type of elm tree, you should not take this supplement Take 2 hours away from medications as it can decrease the effectiveness of the medication
Thymus glandular	Candida	NA	125 mg capsule 3 times a day	Thymus extract may increase the effectiveness of antibiotics Do not use with autoimmune conditions or those taking antirejection, corticosteroid, or immune-suppressant medications Thymus extract may play a role in immunological disorders associated with stress and anxiety. Caution is advised in patients taking anxiolytics due to possible additive effects Thymus extract in conjunction with bronchodilators may have additive effects Caution is advised in patients with heart problems
Vitamin A	Ulcers GERD Leaky gut Candida	Sweet potato, carrots, red peppers, squash, spinach & kale	5 000 – 10 000 IU a day with food The synthetic forms of Vitamin A such as palmitate or acetate have a potential to produce toxic symptoms	Woman who are sexually active or of child-bearing age should not use high doses (over 10 000 IU) of Vitamin A due to risk of birth defects. Doses over 10 000 IU should be done under the supervision of your health care professional
Vitamin C	Ulcers Leaky gut Candida GERD Gallstones	Papaya, bell peppers, broccoli, Brussels sprouts, kale, kiwi, strawberries & pineapple	2000 - 3000 mg a day with food Buffered forms of Vitamin C are easier on the stomach Taking Vitamin C with bioflavonoids will help increase absorption	Sulfa antibiotics increase elimination of Vitamin C from the body High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood thinning medication as Vitamin C can act as a natural blood thinner

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Vitamin E	Ulcers GERD Leaky gut Candida Gallstones	Sunflower seeds, almonds, pine nuts, olives, spinach, blueberries & Swiss chard	800 IU a day for ulcers, GERD, leaky gut & candida 200 – 400 IU a day for gallstones Best taken with food Best form to take is with mixed tocopherols including D alpha-tocopherol, tocotrinols and succinate Do not use synthetic form dl-alpha-tocopherol as it acts very differently in the body	If you have heart disease or diabetes, do not take doses over 400 IU a day This is a natural blood thinner, so consult your health care professional first if you are taking blood-thinning medications or if you have a bleeding disorder Stop taking this supplement 2 weeks before surgery Prolonged and high level intakes of Vitamin E greater than 1500 IU a day can actually be detrimental to the immune system
Water	Muscle relaxant use Ulcers Peristalsis Digestion Low HCL	Drink a minimum of 6 to 8 glasses of water every day	NA	Try to drink filtered water, which has had toxins and other impurities removed (preferably carbon or reverse osmosis filter systems) Avoid distilled water, which can leach minerals from the body Avoid water stored in plastic bottles, which can leach chemicals into the water, potentially disrupting hormone balances
Zinc	Ulcers GERD Leaky gut Candida	Sesame seeds, pumpkin seeds, oats & yogurt	50-100 mg in divided doses a day with food Best absorption forms include: zinc picolinate, acetate, citrate, glycerate and monomethionine Poor absorption forms include: zinc oxide and zinc sulphate	Take in divided doses during the day to prevent possible nausea Consult with your health care professional first if you have high cholesterol Higher doses of zinc (greater than 100 to 300 mg a day) can impair the immune system and may lead to a copper deficiency

CHAPTER 2

Nutrition for Neurogenic Bowel

Nutrition for Constipation

1. Eat 19-30 grams of fiber a day
2. Drink 8-10 cups of water/fluid a day
3. Eat good fats
4. Take probiotics
5. Eat magnesium-rich foods
6. Eat 4-5 small meals a day
7. Try natural bowel aids

Nutrition for Hemorrhoids

1. Reduce constipation
2. Eat flavonoid-rich foods
3. Eat foods rich in Vitamin C
4. Take the supplement horse chestnut

Nutrition for Diverticula/Diverticulitis

1. Reduce constipation
2. Take probiotics
3. Eat garlic
4. Boost your immune system
5. Take glutamine supplements
6. Eat good fats
7. Drink anti-inflammatory juices & teas

Nutrition for Diarrhea

1. Take a fiber supplement every day
2. Take probiotics
3. Drink 8 cups of water/fluid a day
4. Avoid foods, medications & additives that contribute to diarrhea

SCI & Neurogenic Bowel

Anyone who has a neurogenic bowel knows it can cause a lot of stress and contribute to many complications, such as:

- Abdominal bloating/pain
- Excessive gas
- Constipation
- Diarrhea
- Bowel accidents
- Prolonged bowel transit time and elimination
- Incomplete emptying of the bowel
- Megacolon (excessive stretching of the colon)
- Bowel obstruction

Some of these conditions may, in turn, lead to additional complications, such as:

- Diverticula/Diverticulitis
- Hemorrhoids
- Increased spasticity
- Intestinal perforation
- Autonomic dysreflexia
- Colorectal cancer (the incidence is 2 to 6 times higher amongst the SCI population)

To help reduce these risks, it is imperative that you establish an effective bowel routine as early and as naturally as possible.

80%

Approximately 80% of individuals with SCI experience one or more bowel complications.

Neurogenic bowel function tends to worsen over time.

1 to 5 Hours

People with SCI can spend anywhere from 1 to 5 hours a day on their bowel programs and still have incomplete emptying of their bowel.

The overwhelming fear of bowel accidents may also prevent people from working, traveling, socializing and participating in other activities outside the home.

This chapter will discuss the four main SCI-related neurogenic bowel concerns: constipation, diarrhea, hemorrhoids and diverticula/diverticulitis. As you read the following pages, you will discover the critical role diet plays in helping you effectively manage and regain control over your bowel.

SCI Bowel Management

Peristalsis is the involuntary muscular contraction that moves digested food through the intestines.

Spinal cord injury (SCI) alters your peristalsis. Ideally, for able-bodied people, food should pass through the body 18-24 hours after eating a meal. However, for individuals with SCI, bowel transit time is reported to be up to twice as long.

Regular bowel movements are important to remove toxins from your body. If waste is sitting in your colon for more than 24 hours, there is more time for cholesterol and hormones to be reabsorbed back into your blood stream, and you are at greater risk of developing constipation, gas, hemorrhoids, diverticula/diverticulitis, colon distension and a buildup of toxins in the colon (intestinal toxemia).

Standard bowel management for individuals with SCI often includes a combination of pharmacological and non-pharmacological approaches, such as using stool softeners, laxatives, rectal suppositories, enemas and/or digital stimulation. However, regularly scheduled bowel routines using pharmacological aids are not always successful and may become less effective over time. They can also deplete minerals from your body, lead to dehydration, and can cause the bowel to become lazy and dependent on these medications.

TYPES OF LAXATIVES COMMONLY USED:

Bulking Agents

Bulking agents include oat bran and psyllium fiber. These can increase fecal water content and increase stool volume and softness, which can improve evacuation. There are no negative side effects with these substances.

Stimulant laxatives (oral & suppository)

Stimulant laxatives include bisacodyl, ducolax and senokot. These stimulants make the colon contract more forcefully, increasing the wave-like action of peristalsis.

There are several negative side effects of using these types of laxatives, such as excess production of mucus in the intestine, abdominal cramping, diarrhea, dehydration and electrolyte imbalances. Chronic use of stimulant laxatives can also result in the bowel becoming lazy and less responsive.

Osmotic Agents

Osmotic agents include lactulose and sorbitol. These agents draw fluid into the colon, helping to improve stool consistency and also stimulate bowel activity. While there is no tolerance buildup with these, they can cause cramping and liquefy stools, which can lead to problems with incontinence. Lactulose can cause gas, nausea and/or vomiting.

Stool softeners

Osmotic stool softeners such as docusate sodium help with the absorption of water to form softer stool, which is more easily evacuated. These softeners have no impact on the movement of stool through the digestive system or stool volume.

The side effects of stool softeners include the depletion of certain minerals such as calcium, sodium and potassium. They can also irritate the mucosal lining of the intestinal wall, which can cause dehydration.

The goal in managing a neurogenic bowel is to keep your stool soft, well formed, and moving through the intestine as easily as possible while avoiding bowel accidents.

Although not traditionally considered or included as part of SCI bowel routines, diet is a critical component in achieving these goals. **What and when you eat and how much fluid you drink can make the difference between a good bowel routine and a disastrous one.**

Eating specific foods and using natural stool softeners and laxatives can help you maintain control over your elimination function, prevent many of the common SCI-related bowel issues from occurring, and eliminate the negative side effects associated with many over-the-counter laxatives.

SCI & Constipation

Constipation is the main gastrointestinal complaint after SCI. It can be the result of one or a combination of the following:

- **Low fiber intake**
- **Low water intake**
- **Eating too many refined and processed foods (white bread/pasta, pastries, cookies, etc.)**
- **High protein intake**
- **Loss of bowel sensation**
- **Loss of voluntary control of defecation**
- **Altered peristalsis**
- **Side effects of medication**
  - Anticholinergic drugs, often used by individuals with SCI to address bladder function may contribute to increased constipation, as they cause the stool to become dry and increase the time it takes for stool to be evacuated.
  - Pain medications, antidepressants, antacids that contain aluminum, diuretics, antispasmodics, blood pressure medications, chronic use of laxatives, iron supplements, and a high intake of calcium supplements can also contribute to constipation.

Due to decreased sensation, many people with SCI can be constipated and not even know it. Here are some symptoms to help you determine if you may be constipated:

- Pebble-like stool
- Pain in the abdomen
- Hard or swollen lower abdomen
- Loss of appetite
- Headaches
- Nausea
- Sweating
- Autonomic dysreflexia
- Bowel accidents

Diarrhea can be a symptom of constipation

When stools become severely compacted, as can happen more easily in individuals with SCI, your body will try and get rid of the stool by liquefying it, causing diarrhea and potential bowel accidents.

It is not uncommon for individuals with SCI to intentionally try to constipate themselves by severely limiting their food and fluid intake and taking antidiarrhea medications in order to avoid bowel accidents. Constipation does not protect against bowel accidents; in fact, it can make them worse.

It is vital that you try to prevent and manage constipation as much as possible because there are many negative side effects associated with it, such as:

- Fermentation and putrefaction of undigested carbohydrates and proteins. This can not only create gas but also produce tissue-damaging free radicals
- Enabling bad bacteria to replace good intestinal bacteria, which can contribute to the accumulation of toxins
- Reabsorbing hormones back into the blood stream, potentially contributing to hormonal imbalances
- Irritating the lining of your colon
- Placing more burden on your liver, skin, kidneys, lungs and lymphatic system to work harder to break down and eliminate toxins
- Increasing the risk of developing hemorrhoids and diverticula/diverticulitis

By-products of decaying food in your colon are also likely to be absorbed through the bowel wall into the bloodstream, leading to autointoxication, which means your body absorbs too much of its own waste and toxins. When this happens, these toxins accumulate in your body and can result in your cells being unable to function properly. **Autointoxication can also contribute to: body odor, fatigue, headaches, bad breath, skin problems, irritability, depression and reduced concentration & memory.**

Nutrition for Constipation

1 Eat 19-30 grams of fiber a day

Fiber is critical for the proper functioning of your large intestine and can help prevent or reverse constipation. Fiber absorbs water, provides bulk to your stool, and makes your stool more slippery, soft and pliable, which makes bowel evacuation easier.

There are two main types of fiber and you need both to help prevent constipation and improve bowel function.

SOLUBLE FIBER
Soluble fiber forms a gel-like substance that helps prevent and alleviate constipation by making stool softer, moister and more pliable.

Good food sources of soluble fiber include: barley, beans, peas, oats, apples, apricots, bananas, berries, figs, grapes, prunes, peaches & pears.

INSOLUBLE FIBER
Insoluble fiber passes through the intestine relatively unchanged and adds bulk to stools which can help push matter through your colon and relieve constipation.

Good food sources of insoluble fiber include: seeds, whole grains and the skins of many fruits & vegetables such as sweet potatoes.

INCREASING FIBER

Increasing the intake of fiber in able-bodied individuals helps to increase the weight and volume of the stool, propel the stool through the intestine and increase frequency of bowel movements. Recommended daily fiber intake for able-bodied individuals is 35-50 grams a day.

However, studies show that increasing fiber in the diets of individuals with SCI does not have the same effect on bowel function as it does for people without SCI.

Increasing fiber intake above 30 grams a day in the diets of individuals with SCI can actually slow bowel transit time further.

Cameron, Nyulasi, Collier & Brown, 1996

Studies show that individuals with SCI who eat 19-30 grams of fiber a day:

- **decrease their bowel transit time**
- **increase the amount of stool being passed during bowel care routines, and**
- **create better stool consistency to help prevent bowel accidents**

Cameron, Nyulasi, Collier & Brown, 1996

NOTE: Eating less than 18 grams more than 30 grams of fiber a day can increase bowel transit time.

Fiber Content in Foods

Food	Amount	Grams of Fiber
Brown Rice	1/2 cup	1.3 grams
Brussels sprouts	1/2 cup	2.0 grams
Blueberries	1/2 cup	2.0 grams
Spinach	1/2 cup	2.1 grams
Carrots	1/2 cup	2.5 grams
Broccoli	1/2 cup	2.5 grams
Bananas	1 large	2.5 grams
Quinoa	1/2 cup	2.6 grams
Sweet potato	1/2 cup	3.0 grams
Prunes	3 prunes	3.0 grams
Winter squash	1/2 cup	3.0 grams
Apple with skin	1 medium	4.0 grams
Pear with skin	1 medium	4.0 grams
Oatmeal	1/2 cup	4.1 grams
Lentils	1/2 cup	4.2 grams
Peas	1/2 cup	4.7 grams
Baked beans	1/2 cup	6.5 grams
Lima beans	1/2 cup	6.5 grams
Chick peas	1/2 cup	7.0 grams
Kidney beans	1/2 cup	8.0 grams
Barley	1/2 cup	8.0 grams

Foods that contribute to constipation:

- High protein diets – there is no fiber in protein (meat, fish, poultry & eggs)
- Dairy products (milk and cheese)

Be sure to balance meals containing these foods with fiber-rich foods!

Avoid highly processed carbohydrates such as white bread, white pasta, white rice and crackers, as these contain very little fiber and can slow down the speed at which food passes through your digestive tract, thereby contributing to constipation.

FACT:
Processed white bread (which contains very little fiber) was used in the 1800s to actually stop diarrhea because it was so effective at congesting the colon!

Fiber supplements

If you know you are not eating enough fiber-rich foods, you can take fiber supplements. The following natural fiber supplements absorb water, helping to soften and bulk up your stool. This helps to reduce constipation without any of the side effects associated with laxatives.

- **Whole husk psyllium**
- **Ground flax seeds**
- **Ground chia seeds**
- **Apple pectin**

Over time, you may find that as you slowly change your eating habits and increase your dietary intake of fiber through foods, you may no longer need fiber supplements like psyllium, flax or apple pectin.

Always take fiber supplements 2 hours before or after other medications, vitamin or mineral supplements, as fiber can absorb these substances which are then eliminated from the body; as a result, the effectiveness of the fiber supplement is reduced.

2 Drink 8-10 cups of water/fluid a day

Your large intestine is responsible for reabsorbing excess water out of digested matter and putting it back into your body. When you are dehydrated, your body will remove more water from your colon in order to serve other bodily functions, resulting in more solid stools which are harder to pass.

Drinking 8-10 cups of healthy fluids such as water, herbal teas, diluted juices and broths are an important part of avoiding constipation and maintaining a good bowel program. It is also important to limit alcohol, coffee and soda, which are diuretics and can contribute to dehydration.

– Mayo Clinic Guide to Living with a Spinal Cord Injury, 2009

3 Eat good fats

Healthy fats such as omega-3 can help lubricate your bowel and soften hardened stool. Good fats act as natural stool softeners, without the negative side effects of pharmaceutical ones.

Good fat foods include ground flax seed oil & fish oils.

4 Take probiotics

Trillions of bacteria live in your large intestine and assist with proper bowel function. Two major strains of probiotics (good bacteria) that live here are called Lactobacillus acidophilus and Bifidobacterium. These good bacteria ferment fiber found in your digested matter to produce fuel for the cells of your colon, thus helping maintain the health and function of your bowel.

A healthy balance of good bacteria in your large intestine can also enhance peristalsis and help prevent constipation. Constipation disrupts your intestinal bacterial balance, so if you are already constipated or want to prevent it, it is recommended that you provide your large intestine with a good supply of probiotics, either from foods or by taking a probiotic supplement.

Foods that contain probiotics include: kefir, plain unsweetened yogurt, sauerkraut, miso, tempeh & pickled foods.

It is best to take probiotic supplements that contain Lactobacillus acidophilus & Bifidobacterium.

5 Eat magnesium-rich foods

This mineral can be used as a natural laxative because it helps relax intestinal muscles to move stool through your colon.

Good sources of magnesium-rich foods include: bran, sunflower seeds, sesame seeds, black beans & quinoa.

6 Eat 4-5 small meals a day

In able-bodied individuals, eating stimulates the gastrocolic reflex, which promotes defecation. Studies show some individuals with SCI retain this response after eating meals, but the response may be less intense than pre-injury (this reflex is usually absent in individuals with complete SCI injuries). So eating more frequent meals throughout the day can help to stimulate the gastrocolic reflex and the elimination of stool. Take advantage of this gastrocolic reflex as much as possible and start your bowel routine 30 minutes after consuming a meal or warm drink.

Eating smaller, more frequent meals can also stimulate peristalsis, which can help improve bowel transit time.

7 Try natural bowel aids

Bran
Eating oat/wheat bran every day can be very effective at helping to alleviate constipation. Stay away from highly processed bran cereals that contain a lot of sugar and/or salt.

Cascara sagrada
This natural herb has a laxative effect by encouraging peristalsis and helping to relax muscles of the digestive system.

Vitamin C
Vitamin C supplements in large doses (2000 mg a day or more) can help soften stool.

Fresh ginger tea
Ginger tea helps stimulate the digestive system and eases the passage of food through the intestines.

Garlic
Garlic helps destroy harmful bacteria in the colon, which can contribute to constipation.

Licorice root
This root has a natural laxative effect.

Prunes & Apricots
Prunes and apricots can have a laxative effect on your bowels. It is important to note that the body can develop a tolerance to prunes and they can lose their effectiveness over time if you eat them too regularly.

After my motorcycle accident in 2008, I had chronic problems with constipation and hemorrhoids. I run my own business and don't have the time or energy to be worrying about or dealing with prolonged bowel routines. Once I started eating oatmeal for breakfast every other day and taking daily fish oils and probiotics supplements, my bowel routines and hemorrhoids improved, allowing me to focus on my work.

David, T4-5-6 paraplegic

Nutrition for Hemorrhoids

Hemorrhoids, the swelling of veins in the rectum and around the anus, are prevalent among individuals with SCI.

It is believed that the high incidence of hemorrhoids is due to chronic constipation (which intensifies pressure and weakens the veins in the rectal area), prolonged sitting, straining, irritation through repeated digital stimulation and/or use of suppositories or enemas. When the veins in your rectal area are exposed to prolonged pressure and weaken, they lose their elasticity, resulting in sac-like protrusions. A major sign of hemorrhoids for individuals with SCI is bleeding during your bowel management program.

1 Reduce constipation

There is a strong correlation between constipation and hemorrhoid development, so preventing constipation by following the recommendations outlined in the **Constipation** section of this chapter is one of the best ways to reduce your risk of developing them.

Individuals with SCI cannot avoid the other risk factors that contribute to the development of hemorrhoids, such as prolonged sitting and, in some cases, digital stimulation and use of suppositories. So even without constipation, hemorrhoids may still develop. There are, however, many natural substances such as the ones listed below that can help strengthen your veins and help prevent the development and recurrence of hemorrhoids.

2 Eat flavonoid-rich foods

Flavonoids are what give plants their vibrant colors. They have been shown to relieve hemorrhoids by strengthening veins. There are over 6000 different flavonoids, and one in particular called hydroxyethylrutosides (HER) has been shown to be effective at addressing hemorrhoids.

Flavonoid-rich foods include strawberries, blueberries, blackberries, oranges, black beans, red peppers & tomatoes.

3 Eat foods rich in Vitamin C

Vitamin C also helps increase the strength of blood vessels to help prevent hemorrhoids from rupturing. This vitamin also helps with the healing process.

Eat dark berries of all types, as well as broccoli, Brussels sprouts, kale and red/green peppers, which all have high amounts of Vitamin C and flavonoids.

4 Take the supplement horse chestnut

Horse Chestnut
This herb can help tone your blood vessels, improve elasticity of your veins and reduce inflammation.

This can be taken in supplement form.

Nutrition for Diverticula/Diverticulitis

Diverticula are sacs or pouches that form in the colon wall. It is documented that diverticula develop more rapidly after SCI. Decreased physical activity and lack of fiber are associated with the development of diverticula. Constipation, holding back bowel movements, or straining can raise intestinal pressure also causing pouches to form at weak points in the wall of the colon.

Once diverticula form, there is no way to get rid of them, but they won't necessarily cause problems unless they become infected and inflamed, which is usually as a result of waste matter getting trapped in the sacs. This condition is known as diverticulitis.

Symptoms of Diverticulitis include: fever, chills, nausea, diarrhea, constipation, bloody stools or abdominal tenderness and/or bloating.

Here are some specific things you can do to reduce your risk of developing diverticula and address diverticulitis:

1 Reduce constipation

There is a strong correlation between constipation and diverticula. Therefore, one of the best ways to reduce your risk of developing them is to reduce the risk of constipation. (See **Constipation** section at the beginning of this chapter.)

During a diverticulitis flare-up, there are many natural substances that can help you address the infection and inflammation. See below (2-7).

2 Take probiotics

Good bacteria help boost your immune system and fight infection. Try to find probiotics that contain the Bifidobacterium strain, as these are the ones that primarily reside in your large intestine.

3 Eat garlic

Garlic helps destroy unwanted bacteria without harming your good bacteria. It also has beneficial healing properties.

4 Boost your immune system

Eating foods rich in Vitamins A, C and E helps boost the immune system, as well as protect and heal the lining of the colon.

Foods that are high in these vitamins include carrots, sweet potato, broccoli, spinach, berries, red peppers, almonds, olives & sunflower seeds.

5 Take glutamine supplements

This amino acid is highly effective at helping promote a healthy digestive tract.

You can get glutamine from fresh cabbage juice, chicken, eggs, or in supplement form.

6 Eat good fats

Good fats such as omega-3 help reduce inflammation and protect cells in the lining of the colon wall.

Good fats include fresh fish, ground flax seeds & walnuts.

7 Drink anti-inflammatory juices & teas

Aloe Vera
Drinking this as a juice is an effective method to help reduce inflammation and soothe mucous membranes. Aloe vera has also been shown to help reduce pain and stimulate the immune system to fight infection by increasing white blood cell activity. It also contains enzymes to break down toxins.

Marshmallow Root Tea
This herb has soothing properties to an inflamed intestinal lining.

Diverticulitis and Fiber Intake

If you have diverticulitis, avoid fiber supplements as they can be highly irritating to the colon wall. When the diverticulitis inflammation subsides, you can resume eating a high fiber diet and taking fiber supplements.

A good fiber choice is ground flax seeds. They are not irritating to the intestinal lining and can help prevent constipation and infection.

Nutrition for Diarrhea

Many people with neurogenic bowel experience uncontrollable diarrhea, or alternating diarrhea and constipation. If the waste matter in your colon passes through too quickly, water is not absorbed back into your body, thus causing diarrhea. Chronic diarrhea is a serious condition because it can cause dehydration and loss of electrolytes (sodium and potassium).

One of the biggest contributors to diarrhea is antibiotic consumption, which upsets the balance of healthy bacteria in the large intestine. Antibiotics are often taken on a long-term basis by people with SCI to treat pressure sores and/or recurring bladder and respiratory infections. Other contributing factors can be constipation and the overuse of laxatives. Diet is essential to help prevent and manage loose stools.

1 Take a fiber supplement every day

One of the first things you can do to help improve the consistency of your stool and help prevent bowel accidents is to take a fiber supplement. Many people are afraid to add fiber to their diet because they believe it will make their diarrhea worse; however, fiber helps absorb excess water to keep stools formed.

Adding just 1-2 tbsp. of psyllium husk or pectin (the fiber found in apples and other fruits) to your diet every day can make a big difference.

Eating a bowl of oat bran every day can also help prevent diarrhea.

2 Take probiotics

Lactobacillus acidophilus and Lactobacillus bifidus help prevent and address antibiotic-induced diarrhea. Research supports the use of probiotics while simultaneously taking antibiotics (take the probiotics at a different time of day than your antibiotic). Take a probiotic supplement with a minimum of 15 billion micro-organisms during antibiotic treatment and continue afterwards for 2 to 3 months to repopulate your gut with good bacteria.

3 Drink 8 cups of water/fluid a day

Chronic diarrhea can cause you to lose a lot of water and electrolytes (such as potassium, sodium and chloride) which can make you feel very tired. It's important to replace these fluids by drinking 8 cups of water, diluted fruit and vegetable juices, and herbal teas each day.

Avoid drinking electrolyte sport drinks which also contain a lot of sugar, artificial flavors and colors. Instead, drink unsweetened or pure coconut water, which is a natural source of these electrolyte minerals.

4 Avoid certain foods, medications & additives that can contribute to diarrhea

These include the following:

- Dairy products
- Spicy or greasy foods
- Caffeine
- Antacids that contain magnesium salts
- Sorbitol, mannitol and xylitol
  (sugars found in gum, candies and sweets).

The Nutty Prune Smoothie

This is a great drink to help address constipation. It contains a high amount of fiber and water, and the natural laxative effect of the prunes helps keep things moving. ***Servings: 1***

Ingredients:
- 3 tablespoons of unsweetened apple sauce
- 1 cup of almond milk
- 1 cup of prune juice
- 1 tablespoon of ground flax seeds

Directions:
1. Mix in blender and enjoy

NUTRITIONAL CONTENT:
Proteins: 6 grams
Carbohydrates: 70 grams
Fats: 11 grams
Calories: 384

Summer Bean Salad

This refreshing, quick and easy salad contains lots of fiber to support healthy bowel function.
Servings: 4

Ingredients:
- 2 cups of green beans, ends trimmed
- 1 can of red kidney beans, rinsed and drained
- 1 can of mixed beans, rinsed and drained
- 1 small red onion, chopped
- 2 cups of arugula or your favorite lettuce
- 1 tablespoon of cumin seeds
- Dressing: 2 tablespoons of olive oil

Directions:
1. Fill saucepan with water and bring to boil, add green beans and cook for 1-2 minutes
2. Drain green beans and refresh in iced water till cool, remove and pat dry
3. Place kidney beans and mixed beans in bowl
4. Slice green beans and add them to bean mix with onion and arugula/lettuce
5. Toast cumin in dry pan till seeds begin to brown (this releases the flavor)
6. Add toasted cumin to olive oil. Stir and pour over bean salad

NUTRITIONAL CONTENT PER SERVING:
Proteins: 7.5 grams
Carbohydrates: 22.4 grams
Fats: 12 grams
Calories: 203

Yogurt and Granola Parfait

This is great for breakfast, lunch, snack or as a dessert.
The probiotics in yogurt help to address diarrhea. ***Servings: 1***

Ingredients:
- 1 cup of plain Greek yogurt
- 1⁄4 cup granola
- 1 cup of fresh berries (raspberries, blueberries and/or strawberries)
- Extras: you can add sliced almonds, or 1⁄4 cup of flax seeds

Directions:
1. Place yogurt in bowl
2. Add fruit and sprinkle granola on top

NUTRITIONAL CONTENT:
Proteins: 19.5 grams
Carbohydrates: 43 grams
Fats: 17 grams
Calories: 407

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Aloe vera	Diverticulitis	NA	1-3 tablespoons of juice a day	Consult with your health care professional if you are diabetic or on diabetic medication as aloe vera can decrease blood sugar levels Can cause diarrhea and subsequently decrease the absorption of many drugs It is recommended that aloe vera not be taken with the following conditions: appendicitis, inflamed intestinal disorder, Crohn's disease, and ulcerative colitis, or if you are taking antiarrhythimic medicine, corticosteroids, licorice, diuretics or drugs with cardiac glycosides Taking an overdose of aloe vera supplements could result in intestinal spasms, dehydration or stomach cramps
Apricots	Constipation	Eat 2 dried organic apricots daily or 1 glass of juice every morning on an empty stomach to help prevent constipation	NA	Everyone responds to apricots differently, so you may need to experiment with how much you need to get relief and maintain regular bowel routines Buy sulfite-free apricots
Bran	Constipation	1⁄2 cup of 100% unrefined bran cereal or 1 homemade bran muffin a day	NA	Everyone responds to bran differently, so you may need to experiment with how much to take to maintain regular bowel routines Increase the amount in your diet slowly to avoid excessive bloating
Cascara sagrada	Constipation	NA	300 mg capsule or 1 teaspoon of liquid form at bedtime Cascara sagrada should not be used any longer than 5 to 7 days in succession	Always start with a low dose and increase as needed, depending on the reaction to the herb. Drink plenty of water with each dose Not recommended if you have: appendicitis, stomach or intestine blockage, diverticulitis, ulcerative colitis, severe hemorrhoids, congestive heart failure, heart disease, severe anemia, abdominal hernia, liver or kidney disease, recent abdominal or colon surgery, or if you have uncontrolled bowel movements
Coconut water	Diarrhea	Coconut water	8-16 oz. a day	People with high blood pressure, heart disease or any other condition that requires them to follow a low-sodium diet should be aware that coconut water is high in sodium and factor this into their daily sodium allowance It is recommended that diabetics and others watching their sugar intake read labels carefully as some products have high amounts of added sugar
Omega-3 essential fatty acids	Constipation Hemorrhoids Diverticulitis	Salmon, sardines, walnuts, tuna, halibut, ground flax seeds & fish oils	Fish or flax seed: 2-4, 1000 mg capsules or tablespoons of flax or fish oil a day in divided doses	Omega-3 has blood thinning properties. Consult with your health care professional if you are on blood thinning medication. Stop taking 2 weeks prior to surgery Fish oil can increase the risk of mania in patients with bipolar disorder People who have hypersensitivities or allergies to fish or shellfish may also be allergic to fish oil supplements. Signs of an allergic reaction include a rash or hives, difficulty breathing & swelling of the throat, face or mouth. An allergic reaction to fish oil should be considered a medical emergency

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Fiber	Constipation – both soluble and insoluble Hemorrhoids – both soluble and insoluble Diarrhea – soluble Diverticulitis – soluble	Insoluble Fiber – Wheat bran, brown rice, whole grains, vegetables with skin on, broccoli, spinach & carrots Soluble Fiber – Oats, apples, pears, berries, beans, lentils, peas, apricots, berries, & prunes	Insoluble Fiber – 1-2 tablespoons a day of whole husk psyllium Soluble Fiber – 1-2 tablespoons a day of ground flax seeds or apple pectin	Always consume fiber supplements with a glass of water When you increase dietary fiber, it may initially cause gas and bloating until the body adjusts Fiber may interfere with absorption of medications and supplements, and therefore it is best to take two hours apart Do not exceed 30 grams of fiber a day Fiber supplements in pill form should not be taken by people with esophageal disorders as the fiber can expand and cause obstruction Individuals who have had bowel spasms, history of colitis or inflammatory bowel disease should use with caution
Flavonoids (HER)	Hemorrhoids	Dark berries, red apples, red peppers, tomatoes, eggplant & red onions	Bioflavonoids 3000-6000 mg a day HER 1000-3000 mg a day	The flavonoid quercetin may interfere with antibiotics
Garlic	Constipation	1-2 cloves a day	2 garlic capsules twice a day with meals if you are experiencing chronic constipation	Check with your health care professional if you are taking blood thinning medications or protease inhibitors before taking garlic supplements
Ginger root tea	Constipation	A couple of slices of ginger root in a cup of hot water, steep for 10 minutes and drink Or grate onto salads or add to juices	NA	Ginger may interfere with or enhance the effects of blood thinners, barbiturates, beta-blockers, insulin and other diabetic medications Due to blood thinning properties, it should not be taken before surgery Should not be taken if you have kidney disease Can be irritating to the intestinal mucosa and should be taken with or just after meals
Glutamine (amino acid)	Diverticulitis	Beef, fish, poultry, eggs, parsley, spinach, legumes & cabbage 4 cups of fresh cabbage juice a day for two weeks	5-40 g a day for 4 weeks Best to take on an empty stomach with juice as amino acids compete for absorption Best to start with small dose of 5 grams and slowly build from there	Large doses can soften stool. Take smaller doses first and build from there You should not supplement if you have hyper ammonemia, liver or renal failure It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Horse chestnut	Hemorrhoids	NA	500 mg capsule, 3 times a day Take for 3 weeks, then off for a week. Repeat until hemorrhoids have reduced	Seek advice from your health care professional before taking if you have liver problems, kidney disease or a blood clotting disorder May cause side effects such as nausea, headache, dizziness, itching and stomach discomfort (which can be minimized by the use of film-coated tablets)
Licorice root	Constipation	As tea, 1 teaspoon of licorice root for 1 cup of hot water, 1-3 times a day	As directed on label	Check with your physician before taking if you have eye problems, high blood pressure, heart, liver or kidney disease, water retention, low potassium levels or if using diabetic, heart or blood thinning medications Can cause headaches

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Magnesium	Constipation	Black beans, quinoa, sunflower seeds, sesame seeds, green beans, almonds, flax seeds & bran	400-800 mg a day Best taken with food Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools so best to increase dosage slowly Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease and those taking magnesium medications such as antacids and laxatives should consult with their health professional first
Marshmallow root tea	Diverticulitis	As a tea, 1 teaspoon of dried herb in 2 cups of water for 20 minutes and strain	NA	Marshmallow root may reduce blood sugar levels and/or have diuretic effects Consult with a physician before taking marshmallow root if you take blood-thinning, diuretic or diabetic medications Marshmallow root may slow the absorption of medications or other supplements you may be taking. Take several hours before or after taking other drugs or herbal remedies Stop taking marshmallow root at least 2 weeks before a scheduled surgery
Oat bran	Diarrhea	1/2 cup a day	NA	None
Probiotics	Constipation Diarrhea Diverticulitis	Fermented foods such as yogurt, sauerkraut, miso, pickles & kefir	1-2 probiotic supplements at bedtime for constipation or diarrhea 2 capsules, 3 times a day for diverticulitis	If you are taking antibiotics you can take probiotics, but just ensure that they are consumed 2 hours apart. If you have completed a course of antibiotics, you will need to continue probiotics for at least 2-3 months When purchasing probiotics, make sure you look for the following: • a minimum of 8 billion active micro-organisms • Contain at least several types of bacteria including Lactobacillus acidophilus and Bifidobacterium bifidus • freeze-dried probiotics as this keeps the flora dormant until it enters your body • Keep stored in the fridge
Prunes	Constipation	Eat 2-3 prunes a day or drink 1 cup of prune juice before bed or first thing in the morning on an empty stomach to prevent constipation and maintain regular bowel function If you are constipated, drink 2-3 cups of juice on an empty stomach first thing in the morning	NA	Everyone responds to prunes/prune juice differently, so you may need to experiment with how much you need to get relief The body can develop a tolerance to prunes and they can lose their effectiveness over time if you eat them too regularly

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Slippery elm bark	Diverticulitis	As a tea, 1 teaspoon of dried herb in 2 cups of water for 20 minutes then strain	NA	If you are allergic to any type of elm tree you should not take this herb Take 2 hours away from medications as it can decrease the effectiveness of the medication
Vitamin A	Diverticulitis	Carrots, spinach, kale, red peppers, sweet potato & squash	5000 – 10 000 IU a day Best taken with food The synthetic forms of Vitamin A such as palmitate or acetate have a potential to produce toxic symptoms	Woman who are sexually active or of child-bearing age should not use high doses (over 10 000 IU) of Vitamin A due to risk of birth defects Doses over 10 000 IU should be taken under the supervision of your health care practitioner
Vitamin C	Constipation Hemorrhoids Diverticulitis	Pineapples, berries, oranges, red/green peppers, broccoli & Brussels sprouts	Constipation: 1000 mg, 1 to 2 pills a day for constipation Hemorrhoids: 500-1000 mg, 3 times a day for hemorrhoids Diverticulitis: 8000 mg a day in divided doses for diverticulitis	Sulfa antibiotics decrease Vitamin C levels in the body High doses of Vitamin C can cause loose stools or cause gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication as Vitamin C can act as a natural blood thinner
Vitamin E	Diverticulitis	Sunflower seeds, almonds, olives, papaya, pine nuts & blueberries	400-800 IU a day Best taken with food Best form to take is with mixed tocopherols including D alpha-tocopherol, tocotrienols and succinate Do not use synthetic form dl-alpha-tocopherol as it acts very differently in the body	If you have heart disease or diabetes, do not take doses over 400 IU a day. This is a natural blood thinner, so consult your health care professional first if you are taking blood-thinning medications or if you have a bleeding disorder Stop taking this supplement 2 weeks before surgery Prolonged and high level intakes of Vitamin E greater than 1500 IU a day can be detrimental to the immune system
Water	Constipation Diarrhea	8 cups of water a day	NA	Try to drink filtered water, which has had toxins and other impurities removed (preferably carbon or reverse osmosis filter systems) Avoid water stored in plastic bottles, which can leach chemicals into the water, potentially disrupting hormone balances

CHAPTER 3

Nutrition for Neurogenic Bladder

1. Boost your immune system
2. Drink cranberry & blueberry juice
3. Take probiotics
4. Take the supplement D-Mannose
5. Take the herb Uva Ursi
6. Increase your daily flow of urine
7. Avoid caffeine & alcohol
8. Eat bladder-healthy foods & herbs

SCI and Bladder Health

The role of your urinary system is to help eliminate waste from your body. Your kidneys filter and remove waste products from your blood. These wastes then become urine, which flows from the kidneys down thin tubes called ureters and into the bladder. Your bladder serves as a storage tank collecting urine until it is eliminated.

A neurogenic bladder requires catheterization or other urinary devices to help drain your bladder. This can introduce unwanted bacteria into your bladder and may lead to **urinary tract infections (UTIs).**

UTIs are a constant and lifelong threat to individuals with spinal cord injury (SCI). They can contribute to many secondary health issues, increase or prolong hospitalization stays, interfere with your rehabilitation, lower your self-esteem and impede your ability to function.

Therefore, a proactive approach to your bladder management is imperative. Eating a diet that contains the essential nutrients needed to build and maintain your immune system and prevent bacteria from attaching to your bladder wall can help protect you from infection.

80%

Approximately 80% of individuals with SCI will develop **bladder infections** over their lifetime, some of them chronic.

6% - 8%

Approximately 6 - 8% of individuals with SCI will develop **kidney stones** within the first 8 years post injury.

Chen et al, 2000

36%

Approximately 36% of individuals with SCI who use in-dwelling catheters will develop **bladder stones** within the first 8 years post-injury.

Linsenmeyer. 2006

This chapter will discuss the common factors that contribute to UTIs in individuals with SCI, and the many foods, herbs and supplements that can help prevent and manage UTIs.

Symptoms of a bladder infection

The symptoms of a bladder infection can include:

- Low energy/fatigue
- Increased spasticity
- Fever
- Urge to urinate
- Low back pain
- Urine with a strong odor
- Headache
- Sweating
- Autonomic dysfunction
- Cloudy urine
- Lower abdominal pain

If left untreated, UTIs can lead to other complications and potentially life-threatening problems, such as:

- Sepsis
- Kidney stones
- Autonomic dysreflexia
- Kidney failure
- Bladder stones
- Bladder cancer

Due to decreased sensation, some individuals with SCI may have difficulty determining if they have a bladder infection.

Why individuals with SCI are more prone to UTIs:

- **Catheterization**
  UTIs occur when foreign bacteria enter your bladder and multiply. Almost 90% of UTIs are caused by E. coli bacteria, which are part of your normal intestinal flora. E. coli are introduced into the bladder from the rectum or vagina via catheterization. These bacteria are able to cling to the wall of the bladder, multiply and cause infection.
- **Antibiotics**
  Many individuals with SCI take antibiotics to treat a variety of infections related to their injury, including UTIs. Prolonged or repeated use of antibiotics increases the risk of UTIs by:
  - developing bacteria that are resistant to drugs, causing repeated infections
  - destroying good bacteria in your gut, therefore compromising your immune system
  - destroying the protective shield of good bacteria that line your urethra. When antibiotics are used for long periods, this protective shield is stripped away or replaced by less effective organisms
- **Low immune function**
  As with any type of infection, UTIs occur when the body's defense system is low. Nutrient deficiencies are the most common cause of low immune function and it is well documented that individuals with SCI are deficient in many immune-boosting nutrients such as Vitamins A, C and zinc.

  – Walters, Buchholz and Martin Ginis, 2008
- **Cross-contamination**
  While in the hospital or community, there is risk of cross-contamination from caregivers. Hand washing is key to reducing cross-contamination.
- **Incomplete bladder emptying**
- **Over-distension of the bladder**

Nutrition for Bladder Infections

1 Boost your immune system

Nutrient deficiencies are the most common cause of low immune function. Studies show that bladder infections occur more frequently when your body's immune system is low, so optimal immune function is vital in preventing and fighting bladder infections.

Here are the primary nutrients you need to enhance your body's natural defense mechanisms:

Garlic

Garlic is a natural antimicrobial that helps the body fight infection, particularly aged garlic extract. Add 1/2 to 1 clove (more if you like) of fresh garlic a day to salad dressings, sauces and your other favorite dishes. To avoid strong garlic odor or stomach upset, take aged garlic extract supplements.

Vitamin C

This vitamin helps activate powerful white blood cells that work on the frontline defense in fighting bacteria. It also plays an important role in antibody production and coordinating immune system functions.

Good sources of Vitamin C are red & green peppers, broccoli, Brussels sprouts, papaya, strawberries & pineapple.

Vitamin A

This vitamin helps fight infections by enhancing the activity of your white blood cells.

Good sources of Vitamin A include sweet potato, spinach, carrots, kale & winter squash.

Zinc

Zinc helps reduce incidents of infection by increasing the production and function of your white blood cells.

Foods high in zinc include pumpkin seeds, red meat, sesame seeds, yogurt & oats.

2 Drink cranberry or blueberry juice

Cranberries and blueberries do not kill bacteria or prevent bacterial growth. Instead they contain large amounts of compounds called tannins, which prevent E. coli from attaching to the wall of your bladder. They do this by inhibiting the growth of pili (arm-like appendages) on bacteria, which is what enables them to cling on to your bladder wall. If the bacteria can't hang on, they are more easily flushed out of your bladder when you urinate.

Some evidence suggests that cranberries also produce hippuric acid, which makes the urine more acidic, creating an unfavorable environment for bacteria to grow and flourish in.

In order to be effective, tannins must be consumed on a daily basis. Drinking 2 tablespoons of pure, unsweetened cranberry juice twice a day or 1⁄2-1 cup of blueberry juice can help reduce the risk of urinary tract infections.

To avoid excess sugar and calories:

- **Drink pure, unsweetened cranberry or blueberry juice. Avoid commercial cocktail juices that contain very little pure juice and a lot of sugar or other sweeteners.**
- **Supplement with cranberry capsules. Studies show cranberry capsules can significantly reduce the incidence of UTIs.** – Hess, Hess, Sullivan, Nee & Yalla, 2008

3 Take probiotics

Probiotics are good bacteria.
The name probiotic means “life-giving.” While probiotics are essential to your digestive health, what may surprise you is that they are also very important in maintaining and boosting your immune system.

Many individuals with SCI take antibiotics to fight infections. However, antibiotics disturb the healthy balance of good bacteria in your body. This contributes to infections by promoting the development of antibiotic-resistant strains of bacteria.

Research shows that probiotics, especially strains of Lactobacillus, can reduce the recurrence of UTIs. Taking a probiotic supplement every day can help fight and prevent bladder infections.

If you are taking antibiotics, you can still take probiotics – just be sure to take them two hours apart. Once you have finished your antibiotics, it is recommended that you take probiotics for at least 2 to 3 months to repopulate your body with good, immune-enhancing bacteria. This will also help prevent further infections from developing.

Good sources of probiotic foods include plain (unsweetened) yogurt, kefir, sauerkraut & miso.

Eating yogurt at least three times a week can help reduce the risk of bladder infections by 80%.

When buying probiotics to address UTIs look for ones that contain:

- A minimum of 8 billion active micro-organisms
- Multiple strains such as Lactobacillus rhamnosus & Lactobacillus fermentum
- Freeze-dried probiotics – keep the good bacteria dormant until they enter your body

TIP: Store your probiotics in the fridge

Around the world...

For thousands of years, different cultures around the world have boosted their digestive and immune health by eating fermented foods which contain healthy bacteria:

- East Indians enjoy a yogurt drink called lassi
- Bulgarians, known for their longevity, consume fermented milk (kefir)
- Asian cultures traditionally eat pickled foods such as cabbage, turnips, eggplant, onions, cucumbers, squash and carrots

4 Take the supplement D-Mannose

D-Mannose is a naturally occurring sugar, similar in structure to glucose. It can be very effective in preventing and addressing bladder infections.

The E. coli bacteria have tiny arm-like appendages that help bind them to the bladder wall. However, when D-Mannose is present in your bladder, the bacteria grab onto the D-Mannose instead of your bladder, and are flushed out when you urinate.

- **Take 1 teaspoon every day for prevention**
- **When you have early signs of a bladder infection with no fever, take 1 teaspoon in a glass of water every 3 to 4 hours until symptoms disappear**
- **If you have a bladder infection and symptoms of fever, seek medical attention**

Studies indicate that D-Mannose can be more effective at dislodging the E. coli bacteria from the bladder than cranberries. D-Mannose has also been shown to improve more than 90% of UTIs within 24-48 hours.

– Johnston, Alternative Medicine and Spinal Cord, 2006

5 Take the herb uvi ursa

Also known as bearberry, this herb has strong antiseptic properties and is reported to be especially active against the E. coli bacteria. Regular use of this herb in supplement form or as a tea (see chart at end of chapter for dosage) can help prevent bladder infections.

6 Increase your daily flow of urine

Increasing fluid intake is necessary to help dilute your urine and prevent it from staying in your bladder too long, which can contribute to infection.

Drinking 8 cups of water a day (which can include unsweetened cranberry/blueberry juice and/or herbal teas) will help flush bacteria from your system, and also help prevent these micro-organisms from attaching to the lining of your bladder.

Ideally urine should be almost colorless to light yellow – not dark. If it begins to become dark yellow or even orange in color, it's a sign that you may have inadequate fluid intake.

7 Avoid caffeine & alcohol

Caffeine (found in coffee, tea, soda and chocolate) and alcohol can irritate your urinary tract.

8 Eat bladder-healthy foods & herbs

The following foods and herbs can help protect you from UTIs and support your bladder health.

Foods – Try to incorporate these foods into your diet on a regular basis. You don't need to eat them every day to reap their benefits:

- **Asparagus**
  Asparagus helps support urinary tract health.
- **Celery and watermelon**
  Celery and watermelon help to cleanse the bladder.

Herbs – These herbs can help address bladder infections. See chart at end of chapter for recommended dosages.

- **Parsley**
  Parsley contains a volatile oil that acts as a urinary tract antiseptic.
- **Echinacea**
  The herb echinacea enhances the body's production of white blood cells, which helps fight infections.
- **Goldenseal**
  Goldenseal is a herb that has antimicrobial properties. It is very effective in fighting E. coli bacteria. This herb is also good for bladder infections that cause bleeding.
- **Marshmallow root**
  Marshmallow root helps soothe irritated membranes of the urinary tract.

Other facts about UTIs in SCI

- **Good personal hygiene**
  Along with proper nutrition, practicing good personal hygiene helps to avoid the spreading of bacteria from the rectum, penis or vagina into the urethra.
- **Exercise**
  Studies show that individuals with SCI who exercise experience fewer UTIs.

  Cardenas, Hooton, 1995

"I struggled with severe bladder infections, often having blood in my urine, ever since my spinal cord injury at 20 years old. I was on antibiotics consistently for 13 years and they just weren't working.

I needed to find a better long-term way to fight my infections, so I went to see a nutritionist. I cut back on sugar and juices and started taking Vitamins A and C to boost my immune system, as well as uva ursi and D-Mannose.

Within 3 months I was able to reduce taking antibiotics to only once every few months, and I no longer have blood in my urine."

Jerry C6-7 tetraplegic

Bacteria-busting juice

This drink helps cleanse the bladder, acts as a natural antiseptic for your urinal tract and helps prevent bacteria from clinging to the wall of your bladder. ***Servings: 1***

Ingredients:
- 3⁄4 cup of unsweetened cranberry juice
- 1⁄4 cup of crushed ice
- 1⁄2 cup of blueberries
- 1 cup of watermelon
- A handful of parsley
- Garnish with a celery stick

Directions:
1. Mix in a blender and drink immediately

NUTRITIONAL CONTENT:
Proteins: 4 grams
Carbohydrates: 50 grams
Fats: 0 grams
Calories: 200

Roasted asparagus

Asparagus has compounds to help promote bladder health, and butter & garlic are natural antimicrobials. ***Servings: 4***

Ingredients:
- 1 bunch of asparagus, firm and bright green
- 2 tablespoons butter
- 1 clove of garlic, crushed
- Sea salt and pepper to taste

Directions:
1. Preheat the oven to 425F/218C
2. Break off woody stems of asparagus and rinse well under running water
3. Toss spears in baking pan with butter and garlic
4. Season with salt and pepper
5. Bake for 6-10 minutes

NUTRITIONAL CONTENT:
Proteins: 2 grams
Carbohydrates: 5 grams
Fats: 7 grams
Calories: 88

Cool cucumber dip

This quick and easy dip is a great way to help eat your 5+ vegetables a day. The yogurt has probiotics to help boost your immune system, and the garlic and parsley are powerful anti-microbials.

Ingredients:
- 2 cups of plain Greek yogurt
- 1 clove of garlic, crushed
- 1⁄2 cucumber, grated
- 1 tablespoon of fresh lemon juice
- 1 cup of parsley, finely chopped

Directions:
1. Mix yogurt, parsley, cucumber, lemon juice and garlic
2. For added bladder support use celery sticks and sliced peppers to dip

NUTRITIONAL CONTENT OF DIP:
Proteins: 30 grams
Carbohydrates: 25 grams
Fats: 20 grams
Calories: 398

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
D-Mannose	Helps prevent bacteria from attaching to bladder wall	NA	Take 1 teaspoon every 3 to 4 hours in one glass of water when you have an infection with no signs of fever, until symptoms are gone 1 teaspoon in a glass of water every day for prevention	May cause loose stools and bloating in high doses Some research suggests that D-Mannose might affect blood sugar levels in people with diabetes If you have a bladder infection with fever, seek medical attention
Probiotics	Enhance immune system	Fermented foods such as yogurt, miso, sauerkraut & kefir	1-2 capsules at night before bedtime	If you are taking antibiotics you can take probiotics, but just ensure that they are consumed 2 hours apart. If you have completed a course of antibiotics, you will need to continue probiotics for at least 2-3 months When purchasing a probiotics, make sure you look for the following: • A minimum of 8 billion active micro-organisms • Contains strains Lactobacillus rhamnosus & Lactobacillus fermentum, as these have been shown to help reduce bacteria from the bladder • Freeze-dried probiotics, as this keeps the flora dormant until they enter your body • Keep stored in the fridge
Vitamin A	Stimulates immune system	Sweet potato, carrots, spinach, red peppers, squash & kale	5 000 IU a day for prevention 10 000 IU a day in presence of infection	Women who are sexually active or of child-bearing age should not use high doses (over 10 000 IU) of Vitamin A, due to risk of birth defects. Doses over 10 000 IU should be taken under the supervision of your health care practitioner
Vitamin C	Stimulates immune system	Papaya, red/green peppers, parsley, pineapple, broccoli, Brussels sprouts, kale & strawberries	2000 mg a day for prevention 3000-4000 mg a day in divided doses during an infection	Sulfa antibiotics decrease Vitamin C levels in the body High doses of Vitamin C can cause loose stools or gastrointestinal problems: reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication as Vitamin C can act as a natural blood thinner
Water	Helps flush the bladder	Drink a minimum of 8 cups of water every day	NA	Avoid distilled water, which can leach minerals from the body. Try to drink filtered water (as it has had toxins removed from it), preferably from carbon or reverse osmosis filter systems Avoid water stored in plastic bottles, which can leach chemicals into the water, potentially disrupting hormone balances
Zinc	Supports immune system	Red meat, oats, pumpkin seeds, sesame seeds & yogurt	50 mg a day Best taken with food Best absorption forms include: zinc picolinate, acetate, citrate, glycerate and monomethionine. Poor absorption forms include: zinc oxide and zinc sulfate	Take in divided doses during the day to prevent possible nausea Consult with your health care professional first if you have high cholesterol Higher doses of zinc (greater than 100 to 300 mg a day) can impair the immune system and may lead to a copper deficiency

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Blueberries	Help prevent bacteria from attaching to the bladder wall	Fresh, frozen, dried or juice	1⁄2-1 cup a day	None
Cranberries	Help prevent bacteria from attaching to the bladder wall	Drink 2 tablespoons of pure cranberry juice (make sure it is unsweetened juice)	Capsules 400-500 mg Take 2 to 6 capsules a day in divided doses	Drinking excessive amounts of cranberry juice can cause nausea or vomiting
Garlic	Antimicrobial	1⁄2 -1 clove of garlic a day	2-6 capsules a day in divided doses	Check with health care professional if you are taking blood-thinning medications or protease inhibitors before taking garlic supplements
Uva ursi	Active against many common bacteria that cause bladder infections, including E. coli	As a tea put 1 to 2 teaspoons in a cup of hot water and let steep for 10 minutes	250 - 500 mg a day	Prolonged use of this herb should be avoided, as it may cause eye problems or liver impairment Do not use this herb if you have a kidney disorder Do not use this herb where there is digestive irritation, since excessive use may lead to stomach distress This herb has been known to cause nausea and vomiting or a greenish brownish tint to urine Do not combine this herb with diuretics, lithium-based drugs or aminophylline
HELPFUL				
Goldenseal	Active against many common bacteria that cause bladder infections, including E. coli	As a tea put 1 to 2 teaspoons in a cup of hot water and let steep for 10 minutes	250 - 500 mg a day Do not use on a daily basis for more than one week at a time	People with diabetes, anxiety, depression, cardiovascular disease, glaucoma or taking blood thinning medications are advised to consult their health professional first before taking May cause nausea, vomiting, breathing discomfort and loss of sensation in the upper and lower extremities. If used in large quantities, goldenseal may result in irritability of the mucus membranes and worsening of ulcers in the stomach Use roots versus leaves as these contain more of the active properties
Asparagus	Promotes urinary tract health	As stated	NA	None
Parsley	Contains a volatile oil that acts as a urinary tract antiseptic	As stated	NA	Do not use this herb with kidney inflammation Consult with your health care professional first if you suffer from high or low blood pressure
Celery	Helps to cleanse the bladder	As stated	NA	If you are on low blood pressure medications, eat celery in moderation as it can lower blood pressure Can trigger an allergic reaction in people sensitive to psoralens

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
HELPFUL				
Echinacea	Has antimicrobial properties	As a tea put 1 to 2 teaspoons in a cup of hot water and let steep for 10 minutes Drink 3-4 cups a day	900 mg capsule, 3-4 times a day	Do not take echinacea for longer than 10 days Some people have suffered allergic reactions from using echinacea. If you suffer from allergies or asthma, you might have a particular susceptibility to this negative effect. An allergy to any plant in the daisy family could indicate an allergy to echinacea Do not take if you suffer from conditions that result from an overactive immune system such as rheumatoid arthritis or lupus, or if you take any medications that suppress the immune system Other contraindicated uses include diabetes, connective tissue disorders, liver disease, multiple sclerosis, HIV/AIDS and tuberculosis
Marshmallow root	Helps soothe irritated membranes of the urinary tract	As a tea put 1 to 2 teaspoons of dried marshmallow root herb in 1 cup of hot water and let steep for 10 minutes Drink 4 cups of tea a day	Take as directed on label	Marshmallow root may reduce blood sugar levels and/or have diuretic effects. Consult with a physician before taking marshmallow root supplements if you take blood-thinning, diuretic or diabetic medications Marshmallow root may slow the absorption of medications or other supplements you may be taking, so take several hours before or after taking other drugs or herbal remedies Stop taking marshmallow root at least 2 weeks before a scheduled surgery
Watermelon	Helps to cleanse the bladder	As stated	NA	Watermelon is high in sugar so be mindful if trying to lose weight

CHAPTER 4

Nutrition for Cardiovascular Health

1. Eat good fats
2. Eat soluble fiber
3. Eat plant sterols
4. Eat foods rich in arginine & Vitamin B3 (niacin)
5. Eat foods high in antioxidants (Vitamins A, C & E)
6. Increase foods rich in Vitamins B6 & B12
7. Eat garlic
8. Eat foods rich in magnesium & potassium
9. Reduce saturated fats & eliminate trans fats
10. Limit intake of sugar
11. Limit intake of salt

SCI and Cardiovascular Health

Cardiovascular disease (CVD) is a serious and life-threatening condition for individuals with spinal cord injury (SCI). Studies show that CVD occurs more often in individuals with SCI and at an earlier age than the non-SCI population.

Following SCI, you may experience changes in your cardiovascular system. Additionally, individuals with SCI tend to be deficient in nutrients that are essential in maintaining good cardiovascular health such as fiber, calcium, magnesium, potassium and Vitamins A & C. These factors, together with changes in your metabolism, altered body composition and a decreased activity level, significantly increase your risk of developing CVD.

CVD can be improved through diet and lifestyle. Therefore, it is critical to introduce heart-healthy eating strategies to reduce your CVD risk.

SCI & Increased Risk of CVD

Individuals with SCI tend to have increased LDL (bad) cholesterol and triglyceride levels – both of which contribute to plaque build-up in the arteries.

24% - 40%

24% - 40% of individuals with SCI have low HDL (good) cholesterol levels.

– Bauman, Kahn, Grimm & Spungen, 1999

This chapter will explain how CVD develops and the specific SCI factors that contribute to your CVD risk. You will also learn about specific nutrients to keep your cardiovascular system healthy, as well as the difference between fats that are good for lowering or maintaining your cholesterol levels and fats that are bad for your heart.

What is CVD?

Your cardiovascular system includes your heart and blood vessels. Your heart pumps blood and your blood vessels deliver it throughout your body. The blood vessels that carry blood filled with nutrients and oxygen away from your heart to all the cells in your body are called arteries, while the blood vessels that carry waste products and deoxygenated blood back to your heart are called veins.

While the term cardiovascular disease technically refers to any disease that affects the cardiovascular system, it usually refers to **atherosclerosis**, which is the thickening, hardening and loss of elasticity of the artery wall.

Thickening of the Artery Wall

Your artery wall has several layers. The internal lining is called the endothelium. Surrounding the endothelium is an internal elastic layer, which in turn is surrounded by a layer of smooth muscle. Finally, the smooth muscle is surrounded by an external elastic membrane. The internal, smooth muscle and external layers all provide necessary elasticity to your artery so it can respond to changes in blood pressure.

Microscopic scratches in the endothelium are the root cause of atherosclerosis. These scratches can be caused by a lack of nutrients needed to prevent free radical damage, high blood sugar levels, elevated levels of triglycerides and high blood pressure. Once these microscopic scratches occur, the endothelial lining becomes more permeable, particularly to lipoproteins (fat carrying proteins). These lipoproteins then bind with molecules that cause a breakdown of the endothelium.

In an attempt to repair these damaged sites, the body's natural defense mechanism sends white blood cells and platelets (tiny cells in the blood that play a role in blood clotting) to these weakened areas. When the white blood cells and platelets reach the damaged tissue, they release growth factors, which are proteins that stimulate cell growth. In turn, these growth factors cause plaque to start forming. A scab then develops where fat and cholesterol can collect. If left untreated, the plaque can grow and gradually restrict the flow of blood, which can lead to a heart attack or stroke.

Contrary to traditional belief, cholesterol is not the root cause of plaque build-up. In fact, once your body senses damage in your arteries, cholesterol is produced in your liver and sent to these damaged sites to try and heal them. However, this cholesterol can then get trapped on the scabs of the damaged sites and contribute to plaque build-up.

Different Types of Fat Associated with CVD

High density lipoprotein (HDL)

HDL is also known as 'good' cholesterol. HDL carries cholesterol from your arteries to your liver, where it is broken down and later eliminated. It also helps reduce inflammation and prevents dangerous clotting in the blood. Higher levels of HDL are strongly associated with protection from CVD; decreased levels of HDL are associated with the development CVD.

A diet high in monounsaturated fats, such as olive oil and avocado, contributes to higher HDL cholesterol levels.

HDL cholesterol levels also appear to be related to your level of activity. People who are physically active tend to have higher levels of HDL cholesterol.

It is recommended that HDL be greater than 35 mg/dl.

Low density lipoprotein (LDL)

LDL is also known as 'bad' cholesterol. LDL carries cholesterol and triglycerides from your liver to cells throughout your body.

Increased levels of LDL are associated with CVD, and can specifically contribute to atherosclerosis because it tends to stick to damaged endothelium, thereby contributing to plaque build-up.

A diet high in fried food and trans fats contributes to high LDL cholesterol levels. Reducing your intake of trans fats can help lower your LDL cholesterol.

An excess of refined sugars found in drinks and foods such as soda, cakes, cookies and candy can also increase LDL cholesterol levels.

Triglycerides (TG)

Triglycerides are a type of body fat, which are also carried in your blood.

Eating too many calories, sugar, refined carbohydrates and bad fats can increase your TG levels. Elevated TGs are often associated with reduced levels of HDL, both of which are associated with increased risk of CVD. These fats contribute to atherosclerosis because they are deposited on artery walls and can cause blockages.

It is recommended that triglycerides be less than 150 mg/dl.

Saturated Fats

Virtually all fat-containing foods contain some saturated fat. Small amounts of saturated fat are both healthy and necessary. The health risks associated with saturated fat involves **excessive** consumption of them.

Excessive intake of saturated fat can lead to high LDL levels. These saturated fats are also sticky; therefore, they can contribute to plaque build-up.

Saturated fats occur naturally in many animal food sources, such as beef, lamb, pork, chicken & dairy products.

Trans Fats

Almost all trans fats are man-made fats created to increase the shelf life of food. Evidence shows that these fats can increase your risk of developing CVD as they increase LDL cholesterol and decrease HDL cholesterol.

Trans fats are found in many prepared and packaged foods such as salad dressings, cereals, cakes, crackers, cookies, margarine, frozen foods & fried foods.

Factors Contributing to CVD in Individuals with SCI

Autonomic nervous system dysfunction

SCI can alter normal cardiovascular homeostasis, which increases the risk of CVD, particularly in people with injuries above T6. Examples of altered cardiovascular homeostasis include autonomic dysreflexia and loss of vasomotor control leading to decreased blood flow.

Type 2 diabetes & glucose intolerance

There is an increased frequency of glucose intolerance and Type 2 diabetes in individuals with SCI.

Your muscles use up a lot of glucose (sugar). However, changes in body composition after SCI (decreased muscle mass and increased fat mass) combined with decreased physical activity can place individuals with SCI at higher risk of elevated blood sugar levels and the development of Type 2 diabetes. This in turn can increase triglyceride and LDL levels and decrease HDL levels.

Type 2 diabetes also increases the risk of developing high blood pressure and narrowing of the arteries.

Dyslipidemia

Dyslipidemia means the fat (lipid) levels in your blood are either too high or too low.
Studies show that individuals with SCI often have:

- low levels of 'good' HDL cholesterol
  (24-40% of individuals with SCI have HDL levels lower than 35 mg/dl. HDL values less than this are identified as a risk factor for CVD. Low HDL levels may be a result of significantly reduced levels of physical activity. Higher and/or complete injuries have lower levels of this good cholesterol) – Bauman, Kahn, Grimm & Spungen, 1999
- elevated levels of 'bad' LDL cholesterol – contribute to plaque formation in your arteries
- elevated levels of triglycerides – contribute to plaque formation in your arteries

Individuals with tetraplegia tend to have a greater frequency of lipid abnormalities than individuals with paraplegia, suggesting that decreased physical activity contributes to CVD risk.

– Myers et al., 2007

"I was 46 years old and had been living with a spinal cord injury for 15 years. I didn't drink or smoke and thought I was in pretty good shape. Then suddenly out of the blue I had a massive heart attack. Immediately I changed my lifestyle – I started exercising, stopped eating fast food, reduced the amount of sugar and grains in my diet, increased the amount of beans and vegetables I ate. I started taking antioxidants and omega-3 fats every day.

Today I am 35 lbs. lighter, have more energy, and best of all my HDL cholesterol levels are higher and LDL levels are lower."

Ken, C6 tetraplegic

STOP SMOKING!

Studies show that a higher proportion of individuals with SCI smoke compared to the general population.

– Myers, Lee & Kiratli, 2007

Smoking is associated with damage to artery walls, lower HDL levels, platelet aggregation and high blood pressure.

Blood pressure abnormalities

Hypertension – High blood pressure, usually experienced in individuals with paraplegia, contributes to CVD. The increased prevalence of obesity, metabolic syndrome, Type 2 diabetes and low physical activity in individuals with SCI increases the risk for developing hypertension.

Hypotension – Low blood pressure, usually experienced in individuals with tetraplegia, is caused by blood vessels not constricting as efficiently as they did pre-injury. This slow and sometimes unstable blood pressure can result in altered organ function.

High homocysteine levels

High levels of this amino acid are strongly linked with CVD: homocysteine levels are generally high in individuals with SCI. Vitamin B6, B12 and folic acid deficiencies can also increase homocysteine levels.

Inflammation

Evidence identifies that chronic inflammation in the body contributes to the development of CVD. It is well established that individuals with SCI experience systemic inflammation due to factors such as stress, low grade infections and an increase in fat tissue. When tissues, such as arteries, in your body are inflamed, special inflammatory cells are sent out to heal the area. However, in the process they may actually cause stress on the arterial wall, as also cause it to thicken. This in turn can ultimately narrow the artery contributing to CVD.

Low antioxidant levels

Vitamins A, C and E, zinc and selenium are all powerful antioxidants that help to neutralize artery-damaging free radicals. Individuals with SCI are commonly deficient in these nutrients.

Magnesium & potassium deficiencies

Magnesium and potassium are essential to the proper functioning of the entire cardiovascular system. Individuals with SCI are commonly deficient in these minerals.

Obesity

Over 65% of individuals with SCI are over-weight, with one-third of these individuals being obese. Obesity increases the risk of Type 2 diabetes, high blood pressure and high blood cholesterol, all of which in turn increase the risk of CVD.

Platelet stickiness

Individuals with SCI tend to have increased platelet stickiness, which can contribute to plaque build-up.

Reduced physical activity

A sedentary lifestyle results in decreased muscle mass and increased fat mass, which in turn impacts many of the factors listed above.

START EXERCISING!

Upper extremity exercise favorably modifies dyslipidemia in individuals with SCI. For example, using an arm bike, or doing resistance training at moderate intensity 3 times a week for 20 minutes, improves HDL levels in individuals with SCI, therefore helping to decrease CVD risk.

– Cohen, Malone and Nash, 2009

Nutrition for Cardiovascular Health

1 Eat good fats

Omega-3 fats
These good fats help to decrease inflammation, prevent hardening of the arteries, lower LDL cholesterol and triglyceride levels, reduce platelet stickiness and growth of plaque in the arteries, promote relaxation of the lining of the arteries and help to lower blood pressure.

Flax seeds, walnuts and cold water fish are an excellent source of these fats. Eat fish such as salmon, mackerel, trout, tuna & sardines 3-4 times a week or take omega-3 supplements daily.

Monounsaturated fats
These good fats can help lower triglyceride levels and increase HDL cholesterol levels.

These good fats are found in olives, olive oil & avocados.

Statin drugs (cholesterol-lowering drugs) lower the risk of heart attack and stroke over the long term by blocking the enzyme that makes cholesterol; however, this same enzyme is needed to make an essential nutrient the heart needs, called Co-enzyme Q10 (CoQ10). If you are taking these drugs, it is essential to supplement with at least 30 mg of CoQ10 a day.

2 Eat plenty of soluble fiber

Soluble fiber helps to reduce LDL cholesterol levels. Soluble fiber binds with fat/cholesterol in the intestines, which is then excreted in the stool.

Oat bran, peas, beans, flax seed, psyllium, carrots, pears, bananas & apples are all excellent sources of soluble fiber.

3 Eat plant sterols

Plant sterols are substances that occur naturally in small amounts in many grains, vegetables, fruits, legumes, nuts and seeds. Sterols have powerful cholesterol-lowering properties.

Foods rich in sterols include oat bran, brown rice, almonds, pecans, wheat germ, pumpkin seeds, beans, Brussels sprouts, peas, broccoli, cauliflower, blueberries & avocado.

4 Eat foods rich in arginine & Vitamin B3 (niacin)

Arginine – Nitric oxide is a gas that signals your body to relax and dilate your blood vessels which is important for vascular health. It also helps prevent white blood cells and platelets from becoming sticky, and helps reduce plaques that have developed. The essential building block for nitric oxide production is an amino acid called arginine.

Arginine is found in red meat and many plant-based foods such as spinach, chick peas, whole grains, sesame seeds & nuts (such as almonds, walnuts and hazelnuts).

Vitamin B3 (niacin) – This vitamin helps dilate blood vessels, eliminates excess cholesterol and increases HDL levels.

Vitamin B3 is found in salmon, chicken, beef, lamb & spelt.

5 Eat foods high in antioxidants

Free radicals damage tissue, including arteries, if they are not neutralized by antioxidants. Additionally, free radicals may lower HDL cholesterol levels. The primary antioxidant Vitamins A, C & E are also the vitamins individuals with SCI tend to be deficient in.

Vitamin A – Helps protect epithelial cells in the arteries. Its antioxidant properties also help discourage the formation of LDL cholesterol.

Foods high in Vitamin A include sweet potato, winter squash, spinach, carrots, kale, apricots & papayas.

Vitamin C – This is a powerful antioxidant that helps neutralize free radicals. This vitamin also stimulates the production of lipoprotein lipase (LPL), an enzyme that dissolves the fats that have been deposited on artery walls. Moreover, Vitamin C strengthens collagen structures in the arteries, raises HDL levels, lowers triglycerides, inhibits platelet stickiness and helps to lower blood pressure.

Eat lots of broccoli, red/green peppers, tomatoes, kale, kiwi, papaya, strawberries, Brussels sprouts & cabbage.

Vitamin E – This powerful antioxidant is easily incorporated into the LDL cholesterol molecule and prevents free radical damage. This vitamin also reduces platelet stickiness and helps break down fibrin (a clot-forming protein), thus reducing plaque build-up.

Eat lots of almonds, sunflower seeds, papaya, legumes, dark green leafy vegetables, olives & olive oil.

Selenium – This essential trace mineral can neutralize free radicals and may reduce or even help prevent some of the damage they cause.

Eat barley, whole grains, sunflower seeds, Brazil nuts, garlic, onions, salmon & sardines.

Grape seed & pine bark extracts – These substances contain beneficial molecules called procyanidolic oligomer (PCOs), which have potent antioxidant activity. PCOs have multiple anti-CVD properties such as preventing damage to arterial walls, lowering cholesterol levels, reducing plaque deposits in arteries and inhibiting platelet aggregation.

These extracts can be taken in supplement form.

6 Increase foods rich in Vitamins B6 & B12

B6 and B12 help reduce homocysteine, the amino acid that damages artery walls. Individuals with SCI tend to be deficient in both these vitamins. Additionally, B6 decreases platelet stickiness and lowers cholesterol levels, thereby helping to reduce plaque development in the arteries.

B6 is found in bran, sunflower seeds, garlic, tuna, cod, salmon & beef.

B12 is found in trout, salmon, sardines, eggs, lamb & beef.

7 Eat garlic

Garlic helps prevent blood clotting and lowers LDL cholesterol and triglycerides, while simultaneously helping to increase HDL cholesterol.

8 Eat foods rich in magnesium & potassium

Magnesium and potassium are essential to the proper functioning of the entire cardiovascular system. Individuals with SCI are commonly deficient in these minerals.

There is a strong association between magnesium deficiency and risk of heart attack. Magnesium helps dilate arteries and inhibits platelet stickiness and blood clot formation. As well, it reduces the size of any arterial blockages. Potassium helps reduce blood pressure.

Magnesium is found in black beans, quinoa, bran & sunflower seeds.

Potassium sources include bananas, apricots, navy beans & avocados.

9 Reduce saturated fats & eliminate trans fats

Saturated and trans fats raise your bad cholesterol levels. Trans fats also displace good fats in your body.

Saturated fats are found mainly in animal products, including whole milk, cheese, butter, beef, pork & lamb. Instead of eating beef, pork and lamb as your main meal, replace these with fish, which is high in good fats, 3-4 times a week.

An alternative is to make your main meal from legumes, such as a black bean salad. Legumes are a good source of protein, but they contain no saturated fat or cholesterol.

Trans fats should be completely eliminated from your diet. They are found in processed foods, baked goods, fast foods, margarine and shortening.

10 Limit intake of sugar

Dietary sugar plays a major role in increasing triglycerides, LDL cholesterol, and insulin in the blood, all of which cause arterial damage, while at the same time lowering HDL cholesterol levels.

Avoid all refined and processed sugars and foods that contain them – such as soda, candy bars, sugar-laden cereals, cookies & pastries.

11 Limit intake of salt

Salt attracts and holds water in the body. This excess fluid retention can put added stress on the heart and blood vessels to pump the extra fluid.

It is recommended that you do not eat more than 1,500 mg of salt a day.

Avoid foods that tend to have a high content of salt, such as canned soups/vegetables, deli meats, packaged foods, fast foods and condiments (e.g. salad dressings, ketchup & soy sauce).

Mediterranean Tilapia

The antioxidant properties of tomatoes help neutralize free radicals, which can damage arteries, and the good fats in fish and olives help reduce inflammation associated with heart disease.
Servings: 2

Ingredients:
- 2 tilapia fillets
- 1 1⁄2 teaspoons of extra virgin olive oil
- 1⁄2 tomato, sliced
- 4 black pitted olives, sliced

Directions:
1. Preheat the oven to 375F/190C
2. Place the tilapia fillets in a small, shallow baking dish and brush with olive oil
3. Top each fillet with sliced tomato and olives and bake in the oven until the fish flakes easily with a fork (about 10-20 minutes)
4. Serve with a side salad tossed with balsamic vinegar and olive oil dressing

NUTRITIONAL CONTENT PER SERVING:
Proteins: 30 grams
Carbohydrates: 45 grams
Fats: 13.5 grams
Calories: 400

Quick & Easy Curry

Chick peas and kidney beans are a great source of fiber to help lower cholesterol. Turmeric is a powerful anti-inflammatory that supports a healthy heart. ***Servings: 4***

Ingredients:
- 1 can of chick peas
- 1 can of unsweetened cranberry sauce
- 1 red onion, chopped
- 1 teaspoon of turmeric
- Sea salt and pepper to taste
- 1 can of kidney beans
- 2 chicken breasts, chopped
- 3 tablespoons of curry powder (or to taste)
- 2 tablespoons of coconut oil

Directions:
1. Heat coconut oil in a pan and cook chicken and onion on medium heat for 10 minutes
2. Add can of cranberry sauce and cook for another 2 minutes
3. Add drained chick peas and kidney beans
4. Add curry powder, turmeric, salt and pepper to taste and simmer for 20 minutes

NUTRITIONAL CONTENT PER SERVING:
Proteins: 8.8 grams
Carbohydrates: 28.4 grams
Fats: 8.6 grams
Calories: 237

Blueberry Salad

This quick and easy high-fiber salad helps to keep your cholesterol down. ***Servings: 2***

Ingredients:
- 3 cups of a dark leafy lettuce (arugula, spinach and/or romaine)
- 1 cup of cherry tomatoes
- 1⁄4 cup of red onion, finely chopped
- 1⁄2 cup of fresh blueberries
- 6 walnuts
- 2 tablespoons of olive oil

Directions:
1. Mix lettuce, tomatoes and onions together
2. Drizzle olive oil over salad and sprinkle the blueberries and walnuts on top

NUTRITIONAL CONTENT PER SERVING:
Proteins: 6.2 grams
Carbohydrates: 30 grams
Fats: 36 grams
Calories: 437

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
CoQ10	Critical for cardiac function	Fish, organ meats (liver, kidneys & heart) & whole grains	30-100 mg a day Ubiquinol is the preferred form	If you are taking statin drugs, it is essential that you take CoQ10 as these drugs deplete CoQ10 in the body Approximately 14-32% of COQ10 is lost during frying. However, boiling foods preserves CoQ10 Avoid taking CoQ10 two weeks prior to surgery Certain medications may interact with CoQ10 such as blood-thinning drugs. Consult with your health care professional before taking
Fiber (soluble)	Absorbs and removes cholesterol from the body	Oats, apples, pears, berries, beans, lentils & peas	1-2 tablespoons a day of ground flax seeds or apple pectin	Always consume fiber supplements with a glass of water When you increase dietary fiber, it may initially cause gas and bloating until the body adjusts Fiber may interfere with absorption of medications and supplements, and therefore it is best to take two hours apart Do not exceed 30 grams of fiber a day Fiber supplements in pill form should not be taken by people with esophageal disorders as the fiber can expand and cause obstruction Individuals who have had bowel spasms, history of colitis or inflammatory bowel disease should use with caution
Omega-3 essential fatty acids	Helps decrease inflammation, prevents hardening of the arteries, lowers LDL, cholesterol and triglycerides, and reduces growth of plaque in the arteries	Salmon, sardines, walnuts, tuna, halibut & flax seeds	Fish or flax seed oil: 2-4, 1000 mg capsules or tablespoons flax or fish oil a day in divided doses	Omega-3 has blood-thinning properties. Consult with your health care professional if you are on blood-thinning medication Stop taking 2 weeks prior to surgery Fish oil can increase the risk of mania in patients with bipolar disorder People who have hypersensitivities or allergies to fish or shellfish may also be allergic to fish oil supplements. Signs of an allergic reaction include a rash or hives, difficulty breathing and swelling of the throat, face or mouth. An allergic reaction to fish oil should be considered a medical emergency
Magnesium	Essential for cardiovascular function Helps dilate arteries, inhibits platelet aggregation and blood clot formation, as well as reduces arterial blockages	Black beans, quinoa, sunflower seeds, sesame seeds, spinach, tomatoes & bran	400-800 mg a day Best taken with food Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools, so best to increase dosage slowly Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease, and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Potassium	Essential for cardiovascular function and helps lower blood pressure	Bananas, salmon, white beans, apricots, figs, halibut, avocados & apples	99 mg a day	People with kidney disease or severe heart disease should not take potassium supplements except under physician's supervision
Vitamin A	Antioxidant – helps reduce free radical damage	Sweet potato, carrots, red peppers, spinach, kale, collard greens & Swiss chard	5000-10 000 IU a day The synthetic Vitamin A supplements such as palmitate or acetate forms have a greater potential to produce toxic symptoms	Woman who are sexually active or of child-bearing age should not use high doses (over 10 000 IU) of Vitamin A, due to risk of birth defects. Doses over 10 000 IU should be taken under the supervision of your health care practitioner
Vitamin C	Antioxidant – helps reduce free radical damage Also strengthens collagen structures in the arteries, raises HDL levels, lowers triglycer-ides, inhibits plate-let aggregation and helps to lower blood pressure	Papaya, red/green peppers, broccoli, Brussels sprouts, kale, strawberries & oranges	1000 mg capsules 3 times a day Best taken with food Buffered forms of Vitamin C are easier on the stomach Taking Vitamin C supplements with bioflavonoids will help increase absorption	Sulfa antibiotics decrease Vitamin C levels High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication, as Vitamin C can act as a natural blood thinner
Vitamin E	Antioxidant – helps reduce free radical damage	Sunflower seeds, almonds, pine nuts, olives, spinach, blueberries, green leafy vegetables & tomatoes	400-800 IU a day Best taken with food Best form to take is with mixed tocopherols including D alpha-tocopherol, tocotrienols and succinate Do not use synthetic form dl-alpha-tocopherol	If you have heart disease or diabetes, do not take doses over 400 IU a day. Vitamin E is a natural blood thinner, so consult your health care professional first if you are taking blood-thinning medications or if you have a bleeding disorder. Stop taking this supplement 2 weeks before surgery Prolonged and high level intakes of Vitamin E (greater than 1500 IU a day) can be detrimental to the immune system
IMPORTANT				
Mono-unsaturated fats	Help to lower triglyceride levels and increase HDL cholesterol levels	Olives, olive oil & avocados	1-2 tablespoons a day	NA
Selenium	Antioxidant – neutralizes free radicals	Barley, salmon, beef, lamb, sardines, tomatoes, garlic & onions	50-200 mcg a day L- selenomethionine is a highly absorbable form	If you have an underactive thyroid (a condition called hypothyroidism) or a personal history of skin cancer, do not take selenium unless otherwise instructed by your doctor Exceeding 1000 mcg per day can cause toxicity Avoid taking selenium if you have diabetes or if you are on anticoagulants or cholesterol-lowering medications, as this may increase risk of bleeding and may reduce the effectiveness of the drug Selenium may also prolong the sedative effects of barbiturates such as butabarbital and phenobarbital
Sterols	Help to lower LDL	Rice bran, wheat germ, ground flax seeds, olive oil and blueberries	2 g of plant sterols a day	May cause nausea, indigestion, constipation or diarrhea

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Vitamin B3 (Niacin)	Helps dilate blood vessels, decrease cholesterol and increase HDL	Spelt, salmon, lamb, beef & chicken	100 mg a day	If taken in high doses (more than 100 mg a day), can cause liver damage, loss of vision, stomach ulcers or gout People with liver disease, kidney disease, high blood pressure, diabetes, gout and peptic ulcers should avoid this supplement You should not drink large amounts of alcohol if you take Vitamin B3 High doses may cause skin flushing. Niacinamide, nicotinamide and inositol hexaniacinate are non-flushing forms of niacin Avoid time-release niacin as this can be toxic to the liver Niacin may affect anticonvulsant medications and should be used under the care of a medical professional
HELPFUL				
Vitamin B6	Decreases platelet aggregation, lowers cholesterol levels, and helps reduce homocysteine levels	Beef, venison, sunflower seeds, walnuts & chicken	50-200 mg a day	Although Vitamin B6 is abundant in foods, it is not usually found in high amounts and gets easily lost with cooking and processing. You may need to supplement to get best results Do not take higher than 1000 mg as this can cause peripheral neuropathy, a condition characterized by damaged nerves that cause pain and numbness in the extremities Side effects may include loss of appetite, sleepiness, headache, tingling and vomiting
Vitamin B12	Helps reduce homocysteine levels	Salmon, lamb, beef, venison, sardines, eggs & cheese	100 mcg a day	Consult with your health care practitioner before supplementing with B12, due to its impact on the nervous system Only supplement with B12 if you have a deficiency If you take antibiotics, acid reflux, ulcer and diabetic medications, it may interfere with your body's ability to absorb and use Vitamin B12 May cause skin itching, diarrhea, a feeling of being swollen, muscle weakness, cramps and pain, excessive thirst and urination, confusion, shortness of breath, fatigue, headaches, dizziness and difficulties breathing or swallowing
Arginine	Helps relax blood vessels and prevent plaque build-up	Red meats, spinach, chick peas, lentils, whole grains, almonds, walnuts & sesame seeds	500 mg - 4 g a day Best to take on an empty stomach with juice, as amino acids compete for absorption	Diabetics should consult with their health care professional before using, as this may affect blood sugar and insulin Do not take if you have kidney or liver disease, if you have low blood pressure or if you are on blood thinners, as arginine can increase bleeding It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
HELPFUL				
Garlic	Helps prevent blood clotting, and lowers LDL and triglycerides, while helping to increase HDL levels	1-2 fresh cloves a day	4000 mcg of allicin/garlic capsules a day	Check with a health care professional if you are taking blood-thinning medications or protease inhibitors before taking garlic supplements
Grape Seed extract	Potent antioxidant activity. Helps prevent damage to arterial walls, lowers cholesterol levels and reduces plaque deposits in arteries	NA	150 mg a day	Side effects may include headaches, itchy scalp, dizziness and nausea People allergic to grapes should not use grape seed extract If you have a bleeding disorder or high blood pressure, or are taking blood thinners, NSAIDs or medications for your heart, talk to your health care professional first before taking
Pine extract	Helps prevent damage to arterial walls, lowers cholesterol levels and reduces plaque deposits in arteries	NA	150 mg a day	May cause irritability, headaches, dizziness and/or stomach upset Do not use if undergoing chemotherapy or using anticoagulation or immunosuppressant medications

CHAPTER 5

Nutrition for Weight Loss

1. Increase protein
2. Eat good fats
3. Eat 19-30 grams of fiber a day
4. Eat foods that boost your metabolism
5. Take a chromium supplement
6. Reduce carbohydrates and improve insulin sensitivity

SCI and Weight Loss

Following a spinal cord injury (SCI) there are abrupt changes in body composition, including loss of lean muscle and an increase in fat. This, coupled with reduced physical activity, hormonal changes, altered organ function and poor dietary habits, results in an imbalance between energy intake and energy expenditure. This in turn can lead to weight gain.

Being overweight is one of the major contributing factors to Type 2 diabetes, cancer, high blood pressure, gallstones, sleep apnea, fatty liver and cardiovascular disease – all common health issues for people with an SCI.

Some people believe that severe calorie restriction is a fast and effective way to lose weight. It is NOT. Severe calorie restriction cannot be sustained, and your body will adapt to this by slowing down its metabolism, causing you to gain even more weight. This method of weight loss is also not advised for people with an SCI because it can cause you to lose precious lean muscle mass and water, compromise your bone mineral content, and create nutritional deficiencies. This can be extremely detrimental for your health, and compound your risk of developing secondary health complications.

The best way to lose/manage your weight is long-term lifestyle and diet changes.

65% overweight

Over 65% of individuals with SCI are considered overweight, with a third of these individuals being classified as obese.

The percentage of body weight as fat mass is 8-18% higher in people with SCI compared to able-bodied peers.

0.5 to 1.0 lb.

A reduction in 0.5 to 1 lb. a week is an ideal weight loss plan for individuals with SCI.

In this chapter you will find specific ways to measure your weight and body composition as well as learn about food options and lifestyle strategies to help you safely and effectively lose weight.

Factors that Contribute to Weight Gain in Individuals with SCI

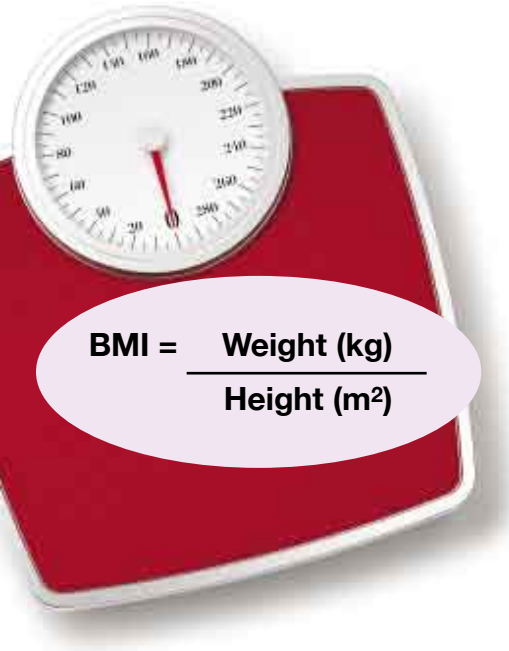
1. **Changes in body composition**
   Lack of nerve innervation needed to stimulate muscle leads to loss of lean muscle mass and an increase in fat mass.
2. **Reduced physical activity**
   Reduced physical activity results in fewer calories being burned. Studies demonstrate a marked reduction of between 12% and 54% of total daily energy expenditure.
3. **Lower resting metabolic rate (RMR)**
   The interrupted nerve pathways to the musculoskeletal system cause metabolic rates to be lower than pre-injury rates. Additionally some medications, such as narcotics, have the potential to decrease resting metabolic rates. A lower metabolic rate means fewer calories are being burned at rest.
4. **Hormonal changes**
   After SCI, people often experience a drop in growth hormone and testosterone. This is associated with a loss of lean muscle tissue and an increase in weight. There is also an increase in the fat-gaining hormones such as insulin and cortisol following SCI.
5. **Glucose intolerance and poor carbohydrate metabolism**
   A decrease in lean muscle mass and an increase in fat tissue following SCI can lead to impaired glucose uptake. Individuals with SCI also have problems with carbohydrate metabolism. When carbohydrates are not processed in the body properly, they are converted into fat, which results in weight gain.
6. **Insulin resistance**
   Insulin resistance is when the hormone insulin becomes less effective at getting glucose into your cells, resulting in increased glucose levels in your blood. This increases fat storage and stops fat from being broken down for energy.
7. **Eating pre-injury portions/calories**
   Many people with SCI continue to eat the same portion sizes/calories as they did pre-injury. However, following SCI the body requires fewer calories and, as a result, consuming these excess calories will result in weight gain.

Health issues associated with weight gain

- Increased stress on nerves, joints and muscles
- Decreased circulation
- Increased pain
- Fatigue
- Cardiovascular disease
- Compromised bowel and bladder routines
- Poor sleep
- Depression
- Compromised immune function
- Stress on kidneys
- Increased risk of pressure sores
- Increased inflammation
- Insulin resistance
- Type 2 diabetes
- High blood pressure
- Fatty liver
- Hormone imbalances
- Difficulty breathing (due to excessive weight on the abdomen causing increased strain on the diaphragm)
- Increased risk of blood clotting and deep vein thrombosis (due to a release of prothrombotic clotting agents from adipose tissue)
- Reduced life expectancy

It isn't fat that makes you fat... it's sugar & refined carbohydrates!

The process of fat storage is primarily regulated by a hormone called insulin. Insulin is released after consuming a meal with carbohydrates, and helps drive glucose from your blood into your cells to be used as fuel. If the carbohydrates (glucose) from your food is not used by your body, it is packaged and stored in your fat cells, causing weight gain.



How to determine if you are overweight

Due to decreased muscle and bone mass, conventional body composition testing and calculations to determine categories of weight do not apply to individuals with SCI. Below are formulas that have been adjusted for a person with SCI.

1. Body Mass Index

The body mass index (BMI) determines categories of weight in the non-SCI population (such as overweight and obese). It is used to determine health risks such as hypertension, cardiovascular disease and Type 2 diabetes. BMI is calculated by dividing a person's height (m^2) by their weight (kg).

However, in SCI this formula significantly underestimates if a person is overweight or obese, and underestimates their overall health risk for disease and metabolic abnormalities. This is because people with SCI tend to have less lean muscle tissue and a greater fat percentage than their able-bodied counterparts.

Adjusted Body Mass Index for SCI

Category	Non-SCI	SCI Adjusted
Underweight	< 19	Not determined
Normal	19 - 25	< 22
Overweight	25 - 30	22 - 25
Obese	30 - 35	> 25

– Groach, Nash, Inger, Ljungberg et al., 2009

2. Ideal Weight Calculations for a Person with SCI

Category	Non-SCI Calculation	SCI Adjusted
Ideal body weight for paraplegia	Male: 110 lbs. for first 5 ft. in height + 5 lbs for each inch over 5 ft. Female: 100 lbs. for first 5 ft. in height + 5 lbs for each inch over 5 ft.	- 5 to 10% - 5 to 10%
Ideal body weight for quadriplegia	Male: 110 lbs. for first 5 ft. in height + 5 lbs for each inch over 5 ft. Female: 100 lbs. for first 5 ft. in height + 5 lbs for each inch over 5 ft.	- 10 to 15% - 10 to 15%

– Powell, Frost, 2010

IDEAL DAILY CALORIE INTAKE (adjusted for SCI)

Paraplegia:

28 kcal/kg of ideal body weight/day

Example: 150 lbs = 60 kg (60 X 28 k/cal = 1,904 calories per day)

Quadriplegia:

23 kcal/kg of ideal body weight/day

Example: 150 lbs = 60 kg (60 X 23 k/cal = 1,564 calories per day)

– Frost, 1998

IMPORTANT:

Have your wheelchair seating reassessed as you lose weight to help prevent the development of pressure sores.

Nutrition for Weight Loss

1 Increase protein

Protein is necessary for making hormones that help stimulate fat burning and curb appetite. It does not raise insulin levels and is crucial in muscle growth/maintenance and tissue repair, which is important for healthy metabolism.

Consume a serving size of protein about the size and thickness of your palm at every meal and half of this for snacks.

Good sources of protein include fish, turkey, legumes & lentils.

2 Eat good fats

Eating fat does not make you fat. On the contrary, eating good fats such as essential fatty acids (omega-3) can actually help you to lose weight by increasing your metabolic rate, reducing cravings, and suppressing your appetite.

Eat good fats from foods such as salmon, halibut, trout, snapper, tilapia, avocado, sunflower seeds, olives, olive oil & walnuts.

DID YOU KNOW?
Good fat curbs your appetite THREE times longer than carbohydrates

3 Eat 19-30 grams of fiber a day

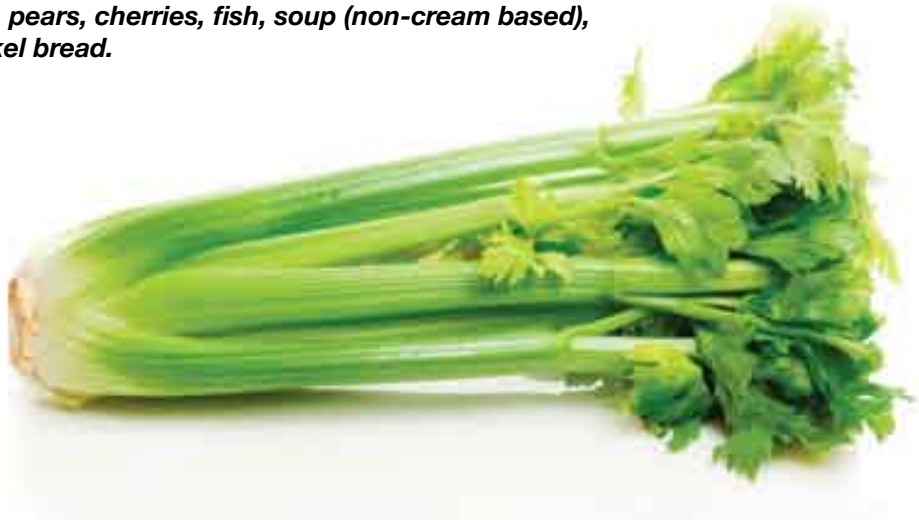
Fiber helps slow the release of sugar into the blood, thereby reducing the risk of insulin resistance. It is also calorie free, makes you feel fuller faster and helps rid your body of excess toxins.

Broccoli, cauliflower, carrots, avocados, beets, oat fiber and psyllium husks are some of the best sources of fiber for weight loss.

4 Eat foods that boost your metabolism

The thermic effect of food is the energy that your body uses to digest and absorb nutrients. For example, celery takes more energy (calories) from the body to absorb and digest than the calories it provides.

Thermogenic foods that stimulate your metabolism include the following: cayenne peppers, salsa (without the sugar), hot peppers, chili sauce, green tea, apple cider vinegar, cabbage, celery, Brussels sprouts, broccoli, cauliflower, spinach, apples, grapefruit, berries, pears, cherries, fish, soup (non-cream based), oatmeal & rye/pumpernickel bread.



5 Take a chromium supplement

Chromium is a mineral that helps improve insulin sensitivity. It does this by increasing the number of insulin receptors on your cells as well as helping insulin bind more strongly to receptors. Together this helps to get sugar into your cells and to minimize excess sugar in the blood. Chromium is naturally found in many foods such as in grains. When foods are processed however much of their chromium is depleted. For example 98% of chromium has been removed from white flour.

Other key vitamins & minerals that help to increase insulin sensitivity include:

- Magnesium
- Biotin
- Zinc
- Vitamin D
- Alpha lipoic acid

Cinnamon

Studies show that cinnamon can help you lose weight by enhancing the body's ability to use glucose. As a result less glucose is stored away as fat. Cinnamon may also reduce the risk factors associated with cardiovascular disease and Type 2 diabetes by regulating blood sugars and reducing LDL "bad" cholesterol.

Try to consume 1/2 to 1 teaspoon of cinnamon a day by putting it in your oatmeal, smoothies, mashed sweet potatoes or favorite tea.

6 Reduce carbohydrates and improve insulin sensitivity

All carbohydrates are broken down into sugar (glucose) after you eat them. The hormone insulin is then needed to move this glucose from your blood into your cells so it can be used for energy. If glucose is not moved into your cells, it will be stored as fat. It can also stimulate appetite and can cause water retention and swelling.

Insulin sensitivity refers to how well or poorly the body responds to insulin. Individuals who are insulin resistant need to release higher amounts of insulin to ensure glucose can get into cells. High levels of insulin can lead to health problems such as Type 2 diabetes and weight gain. One of the leading causes of high insulin levels is eating refined (simple) carbohydrates such as white bread, white rice, white pasta, sugars and other food stimulants such as caffeine. These types of foods should be avoided.

Individuals with SCI have difficulties with carbohydrate metabolism, glucose intolerance and insulin resistance, which means you have greater difficulty processing carbohydrates. Increased consumption of these foods can result in unstable blood sugar levels and can increase your insulin resistance.

If your blood sugar levels are unstable or you are insulin resistant, you are three times more likely to have difficulty losing weight.

The glycemic index measures how quickly different foods increase blood sugar levels. Simple carbohydrate foods such as white bread, white rice, processed breakfast cereals, cakes, cookies, white potatoes and pretzels are digested quickly and tend to increase blood sugar levels quickly. These foods are known as high glycemic foods.

Complex carbohydrates such as vegetables, legumes and quinoa are digested slowly and tend to release sugar gradually into the blood. These foods are known as low glycemic foods.

Reducing simple carbohydrates is a critical factor in weight loss for people with SCI. The government food guides in Canada and America promote 6-8 servings of grains a day. This is too much for your body to process.

Reduce your daily intake of carbohydrates to:

0 - 1 fruit a day

- Fruits low in sugar that can be consumed include: apples, pears, berries, oranges & peaches
- Fruits high in sugar that should be avoided include: grapes, pineapple, bananas, apricots, raisins, papaya & mango

0 - 1 grain or starchy vegetable a day

- Starchy vegetables include carrots, potatoes, yams, corn, parsnips, pumpkin, squash, sweet potatoes & legumes
- Grains which should be avoided include white rice, white pasta, breads, cereal, muffins & cookies

To determine if insulin levels are an issue for weight loss, you may want to consider getting your fasting blood glucose levels checked.

Simple carbohydrate foods such as white bread, white rice, muffins, white pasta, bagels and cookies switch off brain signals that tell you that you're full, so you just keep eating. Eating proteins, vegetables and good fats actually cause people to eat less and result in reduced calorie consumption.

Help balance blood sugars and increase insulin sensitivity by:

- Eating 3 small meals and 2 snacks, approximately 2-3 hours between each meal/snack
- Eating breakfast every day within an hour of waking up
- Eating your last meal two hours before bed
- Eating a combination of lean protein and a complex carbohydrate with each meal
- Avoiding all refined carbohydrates, processed foods, white flour, sugar, and foods containing preservatives and additives
- Avoiding smoked and cured meats such as bacon, ham and salami, which are high in N-nitroso compounds that can interfere with insulin

There are so very many changes that we must make after spinal cord injury, and our eating habits are just one of them. To stay healthy we have to really watch our caloric intake – it is so easy to become obese. By increasing my protein and really cutting back on grains, I had tremendous success losing 40 pounds in just 20 weeks! Diet and exercise are equally important to lose – or in fact to win – a healthy lifestyle.

Brent, C5-6-7 tetraplegic

Skinny Bloody Mary

This refreshing spicy drink stimulates metabolism by 20% and helps break down fat. It also helps boost your liver's fat-burning properties. ***Servings: 1***

Ingredients:
- 2 cups of unsalted tomato juice
- 1 stalk of celery
- A few black peppercorns
- 1 pinch of cayenne pepper
- 1⁄4 of a teaspoon of horseradish
- 1/4 cup of freshly squeezed lemon juice

Directions:
1. Place all ingredients in a glass, stir and enjoy

NUTRITIONAL CONTENT:
Proteins: 3.7 grams
Carbohydrates: 26 grams
Fats: 0 grams
Calories: 106

Note: Be mindful of the spices and their effect on your body's temperature regulation. Start making this drink with minimal spices and then you can increase them if no side effects.

Fat-Busting Breakfast

Eating foods such as protein and those that contain high fiber help balance insulin and blood sugar levels. This not only helps you maintain a healthy weight, but also gives you sustained energy throughout your day. ***Servings: 1***

Ingredients:
- 2 eggs
- 1 cup of asparagus, cut up
- 1⁄2 cup of onions, chopped
- 1⁄2 cup of broccoli, chopped

Directions:
1. Sauté onions, asparagus and broccoli in a pan (with coconut oil or butter) and then add eggs

NUTRITIONAL CONTENT:
Proteins: 17.6 grams
Carbohydrates: 19 grams
Fats: 10 grams
Calories: 192

Apple-Cranberry Salmon Salad

This salad is loaded with protein and fiber, which is perfect for helping shed those extra pounds. ***Servings: 4***

Ingredients:

- 1 can of salmon
- 1 large Granny Smith apple, sliced
- 1⁄2 cup of dried unsweetened cranberries
- 2 handfuls of spinach leaves
- 1⁄4 cup of fresh lemon juice
- 2 tablespoons of fresh tarragon
- 1⁄4 teaspoon of sea salt
- Pinch of black pepper

Directions:

1. Combine lemon juice, salt & pepper in bowl
2. Add sliced apples, cranberries and tarragon to lemon mixture
3. Break salmon apart and add to apple mixture
4. Spoon over bed of spinach leaves

NUTRITIONAL CONTENT PER SERVING:

Proteins: 20 grams
Carbohydrates: 29 grams
Fats: 11 grams
Calories: 293

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Chromium	Supplementing with chromium has been shown to significantly improve insulin action, decrease fasting glucose, cholesterol and triglyceride levels	Onions, tomatoes, bran, whole grains & broccoli	200 to 400 mcg a day If pre-diabetic or have Type 2 diabetes take 800 to 2,000 mcg a day with food but blood sugars will need to be monitored Best form is chromium polynicotinate	If you are diabetic you need to closely monitor your blood sugar levels Chromium levels can be depleted in the body by consuming refined carbohydrates, white flour products and through lack of exercise
Cinnamon	Helps with insulin resistance and balancing blood sugars	Ground cinnamon, 1/2 to 1 teaspoon a day with food	NA	Avoid if you have stomach and/or intestinal ulcers Gastrointestinal irritation may result where large amounts of the pure essential oil are ingested, causing vomiting and possible kidney irritation Cinnamon bark is contraindicated for people with liver diseases such as fibrosis, hepatitis and cirrhosis
Fiber	Regulates blood sugar levels for weight loss, reduces bloating/ abdominal distension and helps reduce overeating	Insoluble fiber – wheat bran, whole grains, brown rice, vegetables (with skin) Soluble fiber – oats, apples, pears, berries, beans, lentils & peas	1-2 tablespoons a day of whole husk psyllium 1-2 tablespoons a day of ground flax seeds or apple pectin	Always consume fiber supplements with a glass of water Fiber may interfere with the absorption of medications and supplements; therefore take fiber 2 hours before or after taking these Do not exceed 30 grams of fiber a day Fiber supplements in pill form should not be taken by people with esophageal disorders, as fiber can expand and cause obstruction Individuals with bowel spasms, colitis, or inflammatory bowel disease should use with caution
Omega-3 essential fatty acids	Prevents belly fat accumulation Improves insulin resistance Balances hormones Reduces inflammation and breaks down fat	Salmon, sardines, walnuts, tuna, halibut & flax seeds	Fish or flax seed oil: 2-4, 1000 mg capsules or tablespoons of flax or fish oil a day in divided doses	Omega-3 has blood-thinning properties. Consult with your health care professional if you are on blood-thinning medication. Stop taking 2 weeks prior to surgery Fish oil can increase the risk of mania in patients with bipolar disorder People who have hypersensitivities or allergies to fish or shellfish may also be allergic to fish oil supplements. Signs of an allergic reaction include a rash or hives, difficulty breathing and swelling of the throat, face or mouth. An allergic reaction to fish oil should be considered a medical emergency
IMPORTANT				
Alpha lipoic acid	Improves insulin resistance, blood sugar balance; reduces abdominal fat and metabolic syndrome	Broccoli, spinach, other green leafy vegetables & calf's liver	200 mg 1- 3 times a day	Alpha lipoic acid may cause nausea, vomiting and diarrhea, abdominal pain, cramping or bloating Taking lipoic acid with diabetic drugs or thyroid-regulating medications should be avoided The antioxidant effects of this supplement may interfere with certain cancer therapies, including chemotherapy and radiation therapy

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Biotin	Addresses insulin resistance	Eggs, liver, Swiss chard, carrots & almonds	1- 3 mg a day	None known
Zinc	Blood sugar balance and improves insulin action	Red meat, pumpkin seeds, sesame seeds & eggs	20 – 50 mg a day Best taken with food Best absorption forms include: zinc picolinate, acetate, citrate, glycerate and monomethionine Poor absorption forms include: zinc oxide and zinc sulfate	Take in divided doses during the day to prevent possible nausea Consult with your health care professional first if you have high cholesterol Higher doses of zinc (greater than 100 to 300 mg a day) can impair the immune system and may lead to a copper deficiency
Vitamin D	Helps improve insulin sensitivity	Cod liver oil, eggs, goat's milk, tuna, salmon & sardines	800 - 2000 IU a day	Best taken in supplement form as minimal amount is obtained from food Consult with your health care professional as dosages may vary considerably based on individual needs Vitamin D3 supplementation doses should be based on Vitamin D 25-OH blood levels. Once optimal intake is maintained, then monitoring is recommended
Magnesium	Helps improve your insulin sensitivity and reduces fat storage	Black beans, quinoa, sunflower seeds sesame seeds, bran, spinach, broccoli, basil, flax seeds & ginger	400 - 800 mg a day in divided doses at meals Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease, and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first
HELPFUL				
CoQ10	Facilitates the transport and breakdown of fat into energy	Fish, organ meats (kidney, liver, heart), chicken & beef	100 – 300 mg a day Best form is ubiquinol	If you are taking statin drugs it is essential that you take CoQ10 as these drugs deplete CoQ10 in the body Approximately 14-32% of CoQ10 is lost during frying of vegetables and eggs; however, boiling these foods preserves CoQ10 Avoid taking CoQ10 two weeks prior to surgery. Certain medications may interact with CoQ10 such as blood-thinning drugs. Consult with your health care professional before taking

CHAPTER 6

Nutrition For Respiratory Health

1. Eat foods that act as expectorants
2. Eat foods that are natural antihistamines
3. Drink 8-10 cups of fluid a day
4. Eat foods high in Vitamins C & A, bioflavonoids & zinc
5. Add lung-supporting herbs & spices to meals
6. Avoid mucus-forming foods such as dairy, red meat & gluten
7. Limit sugar (including sugar from fruit)

SCI and Respiratory Health

Individuals with spinal cord injury (SCI) are at risk of pneumonia and other respiratory infections. Your level of injury and length of time since injury have significant impact on the function of your respiratory system and its defences.

Micro-organisms can invade your lungs when you breathe in. Your lungs are protected from these micro-organisms by your immune system and mucus secretions. Infection can occur when one of these defences becomes compromised. This is more likely to happen when an individual sustains an SCI, particularly people who have been living with SCI for a long time and those with high thoracic and cervical injuries.

Individuals with cervical injuries experience varying degrees of paralysis of the respiratory muscles, and those with injuries at T-6 or above can have difficulty expanding their lungs and coughing up mucus. These individuals also have a tendency to produce excess mucus, which make them more susceptible to respiratory infections.

Good nutrition can help you to decrease your risk of respiratory infections, as well as combat infections when they occur.

Good Mucus vs. Bad Mucus

There is healthy mucus and unhealthy mucus. Healthy mucus lines the respiratory tract. It is clear and slippery, and helps fight invading bacteria.

However, when you get an infection, it can easily develop into thick, sticky and cloudy mucus, which can make breathing difficult. This infected unhealthy mucus can also become a breeding ground for additional bacteria.

This chapter will identify various nutrients, foods, herbs and spices that help reduce the production of bad mucus.

It will also explain ways you can boost your immune system to help prevent and address respiratory infections.

Respiratory Infections

Respiratory infections are usually grouped into 3 categories:

1) **Acute upper respiratory tract infections**
2) **Influenza & pneumonia**
3) **Lower respiratory tract infections**

Your body's approach to fighting respiratory infections, such as bronchitis and pneumonia, includes the normal process of expectorating (removing mucus) and boosting the immune system. Nutrition can help in both of these areas.

While prescription antibiotics have played and continue to play a huge role in fighting bacterial infections, studies indicate that it is extremely important not to overuse them. When these antibiotics are overused, bacteria may develop a resistance to them, leading to an increased risk of infection and/or a less effective treatment of the infection.

Nutrition can help prevent and manage early symptoms of respiratory infections. However, it is critical that you seek medical attention if you are experiencing any of the following symptoms: fever, chills, abnormally fast breathing, decreased breath sounds, cough, increased mucus production, rapid heart beat or shortness of breath.

Pneumonia is inflammation of the lung tissue and is usually caused by an infection. Pneumonia can be difficult to diagnose in SCI because of lack of sensation.

Common signs of pneumonia for an individual with SCI include:

• Fever • Cough • Chills • Increased phlegm production • Rapid heart beat
• Shortness of breath • Abnormally fast breathing • Decreased breath sounds

Nutrition for Respiratory Health

1 Eat foods that act as expectorants

Expectorants are foods and herbs that promote the drainage of mucus from the lungs. They signal the body to increase the amount or hydration of secretions, resulting in more, yet clearer secretions, and as a by-product, lubricate the irritated respiratory tract. Many of these expectorants also have antiviral and antibacterial activity, as well as promoting the coughing reflex.

Expectorant Herbs:
Borage, cardamom, elder, ginger, fenugreek, garlic, hyssop, licorice root, marshmallow root, red clover, plaintain & thyme

Expectorant Vegetables:
Carrots, chili peppers & leeks

2 Eat foods that are natural antihistamines

Garlic is a good example of a natural antihistamine. It not only protects against respiratory infections, but it also destroys unwanted bacteria in the body without harming your good bacteria.

Other antihistamine herbs include: basil, chamomile, parsley, ginger & thyme.

3 Drink 8-10 cups of fluid a day

The neurotransmitter histamine assists with bronchial muscle contraction to help expel mucus from the lungs. Histamine also plays a role in fighting bacteria and viruses. However, when the body is dehydrated, histamine activity increases and actually constricts the lungs, making it more difficult to expel mucus. This is why it is extremely important to stay well hydrated as a way of managing respiratory infections.

Liquids also help thin lung secretions, making it easier for you to cough up mucus. Chicken soup is very good for thinning the mucus and contains protein needed to help produce antibodies to fight the infection.

Drink large amounts of fluid including water, diluted vegetable juices, soups, broths & herbal teas.

4 Eat foods high in Vitamins C & A, bioflavonoids & zinc

Studies show that white blood cells stock up on large amounts of Vitamin C in preparing to fight infections. Therefore, supplementing with Vitamin C can help prevent and fight respiratory infections.

Vitamin C is a water-soluble vitamin and is quickly lost from the body. If you have an infection, it's best to take 500 mg of Vitamin C every 4 hours.

Foods high in Vitamin C include: parsley, red & green peppers, leeks, alfalfa sprouts, lemons, tomatoes, broccoli, cabbage, Brussels sprouts & cauliflower.

Bioflavonoids, found in foods high in Vitamin C, are also helpful in fighting respiratory infections.

Vitamin A is important for your immune system and necessary for helping to maintain the healthy lining of your respiratory passages. People who have a Vitamin A deficiency are at increased risk of an infection and can increase the severity of infection. This can lead to serious respiratory conditions such as pneumonia.

Foods high in Vitamin A include: carrots, winter squash, leeks, red pepper & sweet potato.

Zinc boosts your immunity to help prevent and fight viral and bacterial infections.

Foods high in zinc include: yogurt, oats, pumpkin seeds & sesame seeds.

5 Add lung-supporting herbs & spices to meals

There are numerous herbs and spices that are known to help with respiratory conditions:

- **Cloves** help with asthma and bronchitis
- **Ginkgo biloba** helps to relieve bronchial spasms
- **Thyme** is ideal for deep-seated chest infections, such as chronic coughs and bronchitis
- **Goldenrod** is an antiseptic for mucus membranes, and so can help with bronchitis, coughs and respiratory congestion
- **Turnips** act as a decongestant
- **Oregano** is helpful for lung and chest infections as it has antibacterial properties. **Oil of oregano** has a more potent effect

6 Avoid mucus-forming foods such as dairy, red meat & gluten

Healthy mucus, which is clear and slippery, acts as a vital protective barrier to the lining of your lungs. However, when your body detects an invader, such as bacteria, dust particles and even certain foods, it produces a thick, cloudy and sticky mucus.

If you have a lot of this thick sticky mucus, bacteria can become trapped, creating a breeding ground for infection. Furthermore, this unhealthy mucus can be difficult to cough up. This can be particularly problematic for individuals with SCI who have limited ability to cough, delaying recovery and making them more susceptible to getting sick. Therefore it is important to reduce foods that form mucus, such as bread, sugar, red meat and processed foods.

Milk, cheese and other dairy products are the highest mucus-producing foods and should be limited. If you are at risk, or currently have a respiratory infection, these foods should be avoided altogether.

Gluten is a "glue-like" substance that holds molecules together. It requires the production of extra stomach acid for digestion and this can also lead to increased mucus production.

Foods containing gluten that should be limited include: breads, pasta, baked goods & cereals. Gluten, in the form of flour, is also found in soups, sauces and even injected into some meats.

7 Limit all sugar to less than 50 grams a day (including sugar from fruit)

Sugar weakens your immune system.

Glucose (sugar) and Vitamin C have similar chemical structures, so they compete with each other to enter the cells. If there is more sugar in your system, less Vitamin C will get into your immune cells, reducing the cells' ability to fight respiratory infections.

Food intolerances can also contribute to respiratory problems and mucus build-up, especially in chronic bronchitis.

To find out if food intolerances are contributing to your respiratory problems – complete the ***Food Elimination Diet*** (see Appendix) and monitor your respiratory symptoms.

Lung-Loving Drink

This drink packs a powerful antioxidant punch for maintaining healthy lungs.
Note: *Parsley should be avoided if pregnant or in cases of kidney inflammation.* ***Servings: 1***

Ingredients:
- 6 sprigs of parsley
- 1 kiwi, peeled
- 1⁄2 cup of blueberries
- 1 cup of spinach
- 1 cup of green tea (steeped and chilled)

Directions:
1. Place all ingredients in a blender
2. Blend and drink immediately

NUTRITIONAL CONTENT:
Proteins: 2.4 grams
Carbohydrates: 23.3 grams
Fats: 0.7 grams
Calories: 101

Spinach, Lentil and Lemon Soup

This refreshing soup is packed with immune-boosting Vitamin C and water, and has antihistamine and antimicrobial benefits to help fight off an infection. ***Servings: 4***

Ingredients:
- 1 tablespoon of olive oil
- 1 onion, finely sliced
- 4 cloves of garlic, sliced
- 1 cup of brown or green lentils
- 4 cups of vegetable stock
- 1 bunch of spinach
- 2 bunches of cilantro leaves and stems, roughly chopped
- Juice of 1 lemon
- Salt & pepper

NUTRITIONAL CONTENT PER SERVING:
Proteins: 14 grams
Carbohydrates: 51.1 grams
Fats: 35 grams
Calories: 546

Directions:
1. Saute onion in olive oil, add garlic and cook for another few seconds, add lentils and stir
2. Add stock and simmer until lentils are soft (about 30 minutes)
3. Roughly chop spinach, then add to pot with cilantro and lemon juice
4. Stir well, cover pot to let the spinach wilt
5. Puree and serve

Expectorant Soup

This meal contains the three vegetables that help promote drainage of mucus from your lungs. It also contains 304% of your daily serving of Vitamin A. ***Servings: 4***

Ingredients:

- 1 tablespoon of extra virgin olive oil
- 1 leek (white and pale green parts) thinly sliced
- 6 carrots (peeled and sliced)
- 1 chili pepper, finely chopped
- 2 cloves of garlic, crushed or chopped
- Pinch of sea salt
- 3 cups of low sodium chicken stock
- 1 tablespoon of parsley, chopped finely

Directions:

1. Heat oil in a large saucepan over medium heat, cook leek until soft, approximately 4 to 5 minutes
2. Stir in carrots, chili pepper and garlic and season with salt
3. Cook until carrots are soft, approximately 8 to 10 minutes
4. Add chicken stock and bring to a simmer
5. Cook 10 to 12 minutes
6. Puree half the soup in a blender until smooth
7. Stir puree into remaining soup
8. Garnish with parsley

NUTRITIONAL CONTENT PER SERVING:

Proteins: 5 grams
Carbohydrates: 12 grams
Fats: 5 grams
Calories: 102

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Vitamin C with bioflavonoids	Helps increase circulation of antibodies; increases neutrophil function, reduces the length of chronic illness and protects cell membranes from free radical damage Also has anti-inflammatory, antiviral & antibacterial properties	Brussels sprouts, green/red peppers, parsley, tomatoes, alfalfa sprouts, broccoli, cabbage, cauliflower, lemons, leeks & onions Fruits should be limited due to sugar content	4000-6000 mg a day Bioflavonoids: 1000 mg a day	Sulfa antibiotics increase elimination of Vitamin C High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medications, as Vitamin C can act as a natural blood thinner
Vitamin A	Helps maintain the integrity of the respiratory tract lining, reduces risk of infection and promotes repair of lung tissue It also boosts natural killer cell activity and has antiviral properties	Sweet potato, kale, carrots, spinach, red peppers, butternut squash & leeks	5000-10,000 IU a day	Women should not take high doses of Vitamin A (over 10,000 IU) if sexually active or of child-bearing age due to risk of birth defects Doses over 10,000 IU should only be taken under the supervision of your health care practitioner
Zinc	Helps to support immune cells and may decrease risk and severity of infections It also helps maintain the integrity of the respiratory tract	Sesame seeds, pumpkin seeds, oats & yogurt	45-60 mg a day Best taken with food Best absorption forms include: zinc picolinate, acetate, citrate, glycerate and monomethionine Poor absorption forms include: zinc oxide and zinc sulfate	Take in divided doses during the day to prevent possible nausea Consult with your health care professional first if you have high cholesterol Higher doses of zinc (greater than 100 to 300 mg a day) can impair the immune system and may lead to a copper deficiency
Expectorant herbs and vegetables	Helps promote drainage of mucus from the lungs	Borage, elder, garlic, ginger, cardamom, fenugreek, licorice root, marshmallow root, hyssop, red clover, plaintain, thyme, carrots, chili peppers & leeks	As directed on label (if available in supplement form)	Herbs can be powerful and you should consult with your health care professional if planning to take in supplement form Can be taken as a tea, or put in broths, soups, and stir-frys
Garlic	Antihistamine, antibacterial, antifungal and antiviral	1⁄2 - 1 clove of garlic a day	2-6 capsules a day in divided doses	Check with your health care professional if you are taking blood-thinning medications or protease inhibitors before taking garlic supplements

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Water	Helps to thin mucus secretions and boost the immune system	8-10 cups of fluid a day	NA	Avoid distilled water, which can leach minerals from the body Avoid water stored in plastic bottles, which can leach chemicals into water, potentially creating hormone imbalances
IMPORTANT				
Echinacea	Helps address bacterial, viral and fungal infections	NA	Dried root (in tea) 1/2 - 1 teaspoon in one cup of hot water, 3 times a day OR Tincture 1/2 teaspoon in water 3 times a day	Do not take echinacea for longer than 10 days Some people have allergic reactions to echinacea. If you suffer from allergies or asthma, you might have a particular susceptibility to this negative effect. An allergy to any plant in the daisy family could indicate an allergy to echinacea Do not take if you suffer from conditions that result from overactive immune systems such as rheumatoid arthritis or lupus, or if you take any medications meant to suppress the immune system Also contraindicated in people who have diabetes, connective tissue disorders, liver disease, multiple sclerosis, HIV/AIDS and tuberculosis
Lung-supporting herbs and spices	As stated in chapter	Cloves, gingko biloba, thyme, goldenrod, turnips & oregano	As directed on label (if available in supplement form)	Herbs and spices can be powerful and you should consult with your health care professional if planning to take in supplement form Can be taken as a tea, or put in broths, soups, and stir-frys
HELPFUL				
Antihistamine herbs	Reduce lung irritation/ inflammation from infection	Basil, chamomile, parsley, ginger & thyme	NA	Can be taken as a tea, or put in broths, soups, juices and stir-frys
N-acetylcysteine	Helps to thin mucus secretions, making it easier to cough up. It is often used for emphysema, bronchitis, tuberculosis, pneumonia, in tracheotomy care and cystic fibrosis	Chicken, yogurt, eggs, red peppers, garlic & onions	200-500 mg, 3 times a day	There is a concern that N-acetylcysteine might cause bronchospasm in people with asthma if inhaled or taken by mouth or through a tube in the windpipe. If you take N-acetylcysteine and have asthma, you should be monitored by your health care provider Activated charcoal is sometimes used to prevent poisoning in people who take too much acetaminophen and other medications. Activated charcoal can bind up these medications in the stomach and prevent them from being absorbed by the body. Taking N-acetylcysteine at the same time as activated charcoal might decrease how well it works for preventing poisoning
Thymus extract	Helps protect against viral infections	NA	If you have a viral infection, take 100 mg a day	Thymus extract may increase the effectiveness of antibiotics Do not use with autoimmune conditions or those taking antirejection, corticosteroids or immune-suppressant medications Thymus extract may play a role in immunological disorders associated with stress and anxiety. Caution is advised in patients taking anxiolytics due to possible additive effects Thymus extract in conjunction with bronchodilators may have additive effects Caution is advised in patients with heart problems

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
HELPFUL				
Spleen extract	Helps protect against bacterial infections. Also stimulates white blood cell production and enhances natural killer cell activity	NA	If you have a bacterial infection, take as directed on label	Tuftsin, a component of spleen extract, may enhance the perception of pain. People taking analgesics or other pain-reducing medication should consult with a health care professional Tuftsin may increase the risk of bleeding when taken with drugs such as anticoagulants, antiplatelet drugs and non-steroidal anti- inflammatory drugs (NSAIDS) May interact with antifungal drugs, psychotropic drugs, immunomodulators or immunostimulants Spleen extract is cautioned in people taking medication for Hodgkin's disease, systemic lupus erythematous, cancer or leukemia Spleen extract is possibly unsafe when used in people with immune system disorders

CHAPTER 6

Nutrition For Respiratory Health

1. Eat foods that act as expectorants
2. Eat foods that are natural antihistamines
3. Drink 8-10 cups of fluid a day
4. Eat foods high in Vitamins C & A, bioflavonoids & zinc
5. Add lung-supporting herbs & spices to meals
6. Avoid mucus-forming foods such as dairy, red meat & gluten
7. Limit sugar (including sugar from fruit)

SCI and Respiratory Health

Individuals with spinal cord injury (SCI) are at risk of pneumonia and other respiratory infections. Your level of injury and length of time since injury have significant impact on the function of your respiratory system and its defences.

Micro-organisms can invade your lungs when you breathe in. Your lungs are protected from these micro-organisms by your immune system and mucus secretions. Infection can occur when one of these defences becomes compromised. This is more likely to happen when an individual sustains an SCI, particularly people who have been living with SCI for a long time and those with high thoracic and cervical injuries.

Individuals with cervical injuries experience varying degrees of paralysis of the respiratory muscles, and those with injuries at T-6 or above can have difficulty expanding their lungs and coughing up mucus. These individuals also have a tendency to produce excess mucus, which make them more susceptible to respiratory infections.

Good nutrition can help you to decrease your risk of respiratory infections, as well as combat infections when they occur.

Good Mucus vs. Bad Mucus

There is healthy mucus and unhealthy mucus. Healthy mucus lines the respiratory tract. It is clear and slippery, and helps fight invading bacteria.

However, when you get an infection, it can easily develop into thick, sticky and cloudy mucus, which can make breathing difficult. This infected unhealthy mucus can also become a breeding ground for additional bacteria.

This chapter will identify various nutrients, foods, herbs and spices that help reduce the production of bad mucus.

It will also explain ways you can boost your immune system to help prevent and address respiratory infections.

Respiratory Infections

Respiratory infections are usually grouped into 3 categories:

1) **Acute upper respiratory tract infections**
2) **Influenza & pneumonia**
3) **Lower respiratory tract infections**

Your body's approach to fighting respiratory infections, such as bronchitis and pneumonia, includes the normal process of expectorating (removing mucus) and boosting the immune system. Nutrition can help in both of these areas.

While prescription antibiotics have played and continue to play a huge role in fighting bacterial infections, studies indicate that it is extremely important not to overuse them. When these antibiotics are overused, bacteria may develop a resistance to them, leading to an increased risk of infection and/or a less effective treatment of the infection.

Nutrition can help prevent and manage early symptoms of respiratory infections. However, it is critical that you seek medical attention if you are experiencing any of the following symptoms: fever, chills, abnormally fast breathing, decreased breath sounds, cough, increased mucus production, rapid heart beat or shortness of breath.

Pneumonia is inflammation of the lung tissue and is usually caused by an infection. Pneumonia can be difficult to diagnose in SCI because of lack of sensation.

Common signs of pneumonia for an individual with SCI include:

• Fever • Cough • Chills • Increased phlegm production • Rapid heart beat
• Shortness of breath • Abnormally fast breathing • Decreased breath sounds

Nutrition for Respiratory Health

1 Eat foods that act as expectorants

Expectorants are foods and herbs that promote the drainage of mucus from the lungs. They signal the body to increase the amount or hydration of secretions, resulting in more, yet clearer secretions, and as a by-product, lubricate the irritated respiratory tract. Many of these expectorants also have antiviral and antibacterial activity, as well as promoting the coughing reflex.

Expectorant Herbs:
Borage, cardamom, elder, ginger, fenugreek, garlic, hyssop, licorice root, marshmallow root, red clover, plaintain & thyme

Expectorant Vegetables:
Carrots, chili peppers & leeks

2 Eat foods that are natural antihistamines

Garlic is a good example of a natural antihistamine. It not only protects against respiratory infections, but it also destroys unwanted bacteria in the body without harming your good bacteria.

Other antihistamine herbs include: basil, chamomile, parsley, ginger & thyme.

3 Drink 8-10 cups of fluid a day

The neurotransmitter histamine assists with bronchial muscle contraction to help expel mucus from the lungs. Histamine also plays a role in fighting bacteria and viruses. However, when the body is dehydrated, histamine activity increases and actually constricts the lungs, making it more difficult to expel mucus. This is why it is extremely important to stay well hydrated as a way of managing respiratory infections.

Liquids also help thin lung secretions, making it easier for you to cough up mucus. Chicken soup is very good for thinning the mucus and contains protein needed to help produce antibodies to fight the infection.

Drink large amounts of fluid including water, diluted vegetable juices, soups, broths & herbal teas.

4 Eat foods high in Vitamins C & A, bioflavonoids & zinc

Studies show that white blood cells stock up on large amounts of Vitamin C in preparing to fight infections. Therefore, supplementing with Vitamin C can help prevent and fight respiratory infections.

Vitamin C is a water-soluble vitamin and is quickly lost from the body. If you have an infection, it's best to take 500 mg of Vitamin C every 4 hours.

Foods high in Vitamin C include: parsley, red & green peppers, leeks, alfalfa sprouts, lemons, tomatoes, broccoli, cabbage, Brussels sprouts & cauliflower.

Bioflavonoids, found in foods high in Vitamin C, are also helpful in fighting respiratory infections.

Vitamin A is important for your immune system and necessary for helping to maintain the healthy lining of your respiratory passages. People who have a Vitamin A deficiency are at increased risk of an infection and can increase the severity of infection. This can lead to serious respiratory conditions such as pneumonia.

Foods high in Vitamin A include: carrots, winter squash, leeks, red pepper & sweet potato.

Zinc boosts your immunity to help prevent and fight viral and bacterial infections.

Foods high in zinc include: yogurt, oats, pumpkin seeds & sesame seeds.

5 Add lung-supporting herbs & spices to meals

There are numerous herbs and spices that are known to help with respiratory conditions:

- **Cloves** help with asthma and bronchitis
- **Ginkgo biloba** helps to relieve bronchial spasms
- **Thyme** is ideal for deep-seated chest infections, such as chronic coughs and bronchitis
- **Goldenrod** is an antiseptic for mucus membranes, and so can help with bronchitis, coughs and respiratory congestion
- **Turnips** act as a decongestant
- **Oregano** is helpful for lung and chest infections as it has antibacterial properties. **Oil of oregano** has a more potent effect

6 Avoid mucus-forming foods such as dairy, red meat & gluten

Healthy mucus, which is clear and slippery, acts as a vital protective barrier to the lining of your lungs. However, when your body detects an invader, such as bacteria, dust particles and even certain foods, it produces a thick, cloudy and sticky mucus.

If you have a lot of this thick sticky mucus, bacteria can become trapped, creating a breeding ground for infection. Furthermore, this unhealthy mucus can be difficult to cough up. This can be particularly problematic for individuals with SCI who have limited ability to cough, delaying recovery and making them more susceptible to getting sick. Therefore it is important to reduce foods that form mucus, such as bread, sugar, red meat and processed foods.

Milk, cheese and other dairy products are the highest mucus-producing foods and should be limited. If you are at risk, or currently have a respiratory infection, these foods should be avoided altogether.

Gluten is a "glue-like" substance that holds molecules together. It requires the production of extra stomach acid for digestion and this can also lead to increased mucus production.

Foods containing gluten that should be limited include: breads, pasta, baked goods & cereals. Gluten, in the form of flour, is also found in soups, sauces and even injected into some meats.

7 Limit all sugar to less than 50 grams a day (including sugar from fruit)

Sugar weakens your immune system.

Glucose (sugar) and Vitamin C have similar chemical structures, so they compete with each other to enter the cells. If there is more sugar in your system, less Vitamin C will get into your immune cells, reducing the cells' ability to fight respiratory infections.

Food intolerances can also contribute to respiratory problems and mucus build-up, especially in chronic bronchitis.

To find out if food intolerances are contributing to your respiratory problems – complete the ***Food Elimination Diet*** (see Appendix) and monitor your respiratory symptoms.

Lung-Loving Drink

This drink packs a powerful antioxidant punch for maintaining healthy lungs.
Note: *Parsley should be avoided if pregnant or in cases of kidney inflammation.* ***Servings: 1***

Ingredients:
- 6 sprigs of parsley
- 1 kiwi, peeled
- 1⁄2 cup of blueberries
- 1 cup of spinach
- 1 cup of green tea (steeped and chilled)

Directions:
1. Place all ingredients in a blender
2. Blend and drink immediately

NUTRITIONAL CONTENT:
Proteins: 2.4 grams
Carbohydrates: 23.3 grams
Fats: 0.7 grams
Calories: 101

Spinach, Lentil and Lemon Soup

This refreshing soup is packed with immune-boosting Vitamin C and water, and has antihistamine and antimicrobial benefits to help fight off an infection. ***Servings: 4***

Ingredients:
- 1 tablespoon of olive oil
- 1 onion, finely sliced
- 4 cloves of garlic, sliced
- 1 cup of brown or green lentils
- 4 cups of vegetable stock
- 1 bunch of spinach
- 2 bunches of cilantro leaves and stems, roughly chopped
- Juice of 1 lemon
- Salt & pepper

NUTRITIONAL CONTENT PER SERVING:
Proteins: 14 grams
Carbohydrates: 51.1 grams
Fats: 35 grams
Calories: 546

Directions:
1. Saute onion in olive oil, add garlic and cook for another few seconds, add lentils and stir
2. Add stock and simmer until lentils are soft (about 30 minutes)
3. Roughly chop spinach, then add to pot with cilantro and lemon juice
4. Stir well, cover pot to let the spinach wilt
5. Puree and serve

Expectorant Soup

This meal contains the three vegetables that help promote drainage of mucus from your lungs. It also contains 304% of your daily serving of Vitamin A. ***Servings: 4***

Ingredients:

- 1 tablespoon of extra virgin olive oil
- 1 leek (white and pale green parts) thinly sliced
- 6 carrots (peeled and sliced)
- 1 chili pepper, finely chopped
- 2 cloves of garlic, crushed or chopped
- Pinch of sea salt
- 3 cups of low sodium chicken stock
- 1 tablespoon of parsley, chopped finely

Directions:

1. Heat oil in a large saucepan over medium heat, cook leek until soft, approximately 4 to 5 minutes
2. Stir in carrots, chili pepper and garlic and season with salt
3. Cook until carrots are soft, approximately 8 to 10 minutes
4. Add chicken stock and bring to a simmer
5. Cook 10 to 12 minutes
6. Puree half the soup in a blender until smooth
7. Stir puree into remaining soup
8. Garnish with parsley

NUTRITIONAL CONTENT PER SERVING:

Proteins: 5 grams
Carbohydrates: 12 grams
Fats: 5 grams
Calories: 102

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Vitamin C with bioflavonoids	Helps increase circulation of antibodies; increases neutrophil function, reduces the length of chronic illness and protects cell membranes from free radical damage Also has anti-inflammatory, antiviral & antibacterial properties	Brussels sprouts, green/red peppers, parsley, tomatoes, alfalfa sprouts, broccoli, cabbage, cauliflower, lemons, leeks & onions Fruits should be limited due to sugar content	4000-6000 mg a day Bioflavonoids: 1000 mg a day	Sulfa antibiotics increase elimination of Vitamin C High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medications, as Vitamin C can act as a natural blood thinner
Vitamin A	Helps maintain the integrity of the respiratory tract lining, reduces risk of infection and promotes repair of lung tissue It also boosts natural killer cell activity and has antiviral properties	Sweet potato, kale, carrots, spinach, red peppers, butternut squash & leeks	5000-10,000 IU a day	Women should not take high doses of Vitamin A (over 10,000 IU) if sexually active or of child-bearing age due to risk of birth defects Doses over 10,000 IU should only be taken under the supervision of your health care practitioner
Zinc	Helps to support immune cells and may decrease risk and severity of infections It also helps maintain the integrity of the respiratory tract	Sesame seeds, pumpkin seeds, oats & yogurt	45-60 mg a day Best taken with food Best absorption forms include: zinc picolinate, acetate, citrate, glycerate and monomethionine Poor absorption forms include: zinc oxide and zinc sulfate	Take in divided doses during the day to prevent possible nausea Consult with your health care professional first if you have high cholesterol Higher doses of zinc (greater than 100 to 300 mg a day) can impair the immune system and may lead to a copper deficiency
Expectorant herbs and vegetables	Helps promote drainage of mucus from the lungs	Borage, elder, garlic, ginger, cardamom, fenugreek, licorice root, marshmallow root, hyssop, red clover, plaintain, thyme, carrots, chili peppers & leeks	As directed on label (if available in supplement form)	Herbs can be powerful and you should consult with your health care professional if planning to take in supplement form Can be taken as a tea, or put in broths, soups, and stir-frys
Garlic	Antihistamine, antibacterial, antifungal and antiviral	1⁄2 - 1 clove of garlic a day	2-6 capsules a day in divided doses	Check with your health care professional if you are taking blood-thinning medications or protease inhibitors before taking garlic supplements

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Water	Helps to thin mucus secretions and boost the immune system	8-10 cups of fluid a day	NA	Avoid distilled water, which can leach minerals from the body Avoid water stored in plastic bottles, which can leach chemicals into water, potentially creating hormone imbalances
IMPORTANT				
Echinacea	Helps address bacterial, viral and fungal infections	NA	Dried root (in tea) 1/2 - 1 teaspoon in one cup of hot water, 3 times a day OR Tincture 1/2 teaspoon in water 3 times a day	Do not take echinacea for longer than 10 days Some people have allergic reactions to echinacea. If you suffer from allergies or asthma, you might have a particular susceptibility to this negative effect. An allergy to any plant in the daisy family could indicate an allergy to echinacea Do not take if you suffer from conditions that result from overactive immune systems such as rheumatoid arthritis or lupus, or if you take any medications meant to suppress the immune system Also contraindicated in people who have diabetes, connective tissue disorders, liver disease, multiple sclerosis, HIV/AIDS and tuberculosis
Lung-supporting herbs and spices	As stated in chapter	Cloves, gingko biloba, thyme, goldenrod, turnips & oregano	As directed on label (if available in supplement form)	Herbs and spices can be powerful and you should consult with your health care professional if planning to take in supplement form Can be taken as a tea, or put in broths, soups, and stir-frys
HELPFUL				
Antihistamine herbs	Reduce lung irritation/ inflammation from infection	Basil, chamomile, parsley, ginger & thyme	NA	Can be taken as a tea, or put in broths, soups, juices and stir-frys
N-acetylcysteine	Helps to thin mucus secretions, making it easier to cough up. It is often used for emphysema, bronchitis, tuberculosis, pneumonia, in tracheotomy care and cystic fibrosis	Chicken, yogurt, eggs, red peppers, garlic & onions	200-500 mg, 3 times a day	There is a concern that N-acetylcysteine might cause bronchospasm in people with asthma if inhaled or taken by mouth or through a tube in the windpipe. If you take N-acetylcysteine and have asthma, you should be monitored by your health care provider Activated charcoal is sometimes used to prevent poisoning in people who take too much acetaminophen and other medications. Activated charcoal can bind up these medications in the stomach and prevent them from being absorbed by the body. Taking N-acetylcysteine at the same time as activated charcoal might decrease how well it works for preventing poisoning
Thymus extract	Helps protect against viral infections	NA	If you have a viral infection, take 100 mg a day	Thymus extract may increase the effectiveness of antibiotics Do not use with autoimmune conditions or those taking antirejection, corticosteroids or immune-suppressant medications Thymus extract may play a role in immunological disorders associated with stress and anxiety. Caution is advised in patients taking anxiolytics due to possible additive effects Thymus extract in conjunction with bronchodilators may have additive effects Caution is advised in patients with heart problems

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
HELPFUL				
Spleen extract	Helps protect against bacterial infections. Also stimulates white blood cell production and enhances natural killer cell activity	NA	If you have a bacterial infection, take as directed on label	Tuftsin, a component of spleen extract, may enhance the perception of pain. People taking analgesics or other pain-reducing medication should consult with a health care professional Tuftsin may increase the risk of bleeding when taken with drugs such as anticoagulants, antiplatelet drugs and non-steroidal anti- inflammatory drugs (NSAIDS) May interact with antifungal drugs, psychotropic drugs, immunomodulators or immunostimulants Spleen extract is cautioned in people taking medication for Hodgkin's disease, systemic lupus erythematous, cancer or leukemia Spleen extract is possibly unsafe when used in people with immune system disorders

CHAPTER 7

Nutrition for Pressure Sores

1. Increase calories
2. Increase protein
3. Eat foods high in Vitamins A, C, D, E & zinc
4. Drink 8 cups of water/fluids a day
5. Take amino acids
6. Eat good fats
7. Take skin-healing nutrients & herbs

SCI and Pressure Sores

The skin is the largest organ in the human body. Skin protects you from infection, helps regulate body temperature and enables you to have the sense of touch. Your skin becomes much more vulnerable to breakdown after a spinal cord injury (SCI) and one of its biggest threats is pressure sores.

Pressure sores are a costly and lifelong complication for individuals with SCI. They can lead to prolonged bed rest, pain and depression, and interfere with rehabilitation, education, employment and community reintegration. As well, pressure sores can erode your overall health and independence.

Without a doubt, the best treatment for a pressure sore is prevention – and this takes care and planning.

Taking a proactive approach to your skin care by using proper seating and sleeping devices, practising pressure relief techniques and consuming a healthy diet that includes specific nutrients is associated with a decreased risk of developing pressure sores.

85%-95%

It's estimated that the likelihood of an individual with SCI getting a pressure sore is 85%-95%.

Once you've had a pressure sore, your skin is only 80% of its original strength, so you are at increased risk of developing another one in the same area.

Continuous care

The risk of getting a pressure sore increases 10 to 15 years post-injury therefore, careful, long-term attention to your skin is essential.

This chapter will help you understand how and why the skin breaks down more easily after SCI, and the many ways nutrition can help prevent pressure sores from developing as well as help improve healing time.

What are pressure sores and what causes them?

A pressure sore forms when a large amount of pressure is applied to a localized area of the skin for a long period of time without relief. This pressure compresses underlying tissue and restricts essential blood flow that carries oxygen and nutrients to the tissues, leading to the death of the cells in this area. This tissue damage and cellular death can take as little as 2 to 6 hours to occur, and by the time a pressure sore is visible on the surface of the skin, it's likely that damage to underlying tissue, fat and muscle has already taken place.

One of the biggest and often most frustrating questions is: why does skin breakdown occur so easily after SCI? Your body undergoes many physical and biochemical changes after SCI, which together lead to many contributing factors for pressure sore development.

Skin breakdown can be the result of one or a combination of any of the following:

Altered circulation

After spinal cord damage, circulation is altered. Reduced circulation below the level of injury can compromise the supply of oxygen and essential nutrients to tissue. Additionally, the tone and closing pressure of blood vessels is less than ideal so blood vessels tend to remain more dilated. This can lead to waste build-up in blood vessels, which makes them more susceptible to damage.

Altered collagen production

Collagen is the primary building block of skin and tissues. Collagen production appears to be altered below the level of injury. This may lead to decreased skin strength, which in turn results in increased risk of skin injury and impaired healing.

Anemia

Anemia occurs when the number of red blood cells or concentrations of hemoglobin are low. This can result in you having an increased risk of developing a pressure sore with delayed wound-healing because less oxygen is carried throughout your body. One study revealed that 70% of individuals with SCI who have pressure sores show mild anemia, and the remaining 30% show moderate anemia. SCI-related anemia is often due in part to decreased nutritional intake.

Atrophy

Muscle tissue that has wasted away decreases protective padding (especially over bony parts of your body), resulting in increased pressure over these areas.

Body weight

Over 65% of individuals with SCI are overweight. This increase in weight and pressure can contribute to pressure sore development. However, being underweight can also contribute to skin breakdown as there is little padding to protect tissue. It is estimated that people who are underweight have almost twice the risk of getting a pressure sore as people of ideal weight. Therefore, maintaining a healthy, ideal weight can help reduce the risk of pressure sores (**see Chapter 5 on Weight Loss**).

Changes in body posture / seating

Changes in your posture and the way you sit due to joint contractures, pelvic obliquity, etc. can increase pressure over bony parts of your body and put you at risk of skin breakdown.

Excessive moisture

Sweat, urine and/or feces can contribute to skin breakdown. Therefore, effective bowel and bladder management are also important in helping to prevent pressure sores (**see Chapters 2 & 3 on Neurogenic Bowel & Bladder**).

Heat

Within 2 to 5 minutes of sitting in a wheelchair there is a significant rise in skin temperature around your tailbone and sit-bones. Increases in temperature can make your skin more prone to damage, as higher temperatures increase your tissues' need for oxygen.

Increases in skin temperature also result in more waste product formation and provide an ideal breeding ground for bacteria to grow in, both of which can contribute to skin breakdown and poor wound healing.

Immune function
Normal immune responses are altered following SCI. Communication between the nervous, endocrine and immune systems is associated with blood vessel function, and when altered, not only contributes to pressure sore development, but can impair your body's ability to fight off infections that often develop with pressure sores.

Loss of sensation & movement
Pre-injury, if you had any kind of discomfort in your body or seating position from too much pressure, you would receive a pain sensation and then move to relieve the pressure. With SCI, your loss of sensation and decreased ability to move and reposition your body can lead to the development of pressure sores.

Malnutrition
Many studies link nutritional deficiencies to the development of pressure sores and decreased ability to heal. Many individuals with SCI are deficient in Vitamins A, C and E as well as the mineral zinc – all of which are necessary for strong skin and immunity. It's been shown that nutritional support can not only help prevent the incidence of pressure sores, but also improve their healing.

Spasms
Muscle spasms can cause pressure sores on body parts (such as the knees and ankles) due to the additional friction that they cause.

Thinning skin
Your chance of getting a pressure sore increases over time. This is due in part to the natural aging process. When your skin gets older, it loses elasticity and strength, and has a decreased supply of blood and oxygen, which increases the risk of skin breakdown.

Complications associated with pressure sores:

Pressure sores put tremendous stress on your body. They are also prone to being infected with bacteria and can lead to serious complications, many of which can be life-threatening. Below is a list of potential pressure sore complications:

- **Autonomic dysreflexia**
- **Malignant tumors**
- **Recurrence**
- **Infections**
- **Prolonged bed rest**
- **Spasticity**
- **Loss of weight/lean muscle mass**
- **Osteomyelitis (bone infection)**
- **Surgery**

These serious complications, together with the move towards shorter hospital stays, less opportunity for patient education, and individuals returning to the community with less health care information, mean that you (and your family and caregivers) need to take more responsibility for the prevention and management of pressure sores.

Early intervention with good nutritional practices is a proven means to help protect yourself against pressure sores.

Nutrition for Wound Healing

Individuals with chronic pressure sores often show signs of malnutrition and require aggressive nutritional support. Nutrients provide the raw materials needed for strong, healthy tissue integrity and healing. Early nutritional intervention has been shown to:

- **help prevent pressure sore development**
- **enhance the immune system**
- **lower the risk of associated complications**
- **decrease the length of hospital stays**
- **improve wound healing**

Pressure sores compete with the body for energy stores, amino acids and micro-nutrients, significantly increasing your body's demand for calories and the intake of protein, vitamins and minerals. The following recommendations and specific nutrients are critical for tissue healing and fighting infections which are often associated with pressure sores.

1 Increase calories

Your body works harder and faster when healing itself. Therefore, more calories must be consumed to meet the increased energy and protein needs necessary for a pressure sore to heal.

If calorie needs are not met, it can lead to a catabolic state (this is when your body breaks down protein from tissue, such as muscle, in order to release fuel to keep up with energy demands). This can contribute to weight loss, muscle wasting, and a weakened immune system. All of these conditions result in impaired wound healing.

When increasing calories, consume healthy foods such as: nuts, nut butter, avocados, whole grain breads, whole grain pasta, brown rice & legumes.

These foods are less likely to contribute to weight gain and their fiber content will help absorb and eliminate toxins that may be associated with infections related to the pressure sore.

Avoid processed foods and any foods with a high sugar content. Sugar feeds bacteria therefore potentially making infections worse.

HOW MANY CALORIES?

If you have a pressure sore you need to eat 30-35 calories per kg of body weight a day.

Example:
If you weigh 55 kg, you should be eating 1,650 - 1,925 calories every day until it heals.

TIP: To convert your weight from lbs to kg - divide your weight in lbs by 2.2.

e.g., 150 lbs/2.2 = 68 kg

– Kirk, 1996

2 Increase protein

If you develop a pressure sore, it is essential that you increase your protein intake. Growth and repair of new tissue cannot take place without protein. Studies indicate that low protein levels are associated with both the development of pressure sores and delayed healing.

Protein	Food	Serving	Content (g)
Fish			
	Sardines	1 can	20 grams
	Tuna	1 can	17 grams
	Cod	3 oz. (1 serving)	17 grams
	Haddock	3 oz. (1 serving)	18 grams
	Halibut	3 oz. (1 serving)	20 grams
	Salmon	3 oz. (1 serving)	22.5 grams
Dairy			
	Greek yogurt	3⁄4 cup	15 grams
	Plain yogurt	3⁄4 cup	10.5 grams
	Egg	1	7 grams
	Cheddar cheese	1 oz.	7 grams
Beef/Poultry			
	Beef tenderloin	3 oz. (1 serving)	26 grams
	Chicken breast	3 oz. (1 serving)	21 grams
	Turkey	3 oz. (1 serving)	25 grams
Grains/Beans/Lentils			
	Quinoa	1 cup	9 grams
	Chickpeas	1 cup	12 grams
	Kidney beans	1 cup	13 grams
	Black beans	1 cup	15 grams
	Lentils	1 cup	18 grams
Nuts/Seeds			
	Almonds	1⁄4 cup	8 grams
	Walnuts	1⁄4 cup	7 grams
	Sunflower seeds	1⁄4 cup	6 grams
	Pumpkin seeds	1⁄4 cup	8 grams
Protein Powder			
	1 heaping scoop of whey protein powder = 25 grams (This may vary slightly depending on specific brand used)		

Whey Cool!

One of the easiest ways to increase your protein intake is by drinking protein shakes. Whey is the most absorbable type of protein powder.

PREVENTION:

To maintain your skin, eat 0.8 grams of protein per kg of body weight a day.

– Collins, 2001

Example:
If you weigh 55 kg, you should be eating 44 grams of protein a day. This is 2-3 servings of protein.

HEALING:

If you have a pressure sore, eat 1.2 - 1.5 grams of protein per kg of body weight a day. This is equal to 4-5 servings of protein

– Kirk, 1996

3 oz. = 1 serving
This equals approx. the size of the palm of your hand (without your fingers)

3 Eat foods high in Vitamins A, C, D, E & Zinc

Vitamin A

Vitamin A stimulates the growth of the base layer of the skin, maintains skin integrity and promotes wound healing. This vitamin is also needed to enhance the activity of white blood cells and help protect tissues from infection.

Foods high in Vitamin A: sweet potato, kale, spinach, carrots & winter squash.

Vitamin C

Vitamin C is critical to the prevention and healing of pressure sore. This vitamin helps convert the amino acids proline and lysine into collagen. It also helps the healing process by strengthening the walls of blood vessels, which in turn helps improve circulation and the delivery of oxygen and other essential nutrients to the wound site.

Vitamin C also supports the immune system by helping to activate your white blood cells to fight pressure sore related infections. Studies show that Vitamin C helps to speed up wound healing. Prolonged physical stress depletes Vitamin C from your body, so the need for this vitamin increases when you have a pressure sore.

Note: It takes your body about four hours to use Vitamin C, and and then it is excreted. So if you are taking Vitamin C in supplement form, it is best to take it in divided doses throughout the day. Try to find Vitamin C supplements that also contain flavonoids.

Foods high in Vitamin C: broccoli, red & green peppers, strawberries, oranges, pineapple & papaya.

Vitamin D

Vitamin D helps activate T-cells in the immune system to fight infection.

Foods high in Vitamin D: sardines, eggs, salmon & cod liver oil.

Vitamin E

Vitamin E is a powerful antioxidant that helps stabilize cell membranes, protects tissues and improves circulation. Deficiencies in Vitamin E may contribute to poor wound healing.

Foods high in Vitamin E: sunflower seeds, olives, olive oil, almonds & spinach.

Zinc

Zinc is necessary for cell and tissue formation, skin strength, skin elasticity and repair.

Studies suggest that zinc also speeds pressure sore healing and reduces incidence of infection by increasing the production of white blood cells and enhancing their function. Deficiencies in this mineral may lead to tissue breakdown.

Foods high in zinc: pumpkin seeds, red meat, yogurt, sesame seeds & oats

What are flavonoids?

Flavonoids give fruits and vegetables their vibrant colors. They also:

- Help your body absorb Vitamin C
- Improve blood vessel strength to help prevent rupturing and bleeding
- Help oxygen and essential nutrients pass more freely through blood vessel walls
- Help protect against infection
- Reduce inflammation

Foods that are high in Vitamin C also contain flavonoids. Blueberries, cherries and raspberries are all a great source of flavonoids.

4 Drink 8 cups of water/fluids a day

Water has the tremendous ability to help your body heal. Approximately 81% of your blood is water, and your bloodstream carries important repair substances to sites of injury.

Studies show that drinking at least 8 cups of water a day helps skin wounds heal more quickly by helping to accelerate the making of new skin.

Adequate water intake is also important in helping fight infection as it is needed to eliminate wastes.

Yarkony, 1994

DRINK COCONUT WATER!

Chronic pressure sores can cause essential minerals to be depleted from your body.

Drinking coconut water is a healthy and natural way to replenish these minerals.

5 Take amino acids

Amino acids are the building blocks of proteins. It is very difficult to get the required amount of amino acids for healing from food sources alone. The best way to get them is in supplement form.

The following 3 amino acids are extremely important in wound healing:

Glutamine helps improve and speed up the healing process. During times of stress or injury, your body's demand for glutamine can exceed your body's capacity to release it from your muscles. Supplementing with glutamine can help reduce healing time.

Lysine is a necessary building block for protein and helps with collagen formation and tissue repair.

Proline is essential for collagen formation.

See chart at end of chapter for dosages.

6 Eat good fats

Omega-3 fatty acids (good fats) are required for proper cell reproduction and have been shown to play a central role in the health of the skin. These fats help maintain the integrity and elasticity of the skin, as well as prevent loss of moisture, which can contribute to skin breakdown.

Good fats are found in: walnuts, salmon, anchovies, sardines, tuna, halibut, mackerel & ground flax seeds.

Omega-3 fatty acids can also be taken in supplement form.

7 Take skin-healing nutrients & herbs

Horsetail is a herb that has a high content of silica, a mineral that helps strengthen tissues, especially skin, hair and nails.

Co-enzyme Q10 (CoQ10) is a naturally occurring compound found in all parts of your body. CoQ10 plays a critical role in circulation, stimulating the immune system, and increasing tissue oxygenation, and it has been shown to help increase healing.

Methylsulfonylmethane (MSM) is a sulfur-containing nutrient which has been shown to accelerate wound healing and reduce inflammation.

All of the above can be taken as supplements.

> ***"I had a stage 4 pressure sore on my sacrum that developed into osteomyelitis requiring surgery to remove part of my sacral bone. After months of wound vacuum therapy, my wound was healing at a rate of about 5% every two weeks. Then I started a nutritional program involving foods and supplements to help heal the wound more effectively. Within weeks the wound was closing at a rate of 10% or more every two weeks and was completely closed within six months of being on the nutritional program. My wound care specialists were very impressed at how quickly I was able to heal when I changed my diet."***
>
> ***Jamie, C5 tetraplegic***

Coconut smoothie

This smoothie has the extra calories, good fats, protein and Vitamins A & E that your body needs to help combat a pressure sore. ***Servings: 1***

Ingredients:
- 1 cup of coconut milk
- 1⁄2 to 1 cup of water
- 1 cup of frozen berries
- 1 scoop of whey protein powder
- 1 tablespoon of almond butter
- 1 tablespoon of ground flax seeds
- 1⁄2 of an avocado

Directions:
1. Put ingredients into blender and blend until smooth.

NUTRITIONAL CONTENT:
Proteins: 36.4 grams
Carbohydrates: 43.6 grams
Fats: 76.9 grams
Calories: 958

Sweet potato and pesto mash

This quick and easy dish contains Vitamins A & C to boost your immune system and help fight the infections often associated with pressure sores. Add chicken or fish to give you that extra protein you need to help with skin healing.
Servings: 1

Ingredients:
- 1 large sweet potato
- 1 tablespoon of pesto (bought or homemade)

Directions:
1. Place the sweet potato in the oven for one hour at 400F/205C
2. Let it cool for 5 minutes and then peel off the skin
3. Mash in a bowl
4. Add pesto and mix

NUTRITIONAL CONTENT:
Proteins: 6.5 grams
Carbohydrates: 60 grams
Fats: 10 grams
Calories: 344

Chicken salsa

This zesty dish is loaded with Vitamin C and protein to help accelerate skin healing.
Servings: 2

Ingredients:
- 1⁄4 red onion, chopped
- 1 tomato, diced
- 1 teaspoon of fresh cilantro, chopped
- 1⁄2 green pepper, finely chopped
- Dash of sea salt
- Juice of 1 lime
- 2 skinless, boneless chicken breasts
- 1 tablespoon of garlic, minced
- 1 can of pinto beans, drained
- 1⁄4 cup feta cheese to garnish

Directions:
1. Mix tomato, onion, cilantro, garlic, green pepper, salt and lime juice, then set aside
2. Grill chicken breasts
3. Pour beans and salsa on top of chicken, then garnish with feta cheese

NUTRITIONAL CONTENT PER SERVING:
Proteins: 33.5 grams
Carbohydrates: 37 grams
Fats: 7.9 grams
Calories: 349

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Protein	Build and repair tissue	Beef, poultry, fish, eggs, nuts/nut butters, seeds, legumes & whey protein powder	Consume (eat and/or drink) 1.2-1.5 grams of protein per kg/body weight when you have a pressure wound	Long-term high protein intake over 0.8 grams per kg body weight a day can put extra burden on liver and kidneys. Be sure to drink adequate fluids and eat 5+ servings of vegetables a day A high protein intake may contribute to dehydration and loss of minerals such as calcium, which can contribute to osteoporosis Check protein powder labels for protein content Try to purchase protein powders with no sugar added. Stevia is acceptable
Glutamine (amino acid)	Build and repair tissue	Beef, fish, poultry, eggs & cabbage (juice)	5-40 g in divided doses a day Best to take on an empty stomach with juice, as amino acids compete for absorption Start with 5-10 grams and slowly build up to bowel tolerance	Large doses can soften stool. Take smaller doses first and build from there You should not supplement if you have hyperammonemia, liver or renal failure It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body Tip: Drink cabbage juice right away. Vegetable juice is highly perishable, so best to drink fresh. Drink with other vegetable & fruits, such as carrot or apple, as cabbage juice can have a strong flavor
Lysine (amino acid)	Build and repair tissue	Beef, chicken, salmon & tuna	3000 mg a day Best to take on an empty stomach with juice, as amino acids compete for absorption	Talk to your health care professional before taking lysine if you have a history of gallstones, cholesterol problems, liver dysfunction or kidney impairment Certain types of antibiotics, known as aminoglycoside antibiotics, may become toxic if you take them along with lysine supplements. Talk with your health care professional before combining antibiotics or any other type of medication with lysine supplements It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Proline (amino acid)	Build and repair tissue	Eggs, meat, wheat germ, cheese & cabbage	2000 mg a day Best to take on an empty stomach with juice, as amino acids compete for absorption	It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Vitamin A	Needed for tissue repair and to help protect tissues from infection	Sweet potato, red peppers, carrots, spinach, kale, butternut squash, collard greens & Swiss chard	5000-10 000 IU a day Best taken with food The synthetic forms of Vitamin A such as palmitate or acetate have potential to produce toxic symptoms	Women who are sexually active or of child-bearing age should not use high doses (over 10 000 IU) of Vitamin A due to risk of birth defects Doses over 10 000 IU should be taken under the supervision of your health care practitioner

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Vitamin C	Plays a major role in the formation of collagen and preserves the integrity of blood vessels Stimulates the immune system	Papaya, pineapples, red & green peppers, broccoli, kale, Brussels sprouts, strawberries & cantaloupe	Best taken with food Buffered forms of Vitamin C are easier on the stomach Taking Vitamin C supplements which include bioflavonoids will help increase absorption	Sulfa antibiotics decrease Vitamin C levels in the body High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication, as Vitamin C can act as a natural blood thinner
Omega-3 essential fatty acids	Play an integral role in the health of the skin – help maintain integrity and elasticity of the skin Required for proper cell reproduction	Salmon, sardines, walnuts, tuna, halibut & flax seeds	Fish or flax seed oil: 2-4, 1000 mg capsules or tablespoons of flax or fish oil a day in divided doses	Omega-3 has blood-thinning properties. Consult with your health care professional if you are on blood-thinning medication Stop taking 2 weeks prior to surgery Fish oil can increase the risk of mania in patients with bipolar disorder People who have hypersensitivities or allergies to fish or shellfish may also be allergic to fish oil supplements. Signs of an allergic reaction include a rash or hives, difficulty breathing and swelling of the throat, face or mouth. An allergic reaction to fish oil should be considered a medical emergency
Water	Helps carry repair substances to injury site	Drink 8 or more cups of water a day Can be consumed as broths, herbal teas & soups	NA	Try to drink filtered water, which has had toxins and other impurities removed (preferably carbon or reverse osmosis filter systems). Avoid distilled water, which can leach minerals from the body Avoid water stored in plastic bottles, which can leach chemicals into the water, potentially disrupting hormone balances
Zinc	Necessary for tissue and cell formation, wound healing, skin elasticity and repair Supports the immune system	Red meat, sesame seeds, pumpkin seeds, oats, yogurt & chicken	50-100 mg a day Best taken with food Best absorption forms include: zinc picolinate, acetate, citrate, glycerate and monomethionine Poor absorption forms include: zinc oxide and zinc sulfate	Take in divided doses during the day to prevent possible nausea Consult with your health care professional first if you have high cholesterol Higher doses of zinc (greater than 100 to 300 mg a day) can impair the immune system and may lead to a copper deficiency If you don't see an improvement in wound healing after 8 to 12 weeks, discontinue use. Stop taking once wound has healed
IMPORTANT				
Flavonoids	Help improve capillary and collagen strength, protect wound from infection and help absorption of Vitamin C	Blueberries, black-berries, raspberries, strawberries, lemons, limes, tomatoes, red onions, red and green peppers, broccoli, Brussels sprouts & parsley	500 mg, 1-3 times a day	Quercetin may interfere with antibiotics

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
MSM	Enhances healing Reduces inflammation	Fresh fish, meat and dairy products	2 g a day in divided doses with food Start with 1 gram and increase dose	Excessive amounts may contribute to gastrointestinal intolerance (GI), mild headache, loose stools or skin eruptions. If you experience any GI symptoms, stop taking MSM for a day or two, then resume on a lower daily intake MSM (Organic Sulfur) has natural blood-thinning properties. Consult with a health care professional when using medications or supplements which also have blood-thinning properties MSM should not be used by individuals with a sulfur intolerance/allergy Long term use of MSM may deplete molybdenum levels in the body
CoQ10	Increases circulation and tissue oxygenation Stimulates the immune system	Fish, organ meats (liver, kidney & heart), beef, chicken, broccoli, cauliflower, strawberries & spinach	100 mg a day	If you are taking statin drugs, it is essential that you take CoQ10 supplements as these drugs deplete CoQ10 in the body Approximately 14-32% of CoQ10 is lost during frying of foods. However,boiling these foods preserves CoQ10 Avoid taking CoQ10 two weeks prior to surgery Certain medications may interact with CoQ10 such as blood-thinning drugs. Consult with your health care professional before taking
Vitamin E	Antioxidant that helps stabilize cell membranes and protect tissues	Sunflower seeds, almonds, papaya, pine nuts, olives and olive oil, blueberries, avocados, green leafy vegetables & tomatoes	400-800 IU a day Best taken with food Best form to take is with mixed tocopherols including D alpha-tocopherol, tocotrienols and succinate Do not use synthetic form dl-alpha-tocopherol as it acts very differently in the body	If you have heart disease or diabetes, do not take doses over 400 IU a day This is a natural blood thinner, so consult with your health care professional first if you are taking blood-thinning medications or if you have a bleeding disorder. Stop taking this supplement 2 weeks before surgery Prolonged and high level intakes of Vitamin E greater than 1500 IU a day can be detrimental to the immune system
HELPFUL				
Horsetail	Contains the mineral silica that helps strengthen tissues	Silica is found in bananas, bran, whole grain bread, green beans & carrots	500 mg, 1-3 times a day	Avoid taking this if you have a history of diabetes, heart or kidney problems. Silica also acts as a natural diuretic, so consult with your health care professional if you are on diuretic medications, as this may lead to dehydration Avoid this supplement if you are using nicotine patches or gum If you drink alcohol on a regular basis, do not take horsetail. Heavy drinkers may be at an increased risk of developing a Vitamin B-1 deficiency while taking this supplement
Vitamin D	Helps stimulate the immune system to fight infections	Cod liver oil, eggs, goat's milk, tuna, salmon & sardines	2000 IU a day	Vitamin D supplements may interact with several types of medications, including steroids, corticosteroid medications, weight loss drugs, diuretics, cholesterol-lowering medications and medications used to prevent and control epileptic seizures. Consult with your health care professional if you are taking these medications Vitamin D is best taken in supplement form as minimal amounts can be obtained from food sources

CHAPTER 8

Nutrition for Bone Health

1. Eat foods high in calcium & magnesium
2. Eat protein in moderation
3. Eat a variety of fruits & vegetables
4. Eat foods containing phosphorus in moderation
5. Take a Vitamin D supplement
6. Eat bone-boosting herbs
7. Avoid or limit yeast
8. Avoid caffeine, smoking & alcohol

SCI and Bone Health

Bone is dynamic living tissue that is constantly being broken down (by cells called osteoclasts) and built up (by cells called osteoblasts). As a result, bones require a constant supply of specific nutrients to help regulate this process.

Maintaining your bone health immediately following a spinal cord injury (SCI) is critical, because there is a very high risk of developing osteoporosis.

Osteoporosis is a condition where there is a decline in bone mass, leading to brittle and fragile bones which are susceptible to fractures.

Decline in bone mass (particularly in the the hip and knee region) occurs almost immediately following SCI for a number of reasons. One reason, for example, is that large amounts of calcium and other minerals are lost in the urine following your injury. This demineralization of the bones is highest in the first 12 months following injury and stabilizes between 18 to 24 months post-injury (although this can continue throughout your lifetime).

Proper nutrition and dietary supplementation can be a practical and cost-effective way for you to reduce your risk of bone loss and developing osteoporosis.

30% - 50%

Following SCI, a person can lose anywhere from 30%-50% of their bone mass.

– Maiman, Lumbroso, Psris et al., 2006

88%

The incidence of osteoporosis following SCI can be as high as 88%.

– REFERENCE HERE

This chapter explores osteoporosis and some of its consequences following SCI. It provides nutritional and lifestyle strategies to help you maintain strong bones.

Osteoporosis

The incidence of osteoporosis following SCI can be as high as 88%. While there has been (and continues to be) much research in this area, not all factors contributing to bone changes after SCI are completely understood. Osteoporosis is a silent condition with serious consequences. If undetected, it can result in fragility fractures (low trauma fractures).

The steady loss of bone mineral density normally stabilizes 2 years after injury. Reduced bone mineral density occurs mainly below the level of injury and in the weight-bearing bones of the hips, thighs and shins. Overall lower extremity bone mineral density appears to be 50-70% of the normal values of able-bodied individuals.

Diet can help prevent osteoporosis. **There are a variety of vitamins and minerals including Vitamin D, Vitamin K, calcium, boron, magnesium, strontium and silica that help to maintain strong, healthy bones.** There is a considerable amount of evidence that shows people who are not getting enough calcium or Vitamin D in their diet, or who have gastrointestinal problems that affect the breakdown and absorption of minerals, have an increased risk of developing osteoporosis. Even minor digestion and absorption problems can significantly affect bone density and the risk of fractures.

Deficiencies in Vitamin D and calcium are commonly found in individuals with SCI. This can be due in part to medications, lack of exposure to sunlight, reduced calcium intake, renal disease, gastrointestinal dysfunction (such as low stomach acid) and changes in metabolism. High levels of cortisol, which can be produced by unstable blood sugar levels and stress, can also interfere with bone health. Stabilizing blood sugars, reducing stress and enhancing digestion need to be addressed as part of your bone health program.

Consult with your health care professional about the possibility of completing Vitamin D, PTH and ionized calcium testing. These can help determine your risk of developing osteoporosis and help to establish an appropriate supplementation program.

Fractures

The incidence of a fracture occurring in individuals with SCI ranges from 25% to 46% and usually occurs 10 years or more after injury. A person with a *complete* motor SCI has a 10 times greater chance of sustaining a fracture than a person with an *incomplete* SCI. There are two types of fractures:

- **Incident fractures** are caused by an injury sufficient to fracture a normal bone, such as in a car accident
- **Fragility fractures** are low trauma fractures sustained from falls, transfers, stretching or turning

Fragility fractures can lead to many secondary complications such as delayed healing, pressure sores, decreased function, deep vein thrombosis, femoral (thigh bone) shortening, increased spasticity, and cellulitis. Evidence also supports that additional bone loss may occur after a fracture. With this in mind, it reinforces the need to address and optimize bone health.

The greatest fracture risk areas are the lower end of the thigh bone (just above the knee) and the upper end of the tibia (just below the knee). Therefore, measuring bone mineral density at the knee is one of the best predictors of fracture risk for individuals with SCI.

Fragility fractures may be difficult to detect due to the minimal amount of trauma needed to sustain them. It is important for caregivers and individuals with SCI to be aware of the risk factors, signs and symptoms to look for:

People with intact sensory function – symptoms will include pain, swelling and deformity.

People with impaired sensory function – pain is often absent although swelling, local redness, visible deformity, fever, increased spasticity and autonomic dysreflexia symptoms (such as nausea, sweating and hypertension) may occur.

Nutrition for Bone Health

1 Eat foods high in calcium & magnesium

Calcium is widely known as the key nutrient involved in maintaining healthy, strong bones. Individuals with SCI in the acute phase experience dramatic increases in calcium reabsorption and excretion, which immediately impacts calcium levels in the blood and bones. While your body needs calcium; it is important to consider the food sources calcium is obtained from, and if it is being absorbed into your body properly. Most people think dairy is the best source of calcium, however, there are many other healthier sources that are better absorbed and utilized by your body.

Calcium-rich foods include: broccoli, kale, salmon (with the bones), sardines (with the bones), sesame seeds, parsley, almonds, walnuts & yogurt.

Low stomach acid can affect calcium absorption and this is a common issue for individuals with SCI, especially as you age. **(Refer to Chapter 1 on Digestion for further details.)**

The latest research indicates that individuals with SCI should obtain calcium from their diet first before taking calcium supplements. This is because calcium supplements can raise blood calcium levels too quickly (leading to complications such as heterotopic ossification), while calcium from food sources causes levels to rise more gradually.

Magnesium is an important mineral needed to help with calcium absorption. Magnesium also helps to reduce the risk of ossification and kidney stones. It is recommended that you eat magnesium-rich foods or take a magnesium supplement.

Magnesium-rich foods include: almonds, whole grains, black beans, halibut, avocado, sunflower seeds, sesame seeds, bran, quinoa & nuts.

2 Eat protein in moderation

Maintaining adequate consumption of protein plays an important role in maintaining bone integrity and strength from childhood to old age. However, too little or too much protein can be detrimental for bones.

A high protein diet is associated with an acid imbalance in the body which ultimately depletes calcium from your bones. On the other hand, not enough protein in the diet can result in muscle weakness, impair movement and coordination, and affect hormones needed to facilitate healthy bones and lower bone mineral density.

Studies show that vegetarian-based protein diets may be better than high meat diets, although a strict vegan diet (no dairy or eggs) is frequently associated with low bone mineral density. These individuals need to ensure they are getting the required amounts of Vitamin D, calcium and protein.

Following the guidelines of eating 3 servings of protein a day can help ensure that you are getting the right amount of protein.

Recommended daily protein intake:
0.8 grams of protein/kg of body weight
(To convert lbs to kg, divide your weight in lbs by 2.2)

Healthy proteins include: fish, poultry, beef, Greek yogurt, nuts, seeds, eggs & legumes.

3 Eat a variety of fruits & vegetables

It is important to maintain a normal pH level that is neither too acidic nor too alkalinizing, as either extreme will be detrimental to your body and bone health. Consuming a high vegetable- and fruit-based diet helps to maintain a normal pH level and ensures you get the nutrients your body needs. Western diets tend to be highly acidic (this includes sugar, alcohol, white flour and refined carbohydrates) and this can promote disease and infections, as well as rob essential minerals from your bones. Vitamin K and boron, found predominantly in fruits and vegetables, are two nutrients that support healthy bones.

Vitamin K

Vitamin K is often overlooked as an important nutrient for bone health. It plays a role in anchoring calcium in the bone. A deficiency results in demineralization of bone. Studies indicate that the lower the level of Vitamin K in the body, the lower the bone density and the greater the frequency and severity of fractures.

Foods high in Vitamin K include: kale, spinach, collard greens, broccoli & Brussels sprouts.

Boron

Boron is found in fruits and vegetables. This trace mineral plays a role in reducing calcium excretion. It also helps to activate Vitamin D and estrogen, which are needed to maintain healthy bones.

Foods high in boron include: almonds, avocados, red apples, dried organic apricots & bananas.

– Murray, Pizzorno, 1997

Eat green leafy vegetables such as kale, collard greens, parsley & lettuce to support healthy bones.

4 Eat foods containing phosphorus in moderation

The bone-forming osteoblast cells are particularly sensitive to phosphorus levels. Low phosphorus levels have been shown to contribute to soft bones, otherwise known as osteomalacia. High phosphorus levels are known to increase the risk of osteoporosis.

A diet that contains an adequate amount of protein will contain an adequate amount of phosphorus as well. It is important to consume foods that contain phosphorus in moderation. Therefore, follow the guidelines oulined in #2 on eating protein in moderation.

Foods containing phosphorus include: fish, poultry, meats, legumes, milk and milk products, nuts & whole grains.

Phosphorus levels in soda

Many people tend to consume a diet that is higher in phosphorus than in calcium. The phosphorus levels in many sodas are extremely high and contain no calcium.

Soda lowers calcium levels and raises phosphorus levels in your blood.
In fact, the more soda consumed, the lower your blood calcium levels.

5 Take a Vitamin D supplement

Optimum levels of Vitamin D increase your bone mass and decrease your risk of fractures. This is because Vitamin D increases calcium absorption in your body from 10-20% to 30-40%.

Most individuals with SCI don't get enough Vitamin D. Studies show a deficiency can range from 32-100% for individuals in acute and chronic stages of SCI. Vitamin D deficiency usually occurs through lack of sun exposure, poor diet, lactose intolerance, intestinal malabsorption, fat malabsorption problems (Vitamin D is a fat-soluble vitamin) and obesity. Early intervention is essential for high-risk populations such as those with SCI. There are three ways you can get Vitamin D – your diet, sunlight and Vitamin D supplements.

– Craven, Robertson, McGillivray, Adachi, 2009

Vitamin D in your diet – One of the reasons individuals with SCI are deficient in Vitamin D is that there are very few foods that contain good levels of it. ***Oily fish such as mackerel, eel and salmon, cod liver oil and egg yolks contain Vitamin D, as do fortified milks and cereals.***

Vitamin D from the sun – Your skin makes Vitamin D from the sun. This source of Vitamin D is 100% absorbed and has a longer life cycle in the body than Vitamin D absorbed through food. Unfortunately, many individuals with SCI may have limited access to the sun due to hospitalization or reduced mobility, or may have a lower tolerance for heat due to altered temperature regulation and sensitive skin. Even when out in the sun, people tend to be fully clothed and wearing sun-screen (which inhibits Vitamin D production in the skin).

Vitamin D from supplements – Due to the limitations of getting Vitamin D from your diet and from sunlight, **the best source of Vitamin D is from supplementation.** This will ensure you are getting the necessary amount required for maintaining healthy bones. Recommended Vitamin D doses can vary considerably due to age, skin pigmentation, lifestyle, geographical location and season.

The best way to determine Vitamin D deficiency is through a blood test.

- Vitamin D deficiency refers to Vitamin D 25 (OH) levels below 50 nmol/L
- The ideal range is preferably 75-100 nmol/L in both the acute and chronic stages of SCI. Anything lower will not have the necessary effect to maximally suppress the parathyroid hormone and reduce calcium loss from the bone

– Holik, 2007

Get out and enjoy the sunshine!

To help increase Vitamin D levels in your body, spend 15-20 minutes each day in the sun (with exposed skin and without sunscreen) between the hours of 10:00 a.m. and 3:00 p.m.

6 Eat bone-boosting herbs

Common herbs such as thyme, rosemary and sage inhibit the breakdown of bone which contributes to osteoporosis. Horsetail and oat straw contain silica which helps the body absorb calcium. Silica is also responsible for increasing the strength and integrity of bone. Including silica in your daily diet can help boost the benefits of calcium and Vitamin D.

Foods high in silica include: bananas, beans, raisins, green beans & carrots.

Alfalfa, barley grass, dandelion root, parsley & rose hip all help to build strong bones. These herbs can all be integrated into your diet (salads, smoothies, juices and soups).

Check with your health care professional before using herbs as some can be contraindicated with your medications.

NUTRITIONAL TIP:

INCREASE CALCIUM ABSORPTION BY:

- **Reducing Stress**
  Incorporate stress management strategies into your life
- **Exercising Regularly**
  Exercise regularly to maximize calcium absorption and maintain calcium balance

7 Avoid or limit yeast

Yeast competes with calcium for absorption.

Avoid or limit yeast-based products such as beer, bread, cider, grape juice, pretzels, malt beverages, wine, cakes, donuts, overripe fruit, soy sauces & sake.

8 Avoid caffeine, smoking & alcohol

There is an increased risk of reduced bone mineral density if you consume more than 3 cups of coffee/tea/soda a day, smoke, or consume alcohol (2 or more glasses a day).

All of these activities promote calcium loss. Alcohol may not only contribute to calcium loss but may also be toxic to bone cells. Limiting these activities can help reduce bone health issues.

Other key nutrients that affect your bone health

Consuming foods high in **sulfur,** such as garlic, eggs and onions, is helpful in collagen production.

Increased **sodium** intake in the form of salt has been associated with increased calcium loss in the urine, so keeping salt intake to 1500 mg or 1 teaspoon a day is recommended.

High **potassium** diets are known to reduce urinary calcium loss and can help to buffer the effects of a high sodium diet. Foods high in potassium also tend to be very alkalinizing to the body, which supports healthy bones.

Potassium is found in green & root vegetables, as well as fruit, legumes & milk.

Review medications that can affect bone health and bone mineral density

Corticosteroids, aluminum-containing antacids, anticoagulants, anticonvulsants and neuropathic pain medications are commonly used by individuals with SCI. These medications rapidly reduce active Vitamin D levels and affect calcium levels in the blood.

If you are taking these medications, extra care is required to ensure that sufficient calcium and Vitamin D levels are maintained.

Factors that increase your risk of fractures after SCI:

To calculate your risk level of incurring a fracture post-SCI, check all those that apply below:

- ☐ **Age at injury < 16 years**
- ☐ **Alcohol intake of 5+ servings a day**
- ☐ **Body mass index < 19**
- ☐ **Duration of SCI is 10+ years**
- ☐ **Female**
- ☐ **Motor complete (AISA A-B)**
- ☐ **Paraplegia**
- ☐ **Prior fragility fractures**
- ☐ **Family history of fractures**

Moderate Risk: If you checked 3 or more

High Risk: If you checked 5 or more

– Craven, Robertson, McGillivray and Adachi, 2009

Joint pain?

You may want to limit consumption of nightshade vegetables such as tomatoes, bell peppers, eggplant and potatoes. These can inhibit calcium absorption and redeposit the calcium in joints, kidneys and arteries.

As a chef I'm very conscious of preparing and eating fresh, wholesome foods. To protect my bones I take bisphosphonates, eat lots of nuts, cheese, salads and sardines (with the bones) every week for calcium and never drink soda. As a result of eating these foods in combination with taking bone medication, my bone mass density has increased by over 10%.

Pascal, L8 paraplegic

Bone-Building Smoothie

This smoothie is high in calcium, magnesium, Vitamin K, boron and silica – all nutrients that help to build strong, healthy bones. ***Servings: 1***

Ingredients:
- 5 almonds (or 1 tablespoon of almond butter)
- 5 walnuts
- 1⁄4 of an avocado
- 2 cups of spinach
- 1 scoop of whey protein powder
- Water

Directions:
1. Add all ingredients to blender, blend until smooth

NUTRITIONAL CONTENT:
Proteins: 29 grams
Carbohydrates: 17.6 grams
Fats: 36 grams
Calories: 455

Tuna, Strawberry, Avocado & Spinach Salad

This refreshing salad contains Vitamin D3, boron, Vitamin K, magnesium, silica, strontium and calcium to help prevent osteoporosis. ***Servings: 2***

Ingredients:
- 1 small tin of tuna
- 4 strawberries, sliced
- 2 handfuls of baby spinach
- 1⁄4 of an avocado
- 1⁄4 of a red onion, chopped
- 1 tablespoon of olive oil

Directions:
1. Place spinach on plate, add fruit and vegetables
2. Drizzle with olive oil
3. Place tuna on top

NUTRITIONAL CONTENT PER SERVING:
Proteins: 23.9 grams
Carbohydrates: 14.2 grams
Fats: 31.7 grams
Calories: 409

Sesame Seed Salmon with Greens & Wild Rice

This meal contains the full package of bone-building nutrients including calcium, Vitamin D3, magnesium, Vitamin K, silica, phosphorus and strontium. ***Servings: 2***

Ingredients:

- 1 tablespoon of sesame seeds
- 1 tablespoon of parsley, finely chopped
- 2 salmon fillets
- 2 tablespoons of olive oil
- 2 cups of kale, finely chopped (or spinach)
- 1 cup of wild rice

Directions:

1. Mix parsley in a cup with olive oil and sesame seeds
2. Brush parsley mixture over salmon and grill for 8-10 minutes, until fish flakes easily with fork
3. Cook wild rice (as per instructions)
4. Steam kale for 2-3 minutes
5. Serve together

NUTRITIONAL CONTENT PER SERVING:

Proteins: 40 grams
Carbohydrates: 25.9 grams
Fats: 20.8 grams
Calories: 505

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Calcium	Mineralization of the bones	Kale, broccoli, sardines, almonds, eggs, salmon, sesame seeds, parsley & walnuts	1500 mg a day for people with SCI who are young and have not achieved peak bone mass, are pregnant or breastfeeding, or are elderly with insufficient diets 1000 mg a day for adults with SCI and sublesional osteoporosis (SLOP) and who have no pre- or post-injury history of bladder or renal stones 500-666 mg a day for people with SCI who have a history of calcium stones or have significant renal impairment – Craven, Robertson et al, 2009	It is best to get calcium from foods as opposed to taking supplements, as food sources raise blood calcium levels slowly and reduce risk of kidney and bladder stones and cardiovascular disease Consult with your health care professional before taking calcium supplements If supplementing, it is best to take with meals to maximize absorption, or you can take at night to help with sleep Avoid calcium from oyster shell, dolomite or bone meal, as they are known to be high in lead Best to take with magnesium to maintain a calcium balance and prevent accumulation of calcium in unwanted areas such as soft tissue If you are on diuretics, suffer from hypercalcemia, hypoparathyroidism, renal stones, renal impairment, kidney or heart disease, consult with your health care professional before taking supplements
Vitamin D3	Promotes calcium absorption	Minimal amounts obtained from food – best to get from supplement Salmon, cod liver oil, sardines, goat's milk, eggs & tuna	800-1000 IU of D3 a day for first 2 years following SCI 3000-4000 IU of D3 a day for chronic SCI with no history of renal or bladder stones, renal impairment or heterotopic ossification Craven, Robertson et al, 2009	Best taken as a supplement as minimal amount is obtained from food Vitamin D3 should be adjusted to maintain serum levels in the lower limits of the normal range. Optimal intake should be confirmed with serial measurements of Vitamin D 25 (OH). Once optimal intake is maintained, then monitoring is recommended
Magnesium	Important for calcium uptake and reducing risk of calcification of tissues	Black beans, quinoa, sunflower seeds, sesame seeds, bran, almonds, brown rice, avocado & dark leafy greens	400-800 mg a day Best taken with food Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, sulfate, gluconate and chloride	Too much magnesium can cause loose stools, so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first
IMPORTANT				
Boron	Reduces urinal secretion of calcium and is required to activate estrogen and Vitamin D, which are important for bone health	Almonds, red apples, apricots (dried), avocado, banana, red kidney beans, olives, onion & walnuts	3-5 mg a day (do not exceed this amount)	Large quantities of boron can cause toxicity. Signs of toxicity include skin inflammation & peeling, headaches, irritability, tremors, convulsions, weakness, depression, diarrhea & vomiting. Boron may act like estrogen if you have any condition such as breast cancer, uterine cancer, endometriosis or fibroids. Avoid supplemental boron or high amounts of boron from foods if you have these conditions Don't take boron supplements if you have kidney problems

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Vitamin K	Essential for the production of bone proteins	Broccoli, cabbage, spinach, kale, collard greens, Brussels sprouts & green tea	Do not supplement with Vitamin K – get this vitamin through food sources only	Promotes blood clotting Do not supplement with Vitamin K unless under the supervision of your health care professional. Vitamin K might decrease the effectiveness of blood-thinning medications. Consult with your health care professional if you have liver or kidney disease before taking
HELPFUL				
Silica (horsetail)	For calcium utilization and bone strength	Silica is found in bananas, bran, green beans, carrots, oats, brown rice, avocados, onions, strawberries & other dark leafy greens	As directed on label	Avoid taking this if you have a history of diabetes, heart or kidney problems. Silica also acts as a natural diuretic, so consult your health care practitioner if you are on diuretic medications as this may lead to dehydration Avoid this supplement if you are using nicotine patches or gum If you drink alcohol on a regular basis, do not take horsetail silica. Heavy drinkers may be at an increased risk of developing a Vitamin B1 deficiency while taking this supplement
Phosphorous	Supports osteoblast (bone building) activity	Bran, pumpkin seeds, sunflower seeds, eggs, cheese, milk & nuts	Not recommended if adequate diet is maintained	Too much phosphorus has a negative effect on bone health
Strontium	Supports the function of osteoblasts (the cells which form new bone) while reducing the activity of osteoclasts (the cells which reabsorb old bone)	There's not enough strontium in food to have a significant effect if you already have osteoporosis. If you have a diagnosis of osteoporosis, you should take strontium in supplement form Foods high in strontium include spices, whole grains, parsnips, beans, lentils, spinach, kale, lettuce, carrots, peas, celery & seafood	340 mg, 1-2 capsules a day on an empty stomach	Strontium is best taken first thing in the morning, half an hour to an hour before breakfast, or three hours after the last meal of the day There are no known side effects of this supplement when taken at the directed doses Do not take strontium if you are taking tetracycline or quinolone antibiotics If you have kidney disease, talk to your health care professional before taking this supplement

CHAPTER 9

Nutrition for the Liver

1. Eat antioxidant-rich foods
2. Eat a variety of fresh fruits, vegetables, nuts, seeds, whole grains & legumes
3. Eat healthy sources of protein
4. Eat foods high in sulfur
5. Drink 8 cups of water/fluids a day
6. Eat 19-30 grams of fiber a day
7. Eat liver-supporting herbs & spices
8. Reduce/avoid junk food, alcohol, caffeine & saturated fats

SCI and Liver Function

The liver is the largest gland in the body and has over 500 functions. It is responsible for regulating glucose, processing fats, producing and secreting cholesterol, storing certain vitamins and minerals, and much more. One of your liver's primary roles is protecting you from harmful substances. It does this by filtering the blood for dead cells, excess hormones, microorganisms (bacteria, fungi, viruses and parasites) and toxins.

Although your liver is not directly affected by a spinal cord injury (SCI), this organ needs special attention after your injury because of the sudden increase (and often long-term intake) of prescription and over-the-counter medications. While these medications are necessary, after they have done their job they need to be broken down and then eliminated from your body. This detoxification process puts additional strain on your liver.

If your liver cannot remove harmful substances fast enough, toxic levels buildup and your liver directs these toxins to your fat cells to be stored. Toxins can accumulate in fat cells for years, negatively impacting your weight and overall health.

Long-term toxic build-up from substances such as medications can also potentially cause damage to your liver and affect its ability to function well.

The liver has the amazing ability to heal and regenerate itself when supported with the right nutrients. To help your liver filter out toxins and other undesirable substances, it needs to be cleaned and taken care of regularly. **This means it is important to eat foods that support healthy liver function on a daily basis.**

HOW THE LIVER FUNCTIONS:

- **After foods, drinks and medications are digested and absorbed, they are carried in your blood to your liver where your blood is then detoxified.**

  Toxins are then eliminated from either your kidneys (urine) or bowel (stool).

- **About 8 cups of blood pass through your liver every minute for detoxification.**

- **When your liver is working well, it can clear approx. 99% of bacteria and other toxins from your blood.**

This chapter will provide an overview of the specific foods and nutrients required to detoxify your liver of the medications most commonly used by individuals with SCI. It will also explain how diet can improve the overall function of your liver and ease toxic burden in your body.

Toxins and your liver

Toxins have a negative effect on cell function and structure. Every day we produce toxins through natural processes in our body, as we are constantly exposed to toxins in the air we breathe, the food we eat, the water we drink and the medications we consume.

Toxins can come from:

- Medications
- Pesticides/herbicides/insecticides
- Preservatives (sulfites – found in dried fruits and wine, nitrates-found in deli meats)
- Household cleaning products
- Heavy metals
- Alcohol
- Food colorings & flavorings (such as MSG)
- Preservatives such as butylated hydroxytoluene (BHT)
- Biphenyls found in plastic bottles/containers
- Cosmetics

Symptoms of overburdened liver /toxin build-up:

- Poor digestion of fats (feeling tired or nauseous after eating high-fat meals)
- Allergies
- Headaches
- Negative reactions to a drug or an environmental toxin
- Weakened immune system
- Hormonal imbalances
- Fatigue
- Constipation
- Skin conditions such as acne or psoriasis
- Irritability
- Muscle and joint pain
- Inflammation
- Autoimmune diseases
- Weight gain

Nutrition for Liver Health

1 Eat antioxidant-rich foods

The detoxification process can produce a lot of free radicals, which in excess can damage your liver cells. Vitamins A, C & E, as well as the mineral selenium and amino acid glutathione, are powerful antioxidants, which help to neutralize free radicals.

Vitamin A	Vitamin C	Vitamin E	Selenium	Glutathione
• Sweet potato • Carrots • Red peppers • Spinach • Kale • Winter squash	• Broccoli • Brussels sprouts • Papaya • Red/green peppers • Kale • Strawberries • Cantaloupe	• Sunflower seeds • Almonds • Olives • Spinach	• Beef • Lamb • Sardines • Salmon • Chicken • Barley	• Avocado • Broccoli • Brussels sprouts • Cauliflower • Cabbage

Glutathione is the most powerful antioxidant for neutralizing free radicals and protecting the liver. It can, however, be depleted in the body by large amounts of toxins and drugs. Vitamin C helps your body manufacture glutathione. **In fact, just 500 mg a day of Vitamin C has been shown to elevate and maintain healthy glutathione levels.**

– Murray and Pizzorno, Encyclopedia of Natural Medicine, 1998

2 Eat a variety of fresh fruits, vegetables, nuts, seeds, whole grains & legumes

Different detoxification phases and pathways in your liver detoxify specific substances. If you take any of the following medications, be sure to eat the following nutrients to help ensure these medications are properly broken down and detoxified.

MEDICATIONS	NUTRIENTS TO HELP PROPERLY BREAK DOWN & DETOXIFY THESE MEDICATIONS:		
Blood Thinners, Steroids, Anti-inflammatories or Codeine	**Vitamin C, Zinc, Magnesium & Copper**	**Indole-3-carbinol**	**Limonene (phytonutrient)**
• Amitriptyline • Warfarin • Codeine • Steroids • Ibuprofen • Acetaminophen • Erythomycin • Prednisone	**Vitamin C** • Brussels sprouts • Papaya • Red/green peppers • Broccoli • Kale • Strawberries • Cantaloupe **Zinc** • Sesame seeds • Beef tenderloin • Calf's liver • Oats • Yogurt **Magnesium** • Sunflower seeds • Black beans • Bran • Quinoa **Copper** • Barley • Lentils • Chickpeas • Oats	• Brussels sprouts • Broccoli • Cauliflower • Cabbage • Bok choy	• Oranges • Tangerines • Dill • Caraway
Sulfa Drugs	**Vitamin B1**	**Vitamin B5**	**Vitamin C**
• Antibiotics	• Sesame seeds • Legumes (navy beans) • Lentils	• Avocado • Yogurt • Sweet potato	• Brussels sprouts • Papaya • Red/green peppers • Broccoli • Kale • Strawberries • Cantaloupe
Painkillers and Muscle Relaxants	**Glucuronic acid**	**Calcium-d-glucarate**	
• Acetaminophen • Aspirin • Morphine • Menthol • Muscle relaxants	• Jerusalem artichokes	• Apples • Oranges • Broccoli • Brussels sprouts	

WATCH OUT: Grapefruit or grapefruit juice
This fruit contains a flavonoid called naringenin that can decrease detoxification activity by 30%, which can potentially lead to a medication overdose. Check with your health care professional about the medication that you are taking before consuming grapefruit.

3 Eat healthy sources of protein

Your liver needs sufficient protein intake to properly break down toxins. A deficiency can lead to decreased detoxification.

Healthy sources of protein include: fish, lean beef, chicken, nuts & seeds.

Eat 2-3 servings of protein a day.

3 oz. =1 serving size. This equals approx. the size of the palm of your hand (without your fingers)

4 Eat foods high in sulfur

Part of the detoxification process involves the mineral sulfur. Eating foods high in sulfur such as ***onions, garlic & eggs*** will help support your liver cells and their function.

5 Drink 8 cups of water/fluids a day

Once your liver neutralizes toxins, they need to be eliminated from your body as soon as possible. Drink 8 cups of fluids a day to help flush toxins out.

Adding freshly squeezed lemon juice to your water is a great way to help cleanse your liver.

6 Eat 19-30 grams of fiber a day

Your liver produces about 2 cups of bile a day. Bile carries toxins from your liver to your intestines where they are absorbed by fiber and eliminated in your stool. If there's not enough fiber in your diet, toxins are not efficiently eliminated and can be reabsorbed back into your body. Therefore, as an individual with SCI, it is important to ensure you are consuming the recommended intake of fiber.

Be sure to eat plenty of high-fiber foods such as ***fresh fruits and vegetables, whole grains, legumes, nuts & seeds*** to promote proper absorption and elimination.

Water-soluble fiber found in foods like pears, oat bran, wheat bran, apples & legumes is particularly effective at absorbing toxins, and/or a fiber supplement, such as whole husk psyllium, can be included in your daily diet.

7 Eat liver-supporting herbs and spices

Including these herbs and spices in your diet will help reduce free radicals, protect your liver from damage and enhance detoxification:

Silymarin (extract of the plant milk thistle), turmeric & dandelion root.

8 Reduce/avoid:

Junk food – Processed, fast and fried foods that contain hydrogenated fats can damage liver cell membranes.

Alcohol – Alcohol produces damaging free radicals.

Caffeine – Caffeine puts extra burden on the liver. If you do not want to give up your coffee, try to drink organic coffee. Non-organic coffee often contains pesticides which are extremely toxic to the liver and tend to accumulate in body fat over time.

High saturated fat intake – High saturated fat intake can contribute to decreased bile excretion, which can decrease the elimination of toxins from your liver.

Protein Pancakes

The sulfur-rich onions and cauliflower help you keep your liver healthy. ***Servings: 4***

Ingredients:
- 1/4 head of cauliflower, steamed and mashed
- 2 eggs
- 1 tablespoon of whole grain flour
- 1/2 small red onion, finely chopped
- 1 tablespoon of parmesan cheese
- 1 tablespoon of coconut oil
- Sea salt or pepper to taste

Directions:
1. Steam cauliflower in microwave and gently mash
2. Add eggs to cauliflower mash
3. Sprinkle in flour, onion and cheese
4. Heat coconut oil, fry mash in pan in the shape of pancakes
5. Flip when underside is cooked (brown)

NUTRITIONAL CONTENT PER SERVING
Proteins: 5 grams
Carbohydrates: 3 grams
Fats: 7.5 grams
Calories: 115

Loving Your Liver Salad

This salad is packed with antioxidants to protect your liver from free radical damage.
Servings: 3

Ingredients:
- 3 cups of broccoli, cut up into medium-sized pieces
- 2 cups of alfalfa
- 1 red pepper, chopped
- 1 can of beets, chopped
- 1 red onion, chopped into thin rings
- 1 cup of grape or cherry tomatoes
- 1/2 cup of pumpkin seeds
- 1 chicken breast

Directions:
1. In a large bowl combine all ingredients (except chicken)
2. Grill chicken, place on top of salad
3. Serve straightaway

NUTRITIONAL CONTENT PER SERVING:
Proteins: 23.5 grams
Carbohydrates: 32 grams
Fats: 20.5 grams
Calories: 375

Mushroom, Cabbage & Onion Soup

The liver has the amazing ability to heal and regenerate itself when supported by the right nutrients found in certain foods, such as mushrooms, onion and cabbage.
Servings: 8

Ingredients:
- 3⁄4 cup of brown rice
- 3 large onions, chopped
- 500 grams of portobello mushrooms, thinly chopped
- 2 cloves of garlic, chopped
- 2 tablespoons of olive oil
- 3 teaspoons of thyme
- 6 cups of diluted vegetable stock
- 1 small cabbage, thinly sliced
- 1 bunch of green (spring) onions, chopped
- 1 bunch of flat leaf parsley, chopped
- 1 teaspoon of paprika
- Juice of 1 lemon
- Sea salt and pepper to taste

Directions:
1. Boil rice in one pot
2. Sauté onions in a fryin pan with olive oil and sea salt
3. Add mushrooms and garlic, and sauté until brown
4. Add thyme
5. Drain excess water from rice (if any) and place back into pot with stock, bring to the boil. Simmer, stirring occasionally
6. Add cabbage to the rice and stock and simmer for 20 minutes
7. Add green onions, parsley, onions and mushrooms and simmer for another 10-20 minutes
8. Add more water or stock if the soup becomes too thick
9. Add paprika and lemon juice to taste and season with salt and pepper

NUTRITIONAL CONTENT P
Proteins: 4.2 grams
Carbohydrates: 21.2 grams
Fats: 0.47 grams
Calories: 106

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Fiber	Absorbs and eliminates toxins from the body	Oats, apples, pears, berries, beans, lentils, beets & peas	1-2 tablespoons a day of ground flax seeds, whole husk psyllium or apple pectin	Always consume fiber supplements with a glass of water When you increase dietary fiber, it may cause gas and bloating initially until the body adjusts Fiber may interfere with absorption of medications and supplements; therefore, it is best to take fiber supplements 2 hours before or after these Do not exceed 30 grams of fiber a day Fiber supplements in pill form should not be taken by people with esophageal disorders as the fiber can expand and cause obstruction Individuals who have had bowel spasms or strictures, history of colitis or inflammatory bowel diseases should use fiber supplements with caution
Glutathione	Antioxidant that helps protect the liver	Broccoli, Brussels sprouts, cauliflower, cabbage & avocados	Supplementing with glutathione has not been shown to increase glutathione levels in body Vitamin C - 500 mg a day helps the body produce glutathione	See Vitamin C box on following page
Magnesium	Helps the liver detoxify blood thinners, steroids, codeine & anti-inflammatories	Black beans, quinoa, sunflower seeds, sesame seeds, pumpkin seeds, broccoli, mushrooms, tomatoes, beets & bran	400 mg a day (or take a high potency multivitamin/mineral) Best taken with food Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools, so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first
Milk Thistle (silymarin)	Protects liver and enhances detoxification	N/A	70 - 210 mg capsule 3 times a day	Consult with your health care professional if you are taking the following medications: antipsychotics, antihistamines, cholesterol-lowering medications, antianxiety, antiplatelet and anticoagulant drugs (blood thinners), oral contraceptives and some cancer drugs May lower blood glucose levels. Those with diabetes on antidiabetic medication should have their blood glucose monitored
Protein	Enhances detoxification	Beef, poultry, fish, eggs, quinoa, nuts/nut butters, seeds, legumes & whey protein powder	Whey protein powder (0.8 grams per kg body weight a day*) *check label as protein content varies with different brands	Long-term high-protein intake over 0.8 grams per kg of body weight a day can put extra burden on the liver and kidneys High-protein intake may contribute to dehydration and loss of minerals such as calcium, which can contribute to osteoporosis

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Selenium	Antioxidant	Barley, salmon, beef, lamb, mushrooms & sardines	200-800 mcg a day Best taken with food Best form is L-selenomethionine	If you have an underactive thyroid, a condition called hypothyroidism, or a personal history of skin cancer, do not take selenium unless otherwise instructed by your doctor. Exceeding 1000 mcg per day can cause toxicity Avoid taking selenium if you have diabetes or if you are on anticoagulants or cholesterol-lowering medications, as this may increase risk of bleeding and may reduce the effectiveness of the drug Selenium may also prolong the sedative effects of barbiturates such as butabarbital and phenobarbital
Sulfur	Enhances detoxification	Eggs, broccoli, cabbage, Brussels sprouts, bok choy, cauliflower, garlic, onions, leeks & asparagus	2 garlic capsules a day	Natural organic sulfur compounds are easily destroyed. Food processing, food drying, food storage and food cooking are among the most common reasons people become deficient in sulfur
Vitamin C	Helps the liver detoxify blood thinners, steroids, codeine, anti-inflammatories & sulfa drugs Antioxidant to protect the liver	Parsley, papaya, pineapple, red/green peppers, broccoli, Brussels sprouts, kale & strawberries	1000–3000 mg a day in divided doses Best taken with food Buffered forms of Vitamin C are easier on the stomach Taking Vitamin C supplements which include bioflavonoids will help increase absorption	Sulfa antibiotics decrease Vitamin C levels in the body High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood thinning medication, as Vitamin C can act as a natural blood thinner
Water	Helps flush toxins out of the body	Drink a minimum of 6 to 8 glasses of water every day	NA	Try to drink filtered water, which has had toxins and other impurities removed (preferably carbon or reverse osmosis filter systems) Avoid water stored in plastic bottles, which can leach chemicals into the water, potentially disrupting hormone balances
IMPORTANT				
Calcium d-glucarate	Helps detoxify painkillers & muscle relaxants	Apples, oranges, broccoli, cabbage, cauliflower, bok choy & Brussels sprouts	500 mg a day	Alcohol may increase how fast the body gets rid of calcium D-glucarate, therefore decreasing the effectiveness of calcium D-glucarate Calcium d-glucarate can increase the elimination of certain drugs or hormones from the body, thereby reducing their effectiveness. Check with your physician before taking
Copper	Helps detoxify blood thinners, steroids, anti-inflammatories & codeine	Barley, chick peas, lentils, sesame seeds & mushrooms	Best taken in food form	It is unusual for anyone to be deficient in this nutrient, therefore supplementing is not required Diabetics should only use copper under supervision
Glucuronic acid	Helps detoxify painkillers & muscle relaxants	Jerusalem artichokes	500-1000 mg a day	Not known
Limonene	Helps the liver detoxify blood thinners, steroids, codeine & anti-inflammatories	Oranges, tangerines, lemon rinds, dill & caraway seeds	NA	NA

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Indole-3-carbinol	Helps the liver detoxify blood thinners, steroids, codeine & anti-inflammatories	Broccoli, Brussels sprouts, bok choy, cabbage & cauliflower	200-800 mg a day	It can cause side effects such as skin rashes and small increases in liver enzymes In very high doses, indole-3-carbinol can cause balance problems, tremors and nausea Before taking indole-3-carbinol, talk to your health care provider if you take any medications that can affect liver function
Vitamin A	Antioxidant	Sweet potato, carrots, spinach, kale, red peppers, butternut squash & Swiss chard	5000-10 000 IU a day Best taken with food The synthetic forms of Vitamin A such as palmitate or acetate have potential to produce toxic symptoms	Women who are sexually active or of child-bearing age should not use high doses (over 10 000 IU) of Vitamin A due to risk of birth defects. Doses over 10 000 IU should be taken under the supervision of your health care practitioner
Zinc	Helps the liver detoxify blood thinners, steroids, codeine & anti-inflammatories	Red meat, sesame seeds, pumpkin seeds, oats, yogurt & mushrooms	50 mg a day Best taken with food Best absorption forms include: zinc picolinate, acetate, citrate, glycerate and monomethionine Poor absorption forms include: zinc oxide and zinc sulfate	Take in divided doses during the day to prevent possible nausea Consult with your health care professional first if you have high cholesterol Higher doses of zinc (greater than 100 to 300 mg a day) can impair the immune system and may lead to a copper deficiency
Vitamin B1	Helps detoxify sulfa drugs	Navy beans, black beans, pinto beans, lentils, & sesame seeds	50-300 mg a day	Coffee and tea tannins can make it difficult for your body to use Vitamin B1, so drink these in moderation
Vitamin B5	Helps detoxify sulfa drugs	Avocado, yogurt, sweet potatoes, broccoli, cauliflower, mushrooms & eggs	500-900 mg a day	Your body only requires minute amounts of this nutrient, but it is easily depleted in the body Vitamin B5 in high doses may cause diarrhea You shouldn't take this supplement if you have hemophilia, a condition that prevents proper blood clotting. Taking Vitamin B5 could make bleeding more difficult to control
Vitamin E	Antioxidant	Sunflower seeds, almonds, papaya, pine nuts, olives, spinach & blueberries	800 IU a day Best taken with food Best form to take is with mixed tocopherols including D alpha-tocopherol, tocotrienols and succinate Do not use synthetic form dl-alpha-tocopherol as it acts very differently in the body	If you have heart disease or diabetes, do not take doses over 400 IU a day This is a natural blood thinner, so consult your health care professional first if you are taking blood-thinning medications or if you have a bleeding disorder. Stop taking this supplement 2 weeks before surgery Prolonged and high-level intakes of Vitamin E (greater than 1500 IU a day) can actually be detrimental to the immune system

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
HELPFUL				
Dandelion root tea	Antioxidant	As tea, drink 2-3 cups a day (1 teaspoon of herb per cup of hot water)	NA	Taking dandelion root with antibiotics might decrease their effectiveness Do not take with potassium (water pills) or lithium People who are allergic to ragweed and related plants (daisies, chrysanthemums, marigolds) are likely to be allergic to dandelion. If you have allergies, be sure to check with your health care provider before taking dandelion root
Turmeric	Enhances detoxification	Spice, 1-2 teaspoon a day	300 mg capsule, 2-3 pills a day	May increase body temperature Turmeric might slow blood clotting. Taking turmeric along with medications that also slow clotting might increase the chances of bruising and bleeding

CHAPTER 10

Nutrition for Pain

1. Eat anti-inflammatory foods & herbs
2. Eat a clean diet to avoid toxic buildup
3. Eat foods high in B vitamins, calcium, magnesium & potassium
4. Eat foods high in tryptophan & phenylalanine
5. Maintain a healthy immune system
6. Improve circulation by eating ginger & taking CoQ10
7. Maintain a healthy pH level
8. Drink 6-8 cups of water/fluids a day
9. Maintain a healthy weight
10. Identify and avoid food intolerances
11. Avoid stimulants such as sugar, MSG & artificial sweeteners

SCI and Pain

Pain is experienced when an injured or inflamed area of the body sends a signal through the nervous system to the brain.

It is only when the brain receives and interprets this signal that you experience the sensation of pain. Pain is a very common problem after spinal cord injury (SCI).

Many individuals with SCI take medications to address their pain. Pain medications can decrease pain by interfering with the ability of the nerves to conduct messages of pain, by altering the brain's capacity to receive pain sensations, or by assisting with reducing tissue damage and inflammation.

Nutrition can provide ways to reduce pain impulses within the nerves, limit the brain's perception of pain, and stop local tissue damage without some of the negative side effects associated with pain medications.

This chapter will discuss the various ways nutrition can help you to reduce your pain through foods and supplements.

34% - 94%

Chronic pain is estimated to occur in 34-94% of individuals with SCI.

– Kapadia & Harden, 2000

50% - 81%

Approximately 50-81% of individuals with SCI are estimated to experience ***musculoskeletal pain.***

– V.W. Lin, Spinal Cord Medicine

29% - 75%

Neuropathic pain is experienced by 29-75% of individuals with SCI, and onset usually occurs within the first few months or years following the injury.

– Rintala, Holmes et al., 2007

5%

Visceral pain occurs in approximately 5% of individuals with SCI.

– Gardenas and Rosenbluth, 2001

Pain p. 10.1 - under muscukoskeletal pain - Vernon W. Lin - Spinal Cord Medicine

Common types of pain & pain sensations associated with SCI

The three main types of pain that an individual with SCI may experience are **musculoskeletal pain, visceral pain and neuropathic pain.**

1. Musculoskeletal Pain

This pain can be due to overuse or abnormal use of body parts such as the arms and shoulders from irregular posture, poor gait patterns, and the physical stress from transferring and pushing a wheelchair. This pain tends to get worse over time.

Common musculoskeletal issues for a person with SCI include: rotator cuff tears, carpal tunnel syndrome, narrowing of the joint space in the shoulder, heterotrophic ossification, arthritis and spasticity. Shoulder pain in particular occurs in 30% - 100% of people with SCI and can significantly affect a person's level of independence.

What you may feel:
Dull, aching or stabbing pain which is often related to body position & activity.

2. Visceral Pain

This type of pain is caused by poor nerve innervation to internal organs such as the gastrointestinal tract.

What you may feel:
Can be identified by location, e.g. abdomen and by sensations such as dull pain, bloating and cramping (although tetraplegics may not experience these sensations).

3. Neuropathic Pain

Neuropathic pain is also known as nerve pain. It is a type of chronic pain that occurs when nerves in the central nervous system become injured or damaged. The pain can be described as tingling, pins & needles, or more painful sensations like burning and/or stabbing. This type of pain is the most disabling and the most difficult to treat.

What you may feel above the level of your injury:
Includes pain not specific to SCI. For example, numbness, burning, abnormal sensations and shooting pain, which can occur in the absence of stimulation or with light touch.

What you may feel at the level of your injury:
Constant burning pain. This may be associated with increased sensitivity to pain and allodynia (a stimulus which does not normally provoke pain).

What you may feel below the level of your injury:
Spontaneous or induced pain, characterized by burning, aching, stabbing pain or electric shocks. Pain can be constant but may vary in intensity.

– Siddall, Taylor and Cousins, 1997

Pain is defined as "a sensory or emotional experience associated with actual or potential tissue damage."

Nutrition for Pain

1 Eat anti-inflammatory foods & herbs

Inflammation in the body can be a key factor in the onset and intensity of pain. It can be caused by a number of factors including (but not limited to) infections, immune reactions, poor diet and lifestyle. It is important to note that inflammation is a necessary part of the tissue healing process. However, *chronic* inflammation, persisting after the initial stage of injury, can be highly destructive to tissues and contribute significantly to chronic pain.

A diet which is limited in fruits and vegetables and high in processed grains (such as white breads), dairy and processed foods, will over time lead to chronic inflammation in your body and joints.

There are a number of foods and herbs that can help reduce inflammation in your body. Try to incorporate these into your regular diet:

Chili peppers and cayenne pepper – when tissues are injured they send a message to the brain via the central nervous system. It is only when the brain receives this message and interprets it that you experience pain. Nerves use a chemical called substance P to transmit pain signals. Hot chili peppers and cayenne pepper contain a substance called capsaicin, which helps reduce substance P. In some studies capsaicin has been shown to reduce osteoarthritic pain by up to 70%. Studies also demonstrate improvement of nerve pain in people with SCI when capsaicin ointment is applied topically to painful areas.

Sanford, Benes, 2000

Ginger – is a spice that has success in reducing inflammation in conditions such as osteoarthritis, rheumatoid arthritis and muscular pain. It does this by modifying actions of enzymes in the body and blocking the production of inflammatory compounds.

Clove oil, garlic, sulfur and cumin – also have anti-inflammatory effects on the body and joints. Turmeric has an active compound in it called curcumin, which reduces inflammation and muscle tenderness.

Essential fatty acids (EFAs) – natural oils from plants and fish can have the same effect as anti-inflammatory medications but without the negative side effects. Consuming these good fats also provides many other health benefits to your body. Fish oil is particularly important in reducing inflammation and neuropathic pain. In fact, nerve pain can be associated with an EFA deficiency.

Eat foods high in essential fatty acids such as those found in oily fish like salmon, mackerel, herring & sardines.

2 Eat a clean diet to avoid toxic buildup

When your body has a buildup of toxins it can irritate your nerves leading to: pain or aches in muscles and joints, arthritis, stiffness or limitation of movement, feelings of weakness and tiredness, chest pain, and heartburn, as well as earaches. You can reduce toxin buildup by eating a clean diet which includes ***wholesome foods such as fruits, vegetables, nuts, seeds & fish.*** Drinking lots of water can also help flush out excess toxins from your body that may be irritating nerve endings.

Maintaining a clean diet and a healthy lifestyle not only reduces your toxic load but also helps your body to function better. You may be pleasantly surprised to experience improvement in weight loss, headaches, mental function and mood, as well as sleep.

3 Eat foods high in B vitamins, calcium, magnesium & potassium

There is a tendency in the Western diet to consume high amounts of refined grains, coffee, processed foods, alcohol and sugars. These, together with poor cooking methods and poor quality of soil, lead to vitamins and minerals being absent, lost or destroyed. In turn, these dietary, cooking and agricultural factors contribute to vitamin and mineral deficiencies in your body. Stress, smoking, medications and digestive problems may also contribute to nutrient deficiencies.

Blood work can help determine if a nutrient is low or within normal range, although even normal nutrient ranges still may not be adequate for optimal health, especially in individuals with SCI where nutrient demands are high. If you experience pain, ensure that you are consuming the water-soluble B vitamins (B1, B6, B7 & B12) as well as calcium, magnesium and potassium, as these nutrients may help with reducing pain.

B VITAMINS

Supplementing with these vitamins may help to reduce nerve & muscle pain:

Vitamin B1 – Vitamin B1 promotes healthy nerves and can provide nerve pain relief within a couple of months of supplementing.

Vitamin B6 – Vitamin B6 plays a critical role in pain management by making pain-inhibiting neurotransmitters. It can also help with a variety of pain-related conditions, including but not limited to carpal tunnel syndrome, diabetic pain, back pain, temporomandibular joint (TMJ) pain, swelling, and nerve pain including tingling sensations.

Vitamin B7 – Vitamin B7 is recommended to be used routinely for the prevention and management of neuropathy.

Vitamin B12 – Vitamin B12 helps nerves function. A deficiency in B12 can lead to issues such as loss of coordination in the limbs, spasticity and walking difficulties.

Foods high in the B vitamins include: grass-fed beef, salmon, sardines, chicken, eggs, bananas, avocados, carrots, beans, lentils, brown rice, sunflower seeds & yogurt.

There are eight B vitamins. If you are taking B vitamins in supplement form, it is best to take them together in a B-complex to increase absorption.

MAGNESIUM

A magnesium deficiency can promote inflammation and contribute to fatigue, sleep disorders, mood problems and muscle dysfunction, which are all factors that can influence pain. Studies show that magnesium can reduce osteoporosis pain, muscle cramps, muscle spasms and myalgia.

Foods high in magnesium include: spinach, pumpkin, sunflower seeds, sesame seeds, broccoli, flax seeds, kale, ginger, salmon, quinoa, black beans, beets, tomatoes, almonds & dark chocolate.

Avoid carbonated beverages as these can be high in phosphorus. Phosphorus can deplete calcium and magnesium – two minerals that can help relieve muscle cramps, muscle tension and spasticity.

Eat foods high in B vitamins, calcium, magnesium and potassium (cont'd)

CALCIUM

Symptoms of calcium deficiency can include leg, bone and neck pain, as well as muscle cramps. Therefore, eating ***foods high in calcium such as broccoli, kale, sesame seeds, parsley, almonds & yogurt*** can help to address these issues.

POTASSIUM

Potassium is an essential mineral which is important for the function of all cells, tissues and organs in your body. A potassium deficiency can cause abdominal, leg and joint pain, muscle weakness and cramping.

Foods high in potassium include: avocados, apricots, salmon, white beans, bananas & spinach.

4 Eat foods high in tryptophan & phenylalanine

Eating foods containing the amino acid **tryptophan** (found in ***turkey, eggs & salmon***) along with certain nutrients such as Vitamin B6, Vitamin C, folic acid and magnesium (also found in the foods that contain tryptophan) helps to manufacture a natural painkiller called **serotonin**. Serotonin can help increase a person's pain threshold. **An alternative to tryptophan is to supplement with 5-HTP, as it is more effective in increasing serotonin levels.**

Phenylalanine (DLPA) is an amino acid that has been used to reduce pain and help with depression. It does this by preventing the breakdown of your body's natural painkillers called endorphins. Endorphins are substances that block pain signals moving through the nervous system. Your body's endorphins have a narcotic-like effect when it comes to both pain relief and depression relief.

Foods high in phenylalanine include: cheese, fish, chicken, turkey, eggs, sesame seeds & lentils.

Factors that interfere with the conversion of tryptophan into serotonin:

- **Vitamin B6 deficiency**
- **Cigarette smoking**
- **High sugar intake**
- **Alcohol abuse**
- **Excessive protein consumption**
- **Low blood sugar**
- **Diabetes**

"Every day for the first 10 years of my injury, I lived with excruciating neuropathic pain and relied on heavy narcotic drugs to function. Frustrated with the constipation and fatigue associated with these painkillers and worried about the long-term effects on my health, I was desperate to find another way to cope.

After cleaning up my diet, which involved eliminating all processed food, wheat, dairy, artificial flavors, colors and preservatives, eating more legumes and vegetables, and taking daily supplements of probiotics, antioxidants and good fats, my pain has virtually disappeared. On top of this I lost 10 lbs, have more energy and rarely get headaches anymore."

Joanne, L1 paraplegic

5 Identify and avoid food intolerances

Food intolerances can cause joint, bone and muscular pain as a response to your body's inability to properly break down certain foods and absorb them. Many studies demonstrate improvements in joint stiffness, swelling, tenderness and grip strength when these foods are eliminated from the diet. It is important to identify food intolerances and eliminate them from your diet, as they can cause inflammation and contribute to pain.

The most common food allergens are: milk, dairy, wheat, gluten, citrus, corn, eggs, sugar, soy, peanuts, pork & yeast.

Everyone responds to food differently, and a food allergy or intolerance can be to any food, including healthy ones. It is recommended that you follow the **Food Elimination Diet outlined in the Appendix.**

Even though you may have never experienced food intolerances before your injury, you may find that you are suddenly experiencing them after your injury. This is due to disruptions in digestive function and increased stress levels.

6 Avoid stimulants such as sugar, MSG & artificial sweeteners

Too many stimulants in the body, such as MSG, artificial sweeteners and sugar, can be toxic to your nerve cells and increase sensitivity to pain. When blood sugar levels build up in the body, in conditions such as diabetes and poor circulation (both common problems in SCI), it can cause a chemical reaction around nerves resulting in swelling and pinching. If this swelling is not relieved, it can cause nerves to not function properly and even lead to nerve death. The neuropathic pain that comes from this can be quite debilitating.

Lowering blood sugar levels can help to improve circulation and reduce pain experienced from sugar irritants. You can achieve this by consuming a diet low in "bad" fats and simple sugars and consuming more complex carbohydrates and "good" fats.

7 Maintain a healthy immune system

Trauma, medications, surgery, a compromised immune system and poor diet can all increase the risk of infections. Maintaining a strong immune system is important because bacterial, yeast and viral infections can cause pain and inflammation. For instance, fungal and bacterial infections can produce myotoxins that can cause inflammation and irritate the nerves, resulting in pain. So it is important to eliminate mould-containing foods from your diet as m ssible. It is also recommended to take a probiotic to help combat potential bacterial and fungal infections.

Foods that are known to contain mould and should be AVOIDED include peanuts, cashews, pistachios, corn, dried coconut, cereals, barley, rye & wheat.

Maintaining a strong immune system also involves consuming antioxidant-rich foods to neutralize free radicals. Free radicals are unpaired electrons that cause tissue damage. We are exposed to free radicals through normal bodily processes, toxins, chemicals, medications, pesticides, herbicides, food preservatives and additives, to name a few. If there are too many free radicals and not enough antioxidants to neutralize them, they will in turn cause tissue damage and inflammation, and contribute to pain. Therefore, it is important to reduce food additives and preservatives from your diet and maintain a good supply of antioxidants.

Consume a diet high in fruits/vegetables and nuts/seeds, which are high in the antioxidants Vitamins A, C and E, zinc & selenium.

St. John's Wort

This herb can be used to help address numerous types of pain, including:

- **Headaches**
- **Migraines**
- **Muscle pain**
- **Nerve pain**
- **Fibromyalgia**

8 Improve circulation by eating ginger and taking CoQ10

A lack of adequate blood flow to and from tissues can result in pain. Good circulation is needed to deliver the necessary nutrients and oxygen to your tissues and to remove waste products. If this transportation system becomes sluggish, waste products build up which can irritate your nerve endings, causing tissue damage and pain.

Improving circulation through diet and lifestyle changes can help alleviate pain.

Ginger is a spice that is very effective at improving circulation.

CoQ10 is a key nutrient used to improve circulation in the body, and can help facilitate the delivery of nutrients and removal of wastes from affected tissues.

Foods containing CoQ10 include: fish, chicken, broccoli, cauliflower, organ meats, strawberries, eggs & sesame seeds.

For improving artery health and circulation, refer to Chapter 4 on Cardiovascular Health for more details.

Smoking restricts blood vessels that supply nutrients to the peripheral nerves, and this can increase nerve pain.

9 Maintain a healthy pH level in the body

A healthy pH is important in managing inflammation. Research shows that low pH levels (meaning your body is more acidic) contribute to inflamed and damaged tissue. Low pH levels can cause a cascade of inflammatory changes, which stimulate pain receptors and can produce muscular pain and tenderness. A diet high in meats and grains lowers pH levels, making the body more acidic, while fruits and vegetables increase (alkalinize) pH levels.

10 Drink 6 - 8 cups of water/fluids a day

Keeping your body well hydrated with water and consuming a diet high in good fats help to keep your joints well lubricated and protect them from wear, tear and pain. Other pain-related issues including stomach pain, colitis pain, rheumatoid arthritis, lower back and neck pain, angina pain, headaches, stress, depression, high cholesterol and excess weight can all be exacerbated by a lack of water in the body.

11 Maintain a healthy body weight

Studies show that heavier people are predisposed to shoulder injuries and carpal tunnel syndrome as a result of the excess strain put on these joints when transferring or moving. Studies also show that being overweight can make a person more sensitive to pain.

People who are overweight are at risk of hormonal imbalances which can contribute to pain. For example, the hormone estrogen can be made by fat cells (it can also be consumed in the diet). If you are overweight, your fat cells can potentially produce *excess* estrogen, contributing to inflammation, water retention and swelling, which can create pressure on nerves and nerve endings, as well as cause joint damage and pain.

The liver is responsible for breaking down estrogen in the body, so providing support to your liver for optimal function is important.

See Chapter 9 on maintaining healthy liver function.
To maintain a healthy weight see Chapter 5, Nutrition for Weight Loss.

EXERCISE REGULARLY

Although pain can limit your ability to exercise, your body produces natural painkillers called endorphins and enkephalins during exercise.

Exercise also helps to strengthen muscles, improve cardiovascular fitness, de-stress the mind, lose weight, improve circulation, protect bones, balance blood sugar levels and improve sleep – all of which can help reduce pain.

Painless Chicken Stir Fry

This dish is packed with pain-fighting nutrients. ***Servings: 2***

Ingredients:
- 2 teaspoons of extra virgin olive oil
- 2 cups of spinach
- 1 small zucchini, chopped
- 1 red bell pepper, chopped
- 1⁄2 of a yellow pepper, chopped
- 1⁄2 cup of broccoli, chopped
- 2 cloves of garlic, minced
- 1⁄2 teaspoon of cumin
- 1 small chili pepper, finely chopped
- 1⁄4 cup of vegetable stock
- 4 ounces of boneless, skinless chicken breast, sliced

Directions:
1. Heat the olive oil over moderate heat in a large skillet or wok
2. Add the zucchini, red and yellow peppers, broccoli and garlic
3. Cook until vegetables are tender, add spices and the vegetable stock
4. Stir in chicken and cook for a few minutes
5. Add the spinach and cook until spinach is wilted and the chicken is cooked

NUTRITIONAL CONTENT PER SERVING
Proteins: 16.8 grams
Carbohydrates: 15 grams
Fats: 3.5 grams
Calories: 142

Double Chocolate Smoothie

The strawberries and dark chocolate provide powerful antioxidants, as well as muscle-relaxing magnesium. ***Servings: 1***

Ingredients:
- 1 tablespoon of dark cocoa powder
- 1 tablespoon of ground flax seeds
- 1 cup of frozen or fresh strawberries
- 1 scoop of whey protein powder (can be chocolate flavored)
- 1 1⁄2 cups water

Directions:
1. Mix all in a blender and enjoy

NUTRITIONAL CONTENT PER SERVING:
Proteins: 23.5 grams
Carbohydrates: 18.6 grams
Fats: 4.2 grams
Calories: 181

Turkey Burgers

This serotonin-surged burger is packed with tryptophan to help increase your pain tolerance. The garlic and the good fats in the flax seeds help to reduce inflammation in the joints, and the cayenne pepper offers you capsaicin (the substance that helps to reduce the pain chemical in your body called substance P). ***Servings: 4***

Ingredients:

- 1 lb. of ground turkey
- 1 1⁄2 teaspoons of olive oil
- 1/2 medium onion, finely chopped
- 1 garlic clove, minced
- Pinch of cayenne pepper
- 1 tablespoon of ground flax seeds
- 1⁄2 cup of parsley, chopped
- 2 large eggs
- Sea salt and pepper

Directions:

1. Mix together turkey, oil, garlic, onions, cayenne pepper. flax seeds, parsley, eggs and salt & pepper
2. Gently form 4 patties
3. Grill the burgers
4. Serve on top of a bed of lettuce

Note: For weight loss it's best to have no bun or half a bun to reduce grain intake. Alternately you can serve on top of a grilled portobello mushroom for increased fiber, zinc and magnesium.

NUTRITIONAL CONTENT PER PATTY:

Proteins: 25.7 grams
Carbohydrates: 1.9 grams
Fats: 15.6 grams
Calories: 254

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Magnesium	Helps reduce lactic acid buildup, muscle spasms, muscle cramps and osteoporosis pain Reduces feelings of stress and fatigue that can contribute to pain experiences	Black beans, quinoa, sunflower seeds sesame seeds, bran, spinach, broccoli, basil, flax seeds & ginger	400-1000 mg a day in divided doses at meals Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools, so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease, and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first
Potassium	Improves circulation and reduces risk of tissue hypoxia and inflammation as well as maintains healthy pH levels	Bananas, avocados, apricots, salmon, white beans, spinach, broccoli, kale, carrots, beets, papaya, asparagus, basil, cucumbers & cauliflower	Best consumed through foods	People with kidney or severe heart disease should not take potassium supplements except under supervision of their doctor
B-complex	To help with nerve pain	Grass-fed beef, salmon, sardines, chicken, eggs, bananas, avocado, carrots, beans, lentils, brown rice, sunflower seeds & yogurt	As directed on label or as directed by your health care professional	Check with your health care professional before supplementing if you have, or have had, any of the following: diverticular disease, ulcers, ulcerated colon, inflammation of the lining of the stomach and intestines, iron metabolism disorder causing increased iron storage, sickle cell anemia, hemolytic anemia, or several blood transfusions Beware of niacin flush (when your skin feels warm, red, itchy or you experience a burning sensation)
D-phenylalanine	Increases endorphins in the brain which can help relieve pain	Cottage cheese, fish, chicken, turkey, eggs, pork, sesame seeds & lentils	D-phenylalanine 750-1000 mg a day OR DL-phenylalanine 1500 to 2000 mg a day Best to take on an empty stomach with juice as amino acids compete for absorption	Best to get through diet as opposed to supplementing Consult with your health care professional first if you have a heart condition or hypertension. Do not take if you are on antidepressants, have a seizure disorder, experience panic attacks, are diabetic, or have PKU – Phenylketonuria It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Tryptophan/ 5-HTP	To increase the synthesis of serotonin which is a natural pain reliever	Salmon, lamb, venison, chicken, tuna, turkey, eggs, oats, sunflower seeds, sardines & cod	5-HTP – 50 mg, 2-3 times a day	Best taken with Vitamins B3, B6 and folic acid to help with conversion into serotonin A small percentage of people may experience some nausea with 5-HTP as a lot of serotonin is made in the gut Consult with your health care professional if you are taking an antidepressant before taking 5-HTP
Curcumin	Anti-inflammatory for pain relief and antispasmodic	Turmeric	1-2 g a day	Common side effects include stomach upset, nausea and diarrhea. Turmeric is also known to cause heartburn in people with ulcers

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Capsaicin	Blocks the nerves' ability to transport pain messages to the brain Improves osteoarthritic, diabetic and neuropathic pain	Hot chili peppers & cayenne pepper	Can be topically applied Capsaicin ointment to contain 0.025-0.075% for effective treatment applied 4 times a day	Do not apply to broken skin If you have an allergic reaction such as skin rash, itching or hives, swelling of the face, lips or tongue, burning pain, redness that does not go away, cough or skin sores or thinning of the skin, stop taking and consult with your health care professional
CoQ10	Improves circulation needed to provide nutrients to tissues and remove waste products that can irritate the nerve endings causing pain	Fish, chicken, organ meats (liver, kidney & heart), broccoli, cauliflower, spinach & strawberries	30 – 200 mg a day	If you are taking statin drugs, it is essential that you take CoQ10 as these drugs deplete CoQ10 in the body Approximately 14-32% of CoQ10 is lost during frying of vegetables and eggs; however, boiling these foods preserves CoQ10 Avoid taking CoQ10 two weeks prior to surgery Certain medications may interact with CoQ10 such as blood-thinning drugs. Consult with your health care professional before taking
Ginger	Anti-inflammatory for pain relief	Powdered, or root can be grated in salads or juiced	1-2 g a day or 1⁄2 to 1 teaspoon of powdered ginger a day	Ginger may interfere with or enhance the effects of blood thinners, barbiturates, beta-blockers, insulin and other diabetic medications Due to blood-thinning properties it should not be taken before surgery Should not be taken if you have kidney disease Can be irritating to the intestinal mucosa and should be taken with or just after meals
Calcium	To help reduce leg, bone and neck pain as well as muscle cramps	Kale, broccoli, eggs, sardines, salmon, sesame seeds, almonds, walnuts & parsley	1500 mg a day for people with SCI who are young and have not achieved peak bone mass, are pregnant or breast-feeding, or are elderly with insufficient diets 1000 mg a day for adults with SCI and sublesional osteoporosis (SLOP) and no pre- or post-injury history of bladder or renal stones 500 - 660 mg a day for people with SCI who have a history of calcium stones or significant renal impairment Craven, Robertson et al, 2009	Best to take calcium through foods rather than supplements, as foods raise blood calcium levels slowly and reduce the risk of bladder or kidney stones and cardiovascular disease Consult with your health care professional before taking calcium supplements If using supplements, best to take with meals to maximize absorption or take at night to help with sleep Avoid calcium from oyster shell, dolomite or bone meal, as these are known to be high in lead Best to take with magnesium to maintain a calcium balance and prevent accumulation of calcium in unwanted areas, such as soft tissue If you are on diuretics, suffer from hypercalcemia, hypoparathyroidism, renal stones, renal impairment, kidney or heart disease, consult with your health care professional before taking supplements

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
St. John's wort	Reduces nerve pain, phantom pain and sciatic pain	Can be taken in tea form	300 mg a day away from meals	Can cause photo-sensitivity and can increase the metabolism of certain drugs, reducing their effectiveness in particular: contraceptives, antidepressants esp. SSRIs , anticoagulants, immunosuppressants and anti-convulsants Consult with your doctor before taking
HELPFUL				
SAMe	Addresses pain including osteoporosis pain and migraines	Not found in diet	800-1200 mg a day	Individuals who are using prescription antidepressants or who suffer from bipolar disorder should only use this product under the supervision of a health care professional, as this can increase anxiety and mania If there are not enough B vitamins available to the body, SAMe could break down into homocysteine which has negative consequences to the cardiovascular system. You need to ensure you get enough B vitamins Side effects can include nausea, diarrhea, mild insomnia, constipation, dizziness & sweating

CHAPTER 11

Nutrition for Sleep

1. Eat foods high in tryptophan and supplement with melatonin or 5-HTP
2. Maintain a healthy weight
3. Balance blood sugar levels
4. Eat foods high in magnesium & calcium
5. Avoid alcohol & caffeine
6. Identify & avoid food intolerances

SCI and Sleep

Sleep is vital for overall health and longevity. After a spinal cord injury (SCI) you are more likely to have sleep problems.

Individuals with SCI have more difficulty falling asleep, wake up more frequently during the night, are more often prescribed sleeping pills, sleep longer hours, take frequent and longer naps during the day, snore more, and often feel tired and sleepy during the day.

Lack of sleep can lead to many health problems, such as stress, Type 2 diabetes, heart problems, depression, anxiety, fatigue, mood swings, weight gain, reduced memory and ability to concentrate, and a tendency to have a shorter life span.

When you sleep more deeply and dream, you wake up in the morning with your physical and psychological batteries fully charged and ready for the day.

This chapter will provide you with simple and easy-to-use nutritional strategies to help you get a better night's sleep.

Sleep plays many important roles in your body:

- Repairs the body – especially bones, skin and muscles
- Releases growth hormone, which aids in fat loss
- Replenishes DHEA (anti-aging hormone)
- Reduces insulin and inflammation, which are important in managing your weight
- Increases GABA and serotonin, the "relaxation" and "happy" hormones
- Reduces cortisol (high levels contribute to increased appetite as well as cravings for carbohydrates)
- Increases thyroid hormone to maximize metabolism
- Increases the production of acetylcholine – a neurotransmitter that keeps muscles healthy and enhances memory

Factors That Can Affect Your Sleep

- Anxiety
- Stress
- Sedentary lifestyle
- Changes in sleep cycles and melatonin production
- Depression
- Pain
- Medications
- Spasticity
- Obesity
- Night time bladder management and/or turning in bed

Normal Sleep Patterns

Normal sleep consists of two main states;

- **NON-REM (non rapid eye movement) Sleep**
  Consists of four stages and is considered the period of restorative sleep.
- **REM (rapid eye movement) Sleep**
  Is the last stage of sleep when you are most likely to dream.

Below are the five stages of sleep, and the indicators of each stage:

Stage 1 - Light Sleep	Drifting in and out and can easily be wakened. Your eyes move slowly and muscle activity is low.
Stage 2 - Light Sleep	Eye movement stops and brain waves become slower, with occasional bursts of rapid waves called sleep spindles.
Stage 3 - Deep Sleep	Extremely slow brain waves called delta waves appear, interspersed with smaller fast waves.
Stage 4 - Deep Sleep	The brain produces mostly delta waves. There is no eye movement or muscle activity.
Stage 5 - REM Sleep	Breathing becomes more rapid, irregular and shallow. The eyes jerk rapidly while limb muscles become temporarily paralyzed. Dreams usually occur at this stage.

You typically go through all 5 stages of sleep, 4 to 6 times a night.

Nutrition for Healthy Sleep

1 Eat foods high in tryptophan and supplement with melatonin or 5-HTP

Tryptophan is the amino acid that your brain uses to make **melatonin,** the hormone that helps you sleep. Melatonin can help you get to sleep more quickly, reduce the frequency of waking up during the night and increase REM sleep.

To assist with converting tryptophan into melatonin, the body needs the help of Vitamins B6 and C, folic acid and magnesium. These nutrients are commonly found in foods high in tryptophan. Eating carbohydrates along with foods that contain tryptophan helps get this calming amino acid into your brain so it can have its sleep-inducing effect.

Factors that interfere with the conversion of tryptophan into melatonin include a Vitamin B6 deficiency, cigarette smoking, high sugar intake, alcohol abuse, excessive protein consumption, low blood sugar and diabetes.

5-HTP is a precursor to melatonin. This supplement can help improve your sleep as well as reduce depression, anxiety and pain, which can also affect your ability to get to sleep and remain asleep.

Eat foods high in tryptophan, such as salmon, grass-fed beef, tuna, turkey, chicken, lamb & sardines.

Certain medications such as beta blockers (prescribed for hypertension, high blood pressure and various cardiovascular-related problems) can negatively affect melatonin secretion. Low melatonin levels are also associated with pain, anxiety and depression, which can negatively affect sleep.

Producing melatonin

When it's dark, your body produces more melatonin; when it's light, your production of melatonin drops. Being exposed to too little light during the day or bright lights in the evening (for example, leaving your computer or TV screen on in your bedroom) can disrupt your body's normal melatonin cycles.

Melatonin decreases with:

- Age
- Depression
- Stress
- Complete cervical injury

Research suggests that supplementing with melatonin can help to restore normal sleeping patterns for individuals with SCI.

– Schneer, Zeitzer, Ayas et al, 2006

2 Maintain a healthy weight to address sleep apnea

Sleep apnea is associated with snoring, daytime sleepiness, irregular breathing and periods of time when breathing ceases. The prevalence of sleep apnea in the SCI population is estimated to be between 9% to 45%.

– Burns, Little et al, 2000

– Leduc, Dagher, Mayer et al, 2007

Predictors of sleep apnea in the SCI population:

- Level of injury (greater prevalence with a tetraplegia due to weakness of respiratory muscles)
- Sleeping on your back
- Overweight
- Age
- Large neck circumference
- Lower extremity edema

There are two types of sleep apnea:

1. Central Sleep Apnea (CSA)

CSA occurs when breathing ceases because the muscles in the diaphragm and chest temporarily stop working. This type of sleep apnea occurs due to a central nervous system problem and is common among people with a tetraplegia.

2. Obstructive Sleep Apnea (OSA)

Individuals with SCI are more likely to experience this type of sleep apnea. OSA is characterized by intermittent upper airway obstruction and may be associated with episodes of low oxygen in the blood as well as broken sleep. OSA is diagnosed when someone wakes at least five times during the night. OSA is most closely tied to obesity and influenced by diet.

Obesity is thought to contribute to OSA in people with SCI due to increased fat in the belly region and near the upper airway, which affects breathing. Sleep problems also contribute to additional weight gain. When you don't sleep well, you can experience increased hunger, especially for high calorie foods such as cookies, candy, chocolate and bread.

Weight management is important in addressing sleep apnea. (**Please refer to Chapter 5 on Weight Loss)**.

3 Balance your blood sugar levels

Unbalanced blood sugar levels caused by skipping meals and snacks or eating a diet high in sugar and refined carbohydrate foods can interfere with your ability to sleep.

Hypoglycemia – meaning low blood sugar, has been linked to sleep problems. Research suggests that balancing blood sugar levels (avoiding sugar, caffeine and alcohol, and eating small frequent meals with protein at each meal) can improve insomnia.

Nocturnal hypoglycemia – occurs when blood sugar levels drop at night and your body naturally switches into an alert mode (based on our primitive survival instincts) to seek out food. Eating consistently during the day and eating the right foods in the evening can help prevent this from occurring. To ensure blood sugar levels remain balanced, it is recommended that you:

- Eat 3 meals and 2 snacks a day. Do not skip meals.
- Try to eat protein and a complex carbohydrate (such as vegetables or beans) at every meal.
- Avoid refined carbohydrates and sugars, such as bagels, white bread, pastries, cookies and chocolate, as well as caffeine. These only serve to spike blood sugar levels and disrupt sleep.

4 Eat foods high in magnesium & calcium

Pain, spasticity and muscle cramps are common for many individuals with SCI and can interfere with getting a good night's sleep. A lack of calcium and magnesium can contribute to leg cramps and muscle spasms during the night, as well as make it difficult for you to fall asleep and remain asleep. A calcium deficiency can cause restlessness and wakefulness, while a magnesium deficiency can leave you feeling anxious and nervous – all of which impact your ability to get a good night's sleep.

Calcium helps your brain use tryptophan to manufacture melatonin. This explains why dairy products, which contain both tryptophan and calcium, are one of the top sleep-inducing foods.

The calcium and **magnesium** you get from your food produce calming effects on the brain & body. If you are having difficulty sleeping, it is recommended to try eating the foods listed below. If you take calcium and magnesium supplements, it is best to take them 45 minutes before bedtime.

Eat foods high in magnesium such as: black beans, quinoa, sunflower seeds, almonds & wheat bran.

Eat foods high in calcium such as: broccoli, kale, salmon, sardines, kidney beans, almonds, sesame seeds, hazelnuts & parsley.

5 Avoid caffeine & alcohol

Alcohol impairs the transport of tryptophan into the brain, where it is needed to make melatonin. It also causes the release of adrenaline, which will cause you to feel alert and to wake up in the night. Alcohol can also exacerbate sleep apnea and impair the most important part of sleep – deep sleep.

Caffeine disturbs your sleep because it stimulates the body's stress response by producing the stress hormones adrenaline and cortisol. This response causes muscle tension, anxiety, irritability and insomnia. Caffeine also interferes with melatonin production.

If you cannot live without caffeine – try to drink it before noon. Your body needs several hours to completely eliminate caffeine and its side effects. Be mindful of all the foods and drinks that may contain caffeine, including black tea, chocolate and soda.

6 Identify & avoid food intolerances

If you fail to see any improvement after you implement the above strategies, you may want to try a **Food Elimination Diet (see Appendix for details).**

Insomnia can be a symptom of food intolerances. If you start eliminating commonly known food intolerances such as dairy, wheat, sugar, caffeine, corn and refined carbohydrates for 2 weeks, you may notice improvements in your sleep.

Smoking may feel like it has a calming effect; however, nicotine is a neurostimulant and can cause sleep problems.

Definition of Insomnia: "Insomnia is difficulty falling asleep or staying asleep or a disturbance in sleep that makes sleep seem inadequate or unrefreshing."

MEDICATIONS

There are many medications (commonly used by individuals with SCI) that can interfere with sleep, such as benzodiazepines, antidepressants, muscle relaxants, beta blockers, anticonvulsants and decongestants.

Benzodiazepines, although effective in the short term, can cause significant problems with sleep patterns in the long term. Benzodiazepines can cause a person to wake up feeling tired, and as a result can cause them to experience carbohydrate and coffee cravings to get them going in the morning.

Healthy Eating Habits to Promote Sleep

- Avoid eating a heavy meal at dinner
- Finish your last meal (or snack) two hours before bed; eating after this time can cause lighter sleep and wakenings during the night
- Avoid highly seasoned and spicy foods at the end of the day
- Avoid sugar and refined carbohydrates such as white bread, white rice and baked goods
- Eat a meal or evening snack that is high in complex carbohydrates, with a small amount of protein that contains tryptophan to relax the brain (e.g. apples with almond butter)
- Avoid strict dieting (inappropriate calorie restrictions) as this can interfere with your sleep patterns

Strategies for Getting a Better Night's Sleep:

Regular schedule
Maintain a regular bed- and wake-time schedule including weekends.
This will help to regulate and strengthen your internal sleep-wake clock.

Bedtime routine
Establish a regular and relaxing bedtime routine. This can include listening to relaxing music. It's important to avoid stimulating activities such as playing games, working on the computer or watching television (exposure to light from TV/computer screens will interfere with melatonin production).

Sleep-friendly environment
Create a sleep-friendly environment that is cool, dark, comfortable and quiet. Keeping your room dark helps to stimulate sleep and avoid premature waking from light in the summer mornings or from street lights. You can do this by putting up dark black-out curtains or you may even want to use eye shades, as the light from digital clocks can also affect your sleep. Make sure there is adequate ventilation and the room is quiet.

Exercising regularly
Exercise makes it easier to fall asleep and contributes to a deeper sleep. Late evening exercising is discouraged as this can re-energize you and also raise your body temperature, which should ideally be lower when going to bed. Research shows that moderate exercise, especially in the early evening for individuals with SCI, has positive effects on sleep.

– Mello, Lauro, Silva et al, 1996

Grilled Turkey Breast with Steamed Ginger Broccoli

This meal is packed with magnesium and tryptophan, which helps your body and brain relax before going to bed. ***Servings: 1***

Ingredients:
- 1 grilled turkey breast
- 2 cups of broccoli, chopped
- 1 tablespoon of olive oil
- 1 teaspoon of ginger, freshly grated or minced

NUTRITIONAL CONTENT:
Proteins: 36.2 grams
Carbohydrates: 22.4 grams
Fats: 16.5 grams
Calories: 354

Directions:
1. Mix ginger and olive oil together and set aside
2. Grill turkey breast
3. Steam broccoli
4. When broccoli is cooked, pour ginger and olive oil on top

Sleepy Squash Soup

This relaxing soup contains sleep-inducing magnesium, calcium and tryptophan.
Servings: 4 to 5

Ingredients:
- 1 large sweet potato, peeled & diced
- 2 carrots, peeled and thinly sliced
- 1-2 teaspoons of curry powder
- 1 pear, peeled and sliced
- 2 tablespoons of extra virgin olive oil
- 1 small summer squash, peeled and cubed
- 1-inch piece of ginger root, peeled and sliced
- 6 cups of vegetable stock
- 2 large onions, chopped
- 1 teaspoon of sea salt

Directions:
1. Place the sweet potato, squash, carrots, ginger and curry powder in a large saucepan
2. Add the vegetable stock; cover and gently bring to a boil
3. Reduce the heat and simmer for about 30 minutes or until the vegetables are all soft
4. Place the pear, onions and olive oil in a separate saucepan and cook until soft over medium heat for 5 to 10 minutes
5. Add the cooked pear mixture and salt to the saucepan with the vegetables and mix well
6. Once all the ingredients are thoroughly cooked, puree in a food processor or with a blender
7. Serve

NUTRITIONAL CONTENT PER SERVING:
Proteins: 24 grams
Carbohydrates: 49 grams
Fats: 8 grams
Calories: 360

Good Night Smoothie

This smoothie is great for a bed-time snack or dessert. It is packed with calcium, magnesium and tryptophan. The honey helps get the tryptophan across your blood brain barrier to help you sleep. ***Servings: 2***

Ingredients:
- 1 banana
- Dash of cinnamon
- 1 cup of Greek yogurt
- 1 teaspoon of honey
- 1 cup of almond milk

Directions:
1. Put all ingredients into a blender and mix

NUTRITIONAL CONTENT PER SERVING:
Proteins: 10.3 grams
Carbohydrates: 20.6 grams
Fats: 1.9 grams
Calories: 133

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Melatonin OR 5-HTP	Helps regulate sleep-wake circadian rhythms Helpful for sleep-related problems due to depression, anxiety and pain. It helps to increase REM sleep, decrease the amount of time to fall asleep and the frequency of night-time waking	Tryptophan-based foods are a precursor to melatonin Salmon, lamb, venison, chicken, tuna, spinach, eggs & milk (low fat)	0.5-3 mg, 1 hour before bedtime OR Take 100-300 mg, thirty to forty-five minutes before bed on an empty stomach. Start with the lower dose for at least three days, then consider increasing the dose if sleep has not improved	Melatonin and 5-HTP should not be used by people who have autoimmune diseases, allergies, cardiovascular disease, depression, epilepsy or other seizure disorders, liver disease, immunosuppression or drug and alcohol abuse Do not take if on antidepressants, weight control drugs, or other serotonin-modifying medications
Magnesium	Relaxes nerves and muscles, helps with muscle spasms, reduces stress and assists with balancing blood sugar levels Stimulates GABA production and helps to convert tryptophan into melatonin	Black beans, quinoa, sunflower seeds, sesame seeds, bran, spinach, summer squash, broccoli, flax seeds, green beans, ginger, almonds & salmon	Take with calcium Use a 2:1 ratio, such as 500 mg of calcium and 250 mg of magnesium Take 45 minutes before bedtime Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools, so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first
Calcium	Assists with muscle cramps and spasms and helps address insomnia and depression	Kale, broccoli, sardines, almonds, sesame seeds, yogurt, low-fat cheese & cabbage	Take with magnesium Use a 2:1 ratio, such as 500 mg of calcium and 250 mg of magnesium Take 45 minutes before bedtime	Best to get calcium from foods than through supplements, as food sources raise blood calcium levels slowly and reduce risk of bladder and kidney stones Avoid calcium from oyster shell, dolomite or bone meal as they are known to be high in lead Best to take with magnesium to maintain a calcium balance and prevent accumulation of calcium in unwanted areas such as soft tissue If you are on diuretics, suffer from hypercalcemia, hypoparathyroidism, renal stones, renal impairment, kidney or heart disease, consult with your health care professional before taking supplement

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Vitamin B6	Helps those who wake up frequently due to excessively high cortisol release during the night Helps to convert tryptophan to serotonin and melatonin	Beef, venison, sunflower seeds, chicken, whole grains, bananas, prunes, cauliflower, cabbage, garlic, mushrooms, bell peppers, spinach & avocados	50-100 mg at night before bed Most active form Pyridoxal-5-phosphate Less active form: Pyridoxine hydrochloride	Although Vitamin B6 is abundant in a variety of foods, it is not usually found in high amounts and gets easily lost with cooking and processing. You may need to supplement to get best results Do not take higher than 1000 mg as this can cause peripheral neuropathy, a condition characterized by damaged nerves that cause pain and numbness in the extremities Side effects may include loss of appetite, sleepiness, headache, tingling and vomiting
HELPFUL				
GABA - Gamma amino-butyric acid	A brain chemical that has a calming effect Works well with people who have sleep difficulties related to anxiety, nervousness, muscle tension and pain	L-theanine found in green tea can help stimulate GABA production Use decaffeinated green tea	500-1000 mg before bed or 10 to 20 minutes before dinner for better absorption It starts to relax the mind 30-40 minutes after ingestion	GABA is derived from the amino acid glutamate with the help of Vitamins B3, B6 and B12 People with liver or kidney disease should not take GABA supplements without first consulting with their health care professional It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
L-theanine	Mild tranquilizer, helps to increase levels of serotonin (precursor to melatonin) Assists with sleeping better and feeling refreshed upon waking	Green and black tea. If taking at night drink decaffeinated to avoid sleep problems	50-200 mg of L-theanine a day	Studies have found an increased alpha brain wave pattern just 30 to 40 minutes after consuming 50-200 mg of a L-theanine supplement It is important not to take it in combination with some antidepressants. Consult first with your health care professional before taking Contraindicated in patients receiving chemotherapy treatments as it may increase the effects of chemotherapy agents; contraindicated for people taking cholesterol medication(s) It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body

CHAPTER 12

Nutrition for Fatigue

1. Eat foods high in iron & Vitamin C
2. Eat foods high in folic acid
3. Eat foods high in Vitamin B12
4. Stabilize blood sugar levels by eating 3 small protein-rich meals & 2 snacks a day
5. Identify and avoid food intolerances
6. Avoid sugar & refined carbohydrates

SCI and Fatigue

Fatigue is a common issue that affects many individuals with spinal cord injury (SCI) and it can often lead to low mood, reduced motivation and decreased ability to perform everyday activities. Although fatigue can be caused by a number of different SCI-related issues such as spasticity and infections, one of the leading causes is anemia.

Anemia is a condition in which your blood has lower than normal red blood cells, and this reduces the amount of oxygen available for your cells. As a result, your cells have less energy available to perform their normal functions, and this leads to you feeling tired. Many individuals with SCI experience anemia, especially in the initial stages following injury.

There are several types of anemia:

1) Anemia related to blood loss – due to surgery, skeletal, visceral and soft tissue injuries, gastrointestinal hemorrhage and infections (such as urinary tract infections and pressure sores).

2) Excessive red blood cell destruction – which can be due to trauma, hereditary conditions, or a vitamin or mineral deficiency.

3) Deficient red blood cell production – which can be due to an iron, folic acid or Vitamin B12 deficiency.

Diet can play a significant role in improving your energy levels. Making better food choices and eating foods high in B12, iron, Vitamin C and folic acid can help to fuel your body throughout the day.

Factors Contributing to Fatigue in Individuals with SCI:

- Sleep difficulties/apnea
- Anemia
- Pain
- Depression
- Medication side effects
- Anxiety
- Urinary tract infections
- Low blood pressure
- Reduced respiratory capacity
- Spasticity
- Poor posture
- Poor diet/malnutrition
- Chronic infection

This chapter outlines nutritional recommendations to optimize energy levels and combat fatigue so you can maximize your ability to participate in your daily activities. It discusses the different types of anemia that occur after SCI, as well as other basic nutritional strategies that can help boost your energy levels.

Nutrition for Fatigue

1 Eat foods high in iron & Vitamin C

Iron is the mineral which is used to make hemoglobin, the component of red blood cells that attaches to oxygen and transports it around the body to be used for energy. Low stomach acid (HCL) decreases iron absorption, which is a potential problem for people with SCI. A vegetarian-based diet can also cause inadequate iron levels because vegetable-based iron (known as non-heme iron) is poorly absorbed by the body.

Eating foods rich in iron, such as: lean grass-fed red meat, organ meats, dried sulfite-free organic apricots, spinach, prunes and scallops, can help to boost iron levels.

Vitamin C can help to increase the absorption of iron.

Foods high in Vitamin C include: broccoli, red & green peppers, papaya, pineapple & strawberries.

Certain foods and fluids inhibit iron absorption and should be avoided, such as tea, coffee, wheat bran and egg yolk.

Anemia and Iron:

Anemia is the last stage of an iron deficiency. You may want to consider getting blood work done to test for iron levels. However, in the event of an inflammatory or infectious condition, an iron-deficient state may lead to normalization or even elevation of iron (ferritin).

– Hirsch, Menordetal, 1991

SYMPTOMS OF ANEMIA

Anemia is not a disease, but a symptom of various conditions, such as:

- Hormonal disorders
- Chronic inflammation
- Surgery
- Peptic ulcers
- Infections
- Hemorrhoids
- Dietary deficiencies

Anemia symptoms are non-specific and often go unrecognized. Initial symptoms may include: Loss of appetite, constipation, headaches, irritability and difficulty concentrating.

Anemia symptoms can progress to weakness, fatigue, depression, dizziness, overall pallor, cold extremities, pale and brittle nails, pale lips and eyelids, soreness in mouth, and for women the loss of libido and cessation of menstruation.

2 Eat foods high in folic acid

Folic acid is the most common nutrient deficiency in the world. 20% of individuals with SCI in the acute phase of injury have a folic acid deficiency.

The body has a hard time storing this vitamin in large quantities. Deficiencies can occur due to chronic diarrhea, malabsorption, large alcohol consumption, pregnancy, medications, and of course a lack of folic acid in the diet.

Symptoms of a folic acid deficiency:

- Diarrhea
- Depression
- Swollen red tongue

Foods high in folic acid include: spinach, romaine lettuce, cauliflower, asparagus, broccoli, beans (navy & lima), chick peas and lentils.

3 Eat foods high in Vitamin B12

Vitamin B12 deficiency can be due to a lack of Vitamin B12 in the diet, which is common in individuals with SCI. However, a deficiency is more likely due to a problem with the digestion and/or absorption of Vitamin B12. B12 needs to be extracted from food and absorbed into the body by a complex process involving stomach acid (HCL), intrinsic factor (IF) and digestive enzymes. A lack of intrinsic factor resulting in a B12 deficiency is called pernicious anemia.

Intestinal bacterial overgrowth and some medications such as H2 blockers and proton pump inhibitors can also create Vitamin B12 absorption problems. Vitamin B12 is stored in the liver, kidneys, and other body tissues and as a result, deficiency in B12 may not become apparent until after five or six years of ongoing digestion or absorption problems and poor diet.

With respect to the nervous system, a B12 deficiency can involve demyelination of the spinal cord. **Many of the symptoms of Vitamin B12 deficiency are in fact common characteristics of SCI, so it can be hard to detect.** However, B12 anemia can exacerbate certain nervous system problems, such as numbness and tingling in the arms and legs, depression, mental confusion, memory impairment, coordination problems when walking, loss of vibration sense, and loss of deep tendon reflexes. These issues can be reversed when treated with high doses of oral Vitamin B12 cyancobalamin, which has a very high success rate in individuals with SCI.

– Petechkrua, Little, Burns et al, 2002

Common Signs of Vitamin B12 deficiency in people wth SCI:

- Worsening pain
- Numbness
- Depression
- Reduced mobility
- Decreased strength
- Memory loss

Vitamin B12 Toxicity

Be careful if you are supplementing with Vitamin B12 due to the potential risk of B12 toxicity – which can negatively impact your nervous system.

A person with a B12 deficiency needs to focus on eating foods high in B12 such as calf's liver, sardines, venison, salmon, grass-fed beef, lamb & cod.

When taking vitamin supplements, take a B12 *and* B complex together, as they are much better absorbed into the body when taken at the same time. Supplementing with B12 is especially important for vegetarians.

Consider talking to your doctor about getting blood work done to test your B12 levels

Individuals with SCI have an increased risk of B12 deficiency. You could have symptoms of a B12 deficiency despite having normal blood levels. Studies indicate that individuals with SCI experience improved symptoms with B12 supplementation. A B12 deficiency is usually recognized at 220 pg/mL but for individuals with SCI, it has been suggested that this be higher than or equal to 350 pg/mL. Talk to your health care professional about your symptoms and results before exploring B12 supplementation.

– Petechkrua, Little, Burns et al, 2002

4 Stabilize blood sugar levels by eating 3 small protein-rich meals & 2 snacks a day

Eat small but **regular meals every 3 hours consisting of complex carbohydrates and protein at each meal.** This will help give you more sustained and long-lasting energy, and provide better opportunities to lose weight, sleep better and feel happier.

Eating foods low in the glycemic load helps manage blood sugar levels. **Glycemic index** measures how quickly your blood sugar rises after eating a specific food. Low glycemic foods should be an important part of your diet to ensure blood sugar and energy levels are maintained.

Eat small meals regularly with complex carbohydrates (such as steel-cut oats, sweet potato, vegetables, brown rice, or quinoa) with protein (such as a boiled egg, fish, a handful of nuts or a tablespoon of almond butter).

GLYCEMIC INDEX VS. GLYCEMIC LOAD:

Glycemic Index *is the qualitative measure of food that tells you whether the carbohydrate in the food gets converted rapidly to sugar in the body or slowly. But it doesn't tell you how much of it is carbohydrate.*

Glycemic Load *is a better measure as it takes both quality and quantity of the carbohydrate food. Therefore it is a better predictor of blood sugar levels.*

Eat fresh fruit (1 to 2 servings a day) and vegetables (5+ servings a day).

These foods contain lots of fiber, which helps to maintain blood sugar levels and gives you the vitamins and minerals to make the coenzymes needed for energy production.

5 Identify and avoid food intolerances

Fatigue, low energy, low motivation and poor sleep can all be related to food intolerances. Food intolerances include problems digesting foods due to a lack of specific enzymes (such as the enzyme lactase to break down the milk sugar lactose) and difficulty breaking down proteins (such as gluten found in bread).

You may not think you have any food intolerances; however, if there is a food that you tend to crave or feel you cannot live without, then this food may likely be the one that your body has a problem with. This is because it creates opiate-like responses in your brain giving you an actual high (one of the reasons for food addiction). Food intolerances can have a delayed response (up to 3 days), which is why they can be difficult to identify. By completing the **Food Elimination Diet (see Appendix)**, it may become clearer which foods your body reacts to. Food intolerances can be caused by common foods such as wheat (gluten), dairy, nuts, corn and soy.

6 Avoid sugar & refined carbohydrates

Busy lifestyles and poor food choices can result in eating excess calories which are stripped of vitamins, minerals, phytonutrients, fiber and good fats that the body needs in order to function optimally. Cakes, candy, chocolate, bread, bagels, muffins and white flour all get broken down into simple sugars known as glucose. These foods cause blood sugar levels to soar, and what goes up must come down, leading to a "blood sugar crash" which can make you feel tired and irritable and have difficulty concentrating. To cope with this drop in blood sugar levels, your body wants something that will get your blood sugars back up as quickly as possible, so you will gravitate to the same sugar-laden foods to accomplish this. This creates a vicious cycle of negative eating habits.

Vitamins and minerals are considered coenzymes. Coenzymes speed up chemical reactions in the body, including reactions needed for energy.

Eating a wholesome, well-balanced diet of fresh fruits, vegetables, nuts, seeds, legumes, seafood, poultry & lean grass-fed beef helps to provide your body with the nutrients it needs to make energy and work efficiently.

Apricot Smoothie

Folic acid and iron are two nutrient deficiencies common in anemia. Apricots are high in both these nutrients. ***Servings: 1***

Ingredients:
- 5 dried sulfite-free apricots
- 1/2 cup of plain Greek yogurt
- 1 scoop of whey protein powder
- 1/2 cup of ice
- 1-2 cups of water

Directions:
1. Combine everything in a blender until smooth and creamy

NUTRITIONAL CONTENT PER SERVING:
Proteins: 30 grams
Carbohydrates: 21 grams
Fats: 2 grams
Calories: 330

Energizer Soup

This energy-boosting soup is packed with B-vitamins and iron. ***Servings: 4***

Ingredients:
- 2 tablespoons of extra virgin olive oil
- 1 large onion, chopped
- 1 tablespoon of curry powder
- 1 teaspoon of cinnamon
- 1 teaspoon of sea salt
- 4 cups of vegetable stock
- 1 sweet potato, peeled and diced
- 4 cloves of garlic, minced
- 1 inch of a piece of ginger root, peeled & minced
- 1 cup of spinach
- 1 cup of dry lentils
- 2 tablespoons of tomato paste

Directions:
1. Heat the olive oil in a large saucepan over medium heat.
2. Add sweet potato, onion, garlic and ginger. Cook until vegetables are softened
3. Stir in the curry powder, cinnamon and sea salt. Cook for a few minutes
4. Add the lentils, vegetable stock, spinach and tomato paste and mix well
5. Bring to a gentle boil, reduce heat and then simmer covered for 30 minutes or until lentils are cooked
6. Remove from heat and serve

NUTRITIONAL CONTENT PER SERVING:
Proteins: 16 grams
Carbohydrates: 44.5 grams
Fats: 9 grams
Calories: 325

Spinach Hummus Spread

This is great to have as a dip with cut-up vegetables or as a spread on whole grain pita. Spinach is high in iron and folic acid. The Vitamin C in the parsley and lemon helps to increase the absorption of iron. ***Servings: 48 tablespoons***

Ingredients:
- 4 cups of spinach
- 1 can of chick peas
- 2/3 cup of tahini (sesame seed paste)
- 1/4 cup of water
- 1/4 cup of fresh parsley
- 1/4 cup of fresh basil
- Juice of lemon
- 2 cloves of garlic
- 1/2 teaspoon of salt

Directions:
1. Place all ingredients in a food processor and puree
2. Serve with whole grain pita bread or preferably sliced vegetables

NUTRITIONAL CONTENT PER TABLESPOON:
Proteins: 1 gram
Carbohydrates: 2.5 grams
Fats: 2 grams
Calories: 29

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Vitamin B12	For increased energy and to address B12 anemia	Salmon, lamb, beef, venison, sardines & cheese	100 mcg a day to increase energy levels Dosages higher than this will need to be based on your blood work or in consultation with your health care professional	Consult with your health care practitioner before supplementing with B12 due to its impact on the nervous system Always supplement B12 and folic acid together regardless of the type of deficiency If you take antibiotics or medications for acid reflux, ulcers or diabetes, it may interfere with your body's ability to absorb and use Vitamin B12 May cause skin itching, diarrhea, a feeling of being swollen, muscle weakness, cramps and pain, excessive thirst and urination, confusion, shortness of breath, fatigue, headaches, dizziness, and difficulties breathing or swallowing
Iron	For increased energy and to address iron anemia or iron deficiency	Red meat, eggs, spinach, prunes, dried sulfite-free apricots & poultry	Only supplement under the direction of your health care professional	Do not supplement with iron if you do not have a diagnosed deficiency. Supplementation should only be done under the supervision of your health care professional Not to be taken by those with hemochromatosis, kidney infection, alcoholism, liver disease, asthma, rheumatoid arthritis, heart disease, colitis, stomach ulcer, or those who have a history of inflammatory intestinal diseases May exacerbate your gastrointestinal symptoms. Additionally, do not take iron if you have a medical condition that affects your hemoglobin levels, such as thalassemia Non-steroidal anti-inflammatory drugs should not be used in conjunction with iron supplements. Iron supplements may also reduce the efficacy or absorption of certain medications Women taking birth control medications should be aware that these medications may increase their blood levels of iron
Vitamin C	To help increase absorption of iron	Papaya, parsley, pineapple, straw-berries, oranges, red/green peppers, broccoli, Brussels sprouts & tomatoes	2,000 to 4,000 mg with bioflavonoids (or until bowel tolerance) a day (alternately take a high potency multivitamin/ mineral) Best taken with food Buffered forms of Vitamin C are easier on the stomach Take Vitamin C supplements which include bioflavonoids to help increase absorption	Sulfa antibiotics decrease Vitamin C levels in the body High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication, as Vitamin C can act as a natural blood thinner

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Folic acid	For increased energy and to address folic acid anemia or folic acid deficiency	Chick peas, navy beans, lentils, spinach, broccoli & asparagus	800–1200 mcg 3 times a day if diagnosed with a folic acid deficiency Best taken with food Most active form is folic acid 5-methyl-tetra-hydrofolate Best taken in the form of a B complex to increase absorption	Always supplement B12 and folic acid together regardless of type of deficiency Unless you are diagnosed with a folic acid deficiency, do not take more than 400 mcg per day unless directed by your health care provider High doses of folic acid might cause abdominal cramps, diarrhea, rash, sleep disorders, nausea, irritability, confusion, stomach upset, behavior changes, skin reactions, seizures, gas, excitability, and other side effects Consult with your health care professional before taking if you are on anticonvulsant medications
High potency Vitamin B complex	To boost energy levels and help increase the absorption of the specific B Vitamin supplement (B12 or folic acid)	Brewer's yeast, lentils, eggs, liver, grass-fed beef, peas, sunflower seeds, whole grains, salmon & wheat germ	As directed on label Be aware of niacin flush (this is when your skin feels warm, red or itchy or you experience a burning sensation)	Check with your health care professional before supplementing if you have any of the following conditions: diverticular disease, ulcer from stomach acid, ulcerated colon, inflammation of the lining of the stomach and intestines, several blood transfusions, iron metabolism disorder causing increased iron storage, sickle cell anemia or hemolytic anemia
IMPORTANT				
Hydrochloric acid (HCL)	To address low stomach acid production that could be contributing to the poor absorption of iron, B12 and/or folic acid	1 tablespoon of apple cider vinegar or a glass of warm water and freshly squeezed lemon juice before meals to stimulate stomach acid production	As directed on label, with every meal	If you experience nausea after taking HCL capsules, you need to reduce dose. Once you have reduced to only taking one pill, it means your HCL levels have been restored and you no longer need to supplement Do not use in the presence of ulcers and gastritis
High potency multivitamin	To provide overall spectrum of nutrients needed for overall health and energy	Fresh fruits, vegetables, nuts & seeds, eggs, seafood and meat	As directed on label	May cause nausea
HELPFUL				
Magnesium	Helps to make enzymes and energy Important for managing blood sugar levels	Black beans, quinoa, sunflower seeds, bran, spinach, broccoli, basil, ginger, tomatoes & almonds	400 mg best taken at night after 8:00 pm for best absorption (alternately take a high potency multivitamin/ mineral) Best absorption forms are: magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools, so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first before supplementing

CHAPTER 13

Nutrition for Stress

1. Take herbs that support your adrenal glands
2. Stabilize blood sugar levels
3. Eat foods high in Vitamin Bs, C and E as well as calcium & magnesium
4. Increase potassium-to-sodium ratio
5. Avoid stimulants such as alcohol, caffeine, soda & refined carbohydrates
6. Drink decaffeinated green tea
7. Eat foods high in taurine

SCI and Stress

The trauma of a spinal cord injury (SCI) causes tremendous physical, emotional and mental stress. Long-term stress of any kind wreaks havoc on your body and its ability to function properly.

When you are experiencing stress, your digestion is impaired: stomach acid production is reduced and digestive enzymes (which break down fats, proteins and carbohydrates) don't work as effectively. This results in poor absorption of nutrients from food. Stress also causes you to use up nutrients more quickly, often depleting your body of key vitamins and minerals. These issues not only increase your body's demand for certain vitamins and minerals, but also increase the risk of nutrient deficiencies and secondary health problems. For example, stress can deplete magnesium stored in your muscles and cause your body to store less calcium, which can contribute to osteoporosis.

Stress also causes your adrenal glands (two little glands located on top of each kidney) to release excessive amounts of stress hormones, such as cortisol and adrenaline. While these hormones help you to function during acute periods of stress, prolonged stress and excessive hormone release can lead to a condition called **Adrenal Fatigue.**

Stress hormones also increase free radical damage. Free radicals are unpaired electrons that travel through your body causing tissue damage. These molecules are a natural by-product of stress hormone production, which means the more stress you have, the more stress hormones and free radicals you produce and the more tissue damage your body will experience.

Health Conditions Associated with Prolonged Stress

- Obesity
- Cardiovascular disease
- Cancer
- Depression & anxiety
- Memory & concentration problems
- Diabetes
- Osteoporosis
- Arthritis
- Increased risk of infection
- Endocrine & metabolic disorders
- Gastrointestinal problems

This chapter will give you strategies to help you cope with stress. It will identify the important nutrients needed to support healthy adrenal function and discuss the main antioxidants required to combat free radical damage.

Adrenal Fatigue

Adrenal fatigue occurs when you have been exposed to prolonged, intense stress which results in your adrenal glands becoming overworked and exhausted.

It is important to take care of your adrenal glands because they directly influence many other organs in your body including your thyroid gland, which is responsible for metabolism and weight management. Individuals with SCI commonly experience changes in thyroid function; therefore, supporting adrenal glands together with your thyroid gland can help maintain and improve your overall health.

Symptoms of Adrenal Fatigue

- Difficulty waking up in the morning
- Fatigue not relieved by sleep
- Craving for salt or salty foods
- Lack of energy
- Decreased ability to handle stress
- Increased time to recover from illness
- Mild depression
- Fuzzy thinking
- Irritability
- Don't wake up properly until 10:00 am
- Afternoon energy slump between 3:00 and 4:00 p.m., but feel better after evening meal

Studies show that people with chronic SCI have a high prevalence of poor adrenal function.

– Wang, Hung,1999

Adrenal glands take a long time to recover. It can take anywhere from 3 months to up to 2 years, depending on the severity of your stress.

Nutrition for Stress

1 Take herbs that support your adrenal glands

The following herbs are extremely beneficial to adrenal gland function:

Ashwagandha root and leaf

This herb supports cognitive functioning, critical reasoning and thinking, which can be affected when you are under stress. This herb also has a calming effect on the body and helps balance cortisol levels if they are too high or too low. It should not be taken in high doses (above 35 grams a day) as this will inhibit adrenal function.

Siberian ginseng

Siberian ginseng helps to support and rejuvenate adrenal function, increase resistance to stress, normalize metabolism and regulate neurotransmitters, which help to modify the stress response. It also helps boost endurance, improve sleep and promote a sense of calmness. Additionally, it improves the absorption of B vitamins and helps reduce the loss of Vitamin C – key nutrients that support the adrenal glands.

Licorice root

Licorice root helps restore cortisol balance. It also provides antioxidant support, stimulates blood circulation, boosts the immune system (which often becomes compromised when under stress) and helps to improve digestion and absorption.

Ginger root

Helps to regulate cortisol levels and normalize blood pressure and heart rate. It also helps to stimulate digestive juices needed to assist with digestion. It can easily be purchased at the supermarket and put into smoothies, juices, teas or stir-frys.

Ginkgo Biloba

Ginkgo is a powerful antioxidant that helps to combat free radical damage. It also contains bioflavonoids that improve blood flow, reduces tissue damage from inflammation, boosts mood and reduces mental fatigue that is often associated with stress.

2 Stabilize blood sugar levels

When your blood sugar levels fall, your adrenal glands respond by releasing cortisol to help bring blood sugar levels back up to a normal range. Stabilizing blood sugar levels helps to reduce stress on the adrenal glands. Here are some strategies to help you balance your blood sugar levels.

1. **Eat every 2-3 hours (3 small meals and 2 snacks a day)**
2. **Eat your first meal before 10:00 a.m.**
3. **Do not overeat**
4. **Make sure you eat protein and a complex carbohydrate (such as vegetables, beans & lentils) with each snack and meal**

Example of a daily menu to help balance blood sugar levels:

Breakfast	7:00 a.m.	An omelet with mushrooms and spinach
Snack	10:00 a.m.	Apple slices with almond butter
Lunch	1:00 p.m.	Chicken salad
Snack	3:30 p.m.	Baby carrots and broccoli with hummus
Dinner	6:30 p.m.	Salmon with wild rice and asparagus

3 Eat foods high in Vitamin Bs, C and E as well as calcium & magnesium

There are many nutrients needed to help support your adrenal glands and their function:

All the B vitamins, calcium and magnesium are important in helping to calm the mind and support the adrenal glands.

Foods high in B vitamins include: salmon, chicken, beef, lamb, veal, legumes, brown rice, eggs, sunflower seeds, flax seeds, avocados & lentils.

Foods high in magnesium include: quinoa, black beans, sunflower seeds, broccoli, almonds & bran.

Foods high in calcium include: spinach, basil, yogurt, kale, parsley, Brussels sprouts, sesame seeds, sardines & almonds.

Vitamin C is involved in adrenal metabolism and is essential in the manufacturing of adrenal hormones. In fact, Vitamin C levels used to be the predictor for adrenal dysfunction because of the significant role that it plays. It is also an antioxidant, so it will help neutralize free radicals produced from excess stress hormones.

Foods high in Vitamin C include: bell peppers, tomatoes, cantaloupe, strawberries, kiwi, broccoli, Brussels sprouts, cabbage, cauliflower, kale & peas.

Vitamin E is an antioxidant that helps protect the adrenal glands from free radical damage.

Foods high in Vitamin E include: avocados, eggs, olives, olive oil, tomatoes, green leafy vegetables, almonds, Brazil nuts & sunflower seeds.

DID YOU KNOW...

that the calcium from kale, turnip and mustard greens is absorbed more quickly in the body than the calcium you get from milk?

4 Increase potassium-to-sodium ratio

Eating foods high in potassium and avoiding foods high in sodium helps to support your adrenal glands.

Foods high in potassium include: salmon, whole grains, beet greens, avocados, bananas, apricots, peaches, prunes & yams.

Avoid foods high in sodium:
Foods high in sodium include: table salt, prepared sauces, processed foods, baking soda & baking powder.

5 Avoid stimulants such as alcohol, caffeine, soda & refined carbohydrates

Certain foods such as coffee, soda, alcohol, black tea, sugar and refined carbohydrates act as stimulants to the adrenal glands. If these glands are already exhausted, these foods will only contribute to additional adrenal stress and fatigue.

6 Drink decaffeinated green tea

Green tea has antioxidants that help neutralize free radicals caused by stress. It also has a substance in it called L-theanine which has a calming effect on the body.

7 Eat foods high in taurine

This amino acid helps to control stress by lowering cortisol. It also helps increase energy, fight inflammation and lower blood pressure. It is important to make sure you are getting Omega-3 fatty acids in your diet as this helps increase taurine's effectiveness.

Foods high in taurine include: meat, seafood & eggs.

Smoking may feel like it has a calming effect; however, nicotine is a neurostimulant and can cause sleep problems.

Maintaining regular exercise routines, keeping a positive mental attitude and getting plenty of sleep help reduce stress and stress hormones.

Steak with Grilled Vegetables

This meal contains many of the much needed B vitamins, Vitamin C, calcium and magnesium to help support your adrenal glands and manage your stress. ***Servings: 2***

Ingredients:
- 2 3-ounce lean grass-fed steaks (size of the palm of your hand)
- 6 asparagus spears
- 1 bell pepper, cut into quarters
- 1 large tomato, cut in half
- 1 portobello mushroom
- 2 teaspoons of olive oil
- 1⁄4 cup goat cheese
- Basil leaves to garnish

Directions:
1. Coat the vegetables with olive oil and grill on the BBQ or in the oven
2. Grill the steak
3. Place vegetables on plate with steak and garnish with basil and goat cheese

NUTRITIONAL CONTENT PER SERVING:
Proteins: 27 grams
Carbohydrates: 15.4 grams
Fats: 27 grams
Calories: 379

Bean Dip

This dip is packed with B vitamins which are quickly depleted when you are stressed.

Ingredients:
- 1 can of red kidney beans
- 1 1⁄2 teaspoons of extra virgin olive oil
- 1 teaspoon of chili powder
- 1 teaspoon of dried oregano
- 1⁄2 small onion, finely minced
- 1 clove of garlic, crushed
- Pinch of sea salt and fresh black pepper to taste

Directions:
1. Blend the red kidney beans and olive oil together until it looks like a paste
2. Add remaining ingredients and mix well
3. Transfer to a bowl and cover with plastic wrap
4. Serve with vegetables, whole grain pita bread or put it on top of a grilled chicken breast

NUTRITIONAL CONTENT PER TABLESPOON:
Proteins: 0.7 grams
Carbohydrates: 2 grams
Fats: 0.19 grams
Calories: 15

Quinoa Salad

Quinoa is high in magnesium and calcium to help you relax in times of stress.
Parsley and bell peppers are rich in Vitamin C to help support your adrenal glands.
Servings: 4

Ingredients:

- 1 cup of quinoa, well rinsed and drained
- 2 cups of cold water
- 2 tomatoes, chopped
- 2 large sprigs of parsley, chopped
- 1/4 cucumber, chopped
- 1/3 cup of bell peppers, chopped
- 3 tablespoons of extra virgin olive oil
- 2 tablespoons of freshly squeezed lemon juice
- 1 1⁄2 teaspoon of hot chili pepper flakes (optional)
- 1⁄2 teaspoon of salt
- 1⁄2 teaspoon of ground black pepper

Directions:

1. In a medium saucepan, over medium heat, bring quinoa and water to a boil
2. Reduce heat and boil gently for 10 to 15 minutes or until a small sprout pops out from the grain
3. Cover, remove from heat and let stand for 5 minutes. Remove lid, let cool and fluff with a fork
4. Meanwhile, in a large bowl, combine tomatoes, parsley, cucumber & bell peppers
5. Stir in cooled quinoa
6. Prepare the vinaigrette: In a small bowl, whisk together olive oil, lemon juice, hot pepper flakes (if using), salt and pepper
7. Pour vinaigrette over salad and toss

NUTRITIONAL CONTENT PER SERVING:

Proteins: 9 grams
Carbohydrates: 42.4 grams
Fats: 14.2 grams
Calories: 326

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Magnesium	Anti-stress mineral which calms the mind	Black beans, quinoa, sunflower seeds, sesame seeds, bran, spinach, broccoli, flax seeds, green beans, ginger, almonds & salmon	400 to 800 mg a day Best taken with food Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools, so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first
Calcium	To assist with reducing stress	Kale, broccoli, sardines, almonds, sesame seeds, cheese, yogurt, parsley & dark leafy greens	500-1500 mg a day Best taken with food	Best to get calcium from foods as opposed to taking supplements, as food sources raise blood calcium levels slowly and reduce the risk of kidney and bladder stones If supplementing best take with meals to maximize absorption, or can take at night to help with the benefits of sleep Avoid calcium from oyster shell, dolomite or bone meal as they are known to be high in lead Best to take with magnesium to maintain a calcium balance and prevent accumulation of calcium in unwanted areas such as soft tissue If you are on diuretics, suffer from hypercalcemia, hypoparathyroidism, renal stones, renal impairment, kidney or heart disease consult with your health care professional before taking supplements
High potency Vitamin B complex	To reduce stress and improve energy levels	Avocado, spinach, cauliflower, legumes, nuts, liver, whole grains, prunes, milk, eggs, organ meats, poultry & fish	As directed on label	Check with your health care professional before supplementing if you have any of the following conditions: diverticular disease, stomach ulcer, ulcerated colon, inflammation of the lining of the stomach and intestines, several blood transfusions, iron metabolism disorder causing increased iron storage, sickle cell anemia and hemolytic anemia
Vitamin C	To provide support to adrenal gland metabolism and reduce free radical damage	Parsley, pineapple, bell peppers, citrus fruits, alfalfa sprouts, tomatoes, kiwi fruit, strawberries, kale, broccoli, Brussels sprouts, cabbage, cauliflower & peas	2 000 to 4 000 mg with bioflavonoids a day in divided doses Best taken with food Buffered forms of Vitamin C are easier on the stomach Taking Vitamin C supplements with bioflavonoids will help increase absorption	Sulfa antibiotics decrease Vitamin C levels in the body High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if this occurs Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication, as Vitamin C can act as a natural blood thinner

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Licorice root	Helps restore cortisol balance when stressed It boosts the immune system, which can be compromised during times of stress	As tea, 1 teaspoon of grated dry or fresh root for each cup of hot water and let simmer for 15 minutes Do not take in candy form as this is too high in sugar and is sometimes only licorice flavoring	As directed on label	Check with your physician before taking if you have eye problems, high blood pressure, heart, liver or kidney disease, water retention, low potassium levels or if using blood-thinning, diabetic or heart medications Can cause headaches
IMPORTANT				
Vitamin E	To facilitate adrenal gland function and reduce free radical damage	Sunflower seeds, almonds, papaya, pine nuts, olives, olive oil, eggs, sweet potatoes, cashews, pecans & almonds	800 IU of mixed tocopherols and tocotrienols a day with meals (Alternately take a high potency multivitamin)	If you have heart disease or diabetes, do not take doses over 400 IU a day. This is a natural blood thinner, so consult your health care professional first if you are taking blood-thinning medications or if you have a bleeding disorder. Stop taking this supplement 2 weeks before surgery Prolonged and high level intakes of Vitamin E greater than 1500 IU a day can be detrimental to the immune system
L-theanine	For tension, stress and difficulty relaxing Increasing serotonin, dopamine and GABA	Green tea (decaffeinated)	50-200 mg on empty stomach	Consult with your health care professional before taking if you are on antidepressants Contraindicated in patients receiving chemotherapy or taking cholesterol medication(s) It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Ashwagandha	Supports overall adrenal function and helps balance cortisol levels	As tea, 1 teaspoon of dry leaves or grated dry or fresh root per cup of hot water and simmer for 15 minutes	Take as directed on label	Side effects may include diarrhea, gastrointestinal upset and vomiting If you have peptic ulcer disease or a thyroid condition, consult with your health care professional first before taking Ashwagandha may reduce the effects of immunosuppressive drugs and monoamine oxidase inhibitor (MOIs) antidepressants Be aware that taking ashwagandha with herbs or supplements that have sedative properties can enhance both adverse and therapeutic effects. These include valerian, kava, 5-HTP and St. John's wort Do not take ashwagandha within two weeks of surgery
Ginkgo Biloba	A powerful antioxidant that helps to combat free radical damage It boosts mood and reduces mental fatigue that comes with stress	As tea, 1 teaspoon of dry leaves or grated dry or fresh root per cup of hot water and simmer for 15 minutes	Take as directed on label	Ginkgo should not be used with immunosuppressant drugs, insulin and other drugs for diabetes, bleeding disorders or if taking anticoagulants (blood thinners) Side effects include nausea, headaches, diarrhea, mild gastrointestinal discomfort, dizziness, skin rashes, heart palpitations and weaknesses Do not take in combination with Siberian ginseng or thiazide diuretics

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Siberian Ginseng	Helps to support and rejuvenate adrenal function, increase resistance to stress, normalize metabolism and regulate neurotransmitters which help to modify the stress response. It also helps to boost endurance, improve sleep and promote a sense of calmness. Helps to improve absorption of B vitamins and reduce the loss of Vitamin C which are also key nutrients that support the adrenal glands	As tea, 1 teaspoon of dry leaves or grated dry or fresh root per cup of hot water and simmer for 15 minutes	Take as directed on label	Siberian ginseng can increase the effects of sedatives or barbiturates Siberian ginseng causes insomnia in some people, especially if taken in large amounts or taken right before bed People with high or low blood pressure should use Siberian ginseng with caution because the herb can raise or lower blood pressure. If you have a heart condition, you should not use Siberian ginseng without a doctor's supervision, especially if you are using digoxin because Siberian ginseng can increase the amount of digoxin in your blood and exacerbate its side effects You should be careful with Siberian ginseng if you have diabetes or hypoglycemia because it might lower blood sugar levels Siberian ginseng acts as a blood thinner and can increase the amount of time it takes for bleeding to stop. Don't use this herb if you have a blood clotting disorder or prior to surgery. Siberian ginseng might reduce the effectiveness of anticoagulant medications Do not take in combination with ginkgo biloba
HELPFUL				
Taurine (amino acid)	Reduces nervous tension as well as improves insomnia and depression Helps you to feel relaxed and to unwind	Fish, chicken, eggs, milk, yogurt & red meat	500-1000 mg 2 times a day Best taken on an empty stomach with a small amount of juice	Talk to your doctor or a health care professional before supplementing if you have liver or kidney problems Best taken with Vitamin B6 Do not exceed more than 3000 mg per day A high taurine intake may cause your body to store excess lithium, which can cause diarrhea, dizziness, stomach pains, nausea, vomiting and weakness Avoid taurine if you are taking insulin or steroids It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
Phosphatidyl-serine	Improves nerve function and reduces the stress hormone cortisol	Found in egg yolk & soy	100 mg capsules 1 to 3 times a day with meals	Avoid if allergic to soy

CHAPTER 14

Nutrition for Depression

1. Balance blood sugar levels
2. Eat foods high in B Vitamins, Vitamin C, folic acid & magnesium
3. Eat foods high in tryptophan
4. Eat foods high in phenylalanine & tyrosine
5. Eat good fats
6. Drink 8 cups of fluids/water a day
7. Identify & avoid food intolerances
8. Take St. John's wort
9. Avoid caffeine & artificial sweeteners

SCI and Depression

Depression is common for individuals with spinal cord injury (SCI) because of the multiple dramatic life changes that suddenly occur.

Depression can interfere with the rehabilitation process. An individual who is depressed may not be able to process, absorb and utilize the information and resources made available to them in the hospital and rehabilitation settings. This can make reintegration back into their home and community more difficult. Depression can also lead to self-neglect. For example, research shows that there is an increased risk of developing pressure sores and urinary tract infections due to neglect in self-care activities (which in turn can magnify the depression).

– Elliot, Frank, 1996

20-40%

It's estimated that people with SCI are 5 times more likely to experience depression than their able-bodied peers, with rates for people with SCI being approximately 20-40%.

Symptoms of Depression include the following:

- Loss of or increase in appetite
- Irritability
- Tearfulness
- Disturbed sleep
- Lack of energy
- Feelings of worthlessness
- Weight loss or weight gain
- Reduced drive and motivation
- Suicidal thoughts

In this chapter you will learn about the various ways to address depression through nutrition. It will discuss specific nutrients and foods that can help boost your mood, as well as foods to avoid.

Depression and Nutrition

Traditionally, nutrition has not been used to address depression. Specific nutrient deficiencies can, however, contribute to depression symptoms. Optimum nutrition (specifically for your brain) can improve your mood and help give you the energy and motivation you need for you to perform your daily activities.

Vitamins B3, B6, folic acid and B12, essential fats, and amino acids such as phenylalanine, tryptophan and tyrosine can help boost your mood and motivation. Stress causes nutrients such as Vitamins C, B5 and B6 to be used up far too quickly in the body. This may lead to nutrient deficiencies that can contribute to the onset of depression.

Your digestive system also contains approximately 100 million neurons and produces many of the neurotransmitters needed by your brain to help you think, stay focused and feel motivated, as well as feel happy and calm. These neurotransmitters are predominantly made from amino acids, which are the basic building blocks that make up proteins. For example, the neurotransmitter **serotonin**, made from the amino acid tryptophan (found in turkey, eggs, chicken and salmon), helps you to feel happy and can increase your sense of well-being, while the neurotransmitter **dopamine** helps to make the hormones adrenaline and noradrenaline, which can help to increase your motivation level and drive.

Furthermore, your brain and gut are constantly communicating with each other. This is why we often feel a lot of emotions in our stomach. For example, our tummy turns in knots when we get nervous, or we get butterflies when we get excited.

Obesity (a common secondary health complication for individuals with SCI) can negatively impact body image, self-esteem and mobility. While these issues can increase your risk of depression, studies show that losing weight can significantly improve your mood and self-esteem.

IN OUR GENES?

There may be a genetic disposition to depression. Some people's ability to manufacture or transport serotonin (the neurotransmitter responsible for making us feel happy) may not be working properly.

This genetic disposition can make some individuals with an SCI more prone to depression than others.

EXERCISE REGULARLY

Exercise improves mood through the release of endorphins and serotonin.

Exercise also helps to increase lean muscle mass, facilitate weight loss, improve blood sugar and insulin levels, reduce pain, increase energy and improve body image. All of these health benefits can help boost your mood.

Nutrition for Depression

1 Balance blood sugar levels

Unstable blood sugar levels can have an impact on depression. When blood sugar levels drop, there is an inadequate supply of glucose to the brain. When this happens a person can experience fatigue, irritability, dizziness, insomnia, poor concentration and forgetfulness, as well as depression. If your diet is high in sugar, refined carbohydrates and processed foods, it can not only cause blood sugar crashes, but can also lead to insulin insensitivity, carbohydrate cravings and ultimately weight gain, which can lower your mood even more.

You can help balance your blood sugar levels by taking minerals such as chromium, magnesium and zinc. These help to sensitize your cells to insulin and help keep blood sugar levels more balanced.

To help balance blood sugar levels:

- Eat 3 small meals and 2 snacks a day
- Combine protein with a complex carbohydrate at each meal. For example, eat proteins such as fish, chicken or eggs with sweet potatoes, lentils, brown or wild rice
- Avoid refined and processed foods such as white bread, pastries, cookies, muesli bars and sugar. These cause blood sugar levels to skyrocket

2 Eat foods high in B Vitamins, Vitamin C, folic acid & magnesium

Many people who are depressed are deficient in **folic acid,** and research indicates that these individuals may be less likely to experience any real benefits from taking SSRI antidepressants (selective serotonin re-uptake inhibitors). Folic acid deficiency is the most common nutrient deficiency in the world. You may want to consider getting your blood checked to see if this may be one of the underlying reasons for your depression.

Folic acid, together with some of the other **B Vitamins (such as B6 & B12), Vitamin C & magnesium** help to increase production of serotonin. They also help with the conversion of the amino acids phenylalanine and tyrosine into dopamine, noradrenaline and adrenaline, which help with boosting motivation, mental alertness and excitement.

Your brain contains the highest amount of **Vitamin C** of any organ in your body. This vitamin has numerous roles in brain chemistry, such as increasing motivation and mental alertness and protecting the brain against toxicity, while at the same time enhancing the activity of certain antipsychotic drugs.

Magnesium is involved in over 300 functions in the body including making serotonin, reducing stress, anxiety and pain, helping with post-traumatic depression, and improving sleep.

It's important to eat a variety of fresh fruits and vegetables, whole grains, nut, seeds, legumes, fresh fish & grass-fed beef to get the necessary nutrients to maintain healthy brain chemistry. It may also be helpful to take a high-potency multivitamin.

3 Eat foods high in tryptophan

Tryptophan is an amino acid that is converted to 5-HTP (5-hydroxytryptophan) which is then converted to serotonin (the "happy neurotransmitter"). Serotonin is an important brain chemical involved in mood, behavior, appetite and sleep.

TRYPTOPHAN → **5-HTP** → **SERONTONIN** = 

Tryptophan can help not only to boost your mood, but also to improve your sleep, as well as reduce carbohydrate cravings, pain and migraines.

There are many lifestyle and diet choices that can negatively affect your body's ability to covert tryptophan into serotonin. These include: cigarette smoking, alcohol abuse, eating too much sugar and/or protein, unstable blood sugar levels (diabetes and hypoglycemia) and certain nutrient deficiencies.

People who are deficient in serotonin may need to take the supplement 5-HTP (5-hydroxytryptophan) as studies show that 5-HTP can be very effective in improving depression symptoms with minimal to no side effects. When supplementing with 5-HTP it is best to find a brand that also contains Vitamins B3, B5 and folic acid, as these vitamins help convert 5-HTP into serotonin.

Tryptophan is found in salmon, tuna, eggs, turkey, lamb, chicken, beans & oats.

IMPORTANT NOTE:
It is contraindicated to take 5-HTP if you are on antidepressants.

A woman's rate of making serotonin (also known as the "happy neurotransmitter") is approximately 50% less than a man's, which is why women are more likely to experience depression than men.

Avoid smoking & second hand smoke

Smoking and second hand smoke affect your body's cortisol levels and limit the amount of tryptophan getting into the brain.

4 Eat foods high in tyrosine & phenylalanine

Phenylalanine and **tyrosine** are amino acids that help you to produce the hormone adrenaline. This hormone helps to keep you upbeat, awake, excited, motivated and engaged.

Phenylalanine has a direct effect on brain chemistry by helping to make neurotransmitters such as dopamine, epinephrine, norepinephrine and phenylethylamine (PEA). These neurotransmitters help to elevate your mood and feelings of love, as well as decrease pain, suppress appetite and improve your memory and learning.

Phenylalanine and tyrosine are well supplied in a diet with an adequate intake of protein (45-60 g a day). However, phenylalanine is an essential amino acid, which means your body cannot make it, therefore, you must get this nutrient from your diet.

Phenylethylamine (PEA) is also found in high concentrations in chocolate, which is why it is often craved when someone is feeling depressed or feeling low. This doesn't mean that you should stock up on chocolate; however, a few pieces of dark chocolate (70% or higher) can be helpful.

You may want to consider getting your urine checked to determine your phenylethylamine (PEA) levels, as low levels of PEA (indicative of low tyrosine and phenylalanine levels) are often found in people who are depressed.

Tyrosine & phenylalanine → **Adrenaline** → **Feel motivated, upbeat & alert**

Foods high in phenylalanine include spirulina, turkey, fish, eggs, grass-fed beef, lamb & veal.

Foods high in tyrosine include seaweed, spirulina, turkey, eggs, low-fat cottage cheese, salmon, tuna & whole grains.

5 Eat good fats

60% of your brain is made up of fats. People generally do not eat enough foods high in essential fatty acids (good fats) which are vital for brain health and function. Essential fats can help boost your brain's ability to make serotonin, as well as other neurotransmitters. A diet void of or deficient in good fats can alter nerve structure, fluidity and function, and this in turn can negatively affect your mood.

One particular essential fatty acid which is important for your brain health is called **DHA (docosahexaenoic acid**). Research shows that people on antidepressant medication who persisted in having significant symptoms of depression experienced major improvements when supplementing with **omega-3 fats** with a high DHA content.

– Patrick Holford, 2004

Good sources of omega 3 fatty acids are walnuts, flax, hemp & pumpkin seeds.

Foods high in DHA include salmon, mackerel, herring, sardines, anchovies, tuna, marine algae & eggs.

Bad fats such as trans fats, hydrogenated oils, margarine, processed and fried foods interfere with the body's ability to use these good fats and can displace good fats from the brain.

6 Drink 8 cups of fluids/water a day

It may surprise you to know that drinking water can help improve your mood. The brain uses electrical energy that is generated by water. When your body and brain are provided with enough water, this can help give you more energy.

Individuals with SCI are often dehydrated due to taking certain medications, poor diet and limited intake of fluids. The amino acids tyrosine and tryptophan are needed by the brain to make neurotransmitters to help boost our mood. When the body is dehydrated, these amino acids are used instead to help transport wastes out of your body, and therefore cannot perform their brain-boosting jobs.

Find it difficult to drink plain water?

- **Try getting your water from herbal teas, smoothies (using water instead of milk) or broths**
- **Eat lots of fresh fruit and vegetables**
- **Add a small amount of juice to your water if you need flavor to make it more palatable**

7 Identify & avoid food intolerances

Some foods that are considered to be healthy, such as nuts, strawberries, citrus fruits, milk, corn and whole wheat, are also known to be common food intolerances. These intolerances can cause chemical reactions which can contribute to depression.

There are also thousands of chemicals added to our foods, often as preservatives, artificial colors and flavors. Many people are allergic or intolerant to these chemicals, which can also negatively affect your body and your mood.

Food intolerances can cause fatigue, slowed thinking, irritability, agitation, nervousness, anxiety, depression and learning disabilities.

The symptoms of food intolerances can take anywhere from 1 hour to 3 days to appear. This can make it difficult to identify the food that you are intolerant to. You may want to consider getting a food allergy test done to determine what, if any, foods you may be sensitive to and should avoid. Alternately, you can complete the **Food Elimination Diet** (see the Appendix for details).

Good digestion is important to ensure that food is broken down properly, and this can help reduce the negative effects of food intolerances. A digestive supplement including digestive enzymes, bile and HCL can be helpful.

8 Take St. John's wort

St. John's wort is a herb that helps to address mild to moderate depression. It also has the added bonus of helping to relieve pain and improve sleep.

IMPORTANT NOTE:
It is contraindicated to take St. John's wort if you are on antidepressants.

9 Avoid caffeine & artificial sweeteners

There are numerous studies that show a connection between people who have a high coffee or caffeine consumption and depression. People often use caffeine as a way to "self-medicate" by giving them that boost of energy to get them motivated and started for the day. However, some people are particularly sensitive to caffeine and will experience nervousness, anxiety,
irritability, headaches and heart palpitations. Caffeine also places stress on your adrenal glands and increases the secretion of the stress hormone cortisol, which can negatively affect your mood.

Long-term elevation of cortisol can have detrimental effects. It is known that in the general population the level of cortisol in the bloodstream peaks in the morning, and then decreases as the day progresses. However, for individuals who are depressed, cortisol peaks earlier in the morning and does not level off or decrease in the afternoon or evening.

Although the exact mechanism that causes depression is uncertain, clinical studies suggest that chronically elevated cortisol may induce clinical depression. As a result you should avoid coffee, sodas and other products that contain caffeine.

Additionally, the artificial sweetener aspartame can block the formation of serotonin and contribute to depression, headaches and insomnia. Avoidance of all artificial sweeteners is recommended.

If you need to sweeten your hot drink or food – use healthy alternatives such as honey, pure maple syrup or stevia.

Reduce Your Stress

Stress is very common in the SCI population. Stress rapidly reduces serotonin levels and also uses up essential vitamins and minerals in your body (such as the ones identified in this chapter).

When your body is depleted of these nutrients, they are unavailable to assist with maintaining healthy brain function and performing the chemical conversions needed to make the neurotransmitters that bring about a happy and upbeat mood.

Please refer to Chapter 13 - Nutrition for Stress for further information and nutritional support.

Turkey Chili

Turkey is high in tryptophan, so this dish is a great way to boost your serotonin levels.
Servings: 8

Ingredients:
- 2 lbs. of ground turkey
- 2 cans of tomatoes
- 2 cans of red kidney beans, drained
- 1 can of tomato paste
- 1 medium chopped onion
- 1 clove of garlic
- 1-2 tablespoons of chili powder
- Add spices for flavor (basil, oregano, parsley and black pepper)

Directions:
1. Cook turkey in a large pot and then stir in tomatoes, kidney beans, tomato paste, garlic, onion and spices
2. Simmer uncovered for 45 minutes stirring occasionally

NUTRITIONAL CONTENT PER SERVING:
Proteins: 24 grams
Carbohydrates: 16 grams
Fats: 9.7 grams
Calories: 250

Salmon Salad with Avocado

This salad provides a high dose of the good fats your brain needs to boost your mood.
Servings: 1

Ingredients:
- Salmon (smoked, canned or grilled)
- Handful of spinach
- 1⁄2 avocado, cut up
- 1⁄4 cup of sunflower seeds
- 1⁄4 of a bell pepper, chopped

Directions:
1. Place all ingredients into a salad bowl
2. Eat straight away

NUTRITIONAL CONTENT PER SERVING:
Proteins: 31.8 grams
Carbohydrates: 19 grams
Fats: 34.5 grams
Calories: 486

Blues Buster Smoothie

This hearty smoothie is rich in antioxidants, Vitamin C, magnesium and good fats to help kick-start your day. ***Servings: 1***

Ingredients:
- 1 kiwi (peeled)
- 1⁄2 cup of strawberries
- 1⁄2 cup of raw oatmeal
- 3 tablespoons of Greek yogurt
- Water (amount dependent on preference for thickness of smoothie)
- 1 tablespoon of ground flax seeds

Directions:
1. Place all ingredients in a blender, mix and serve

NUTRITIONAL CONTENT:
Proteins: 12 grams
Carbohydrates: 51 grams
Fats: 8 grams
Calories: 310

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
5-HTP/ tryptophan	To increase the synthesis of serotonin	Tryptophan foods include: salmon, lamb, venison, chicken, tuna, turkey, eggs, oats, sunflower seeds, sardines, spinach & cod	5-HTP: 100 mg twice a day (once in morning upon rising and once at bedtime)	Best with Vitamins B3, B6 and folic acid to help with conversion into serotonin Take on an empty stomach A small percentage may experience some nausea with 5-HTP as approximately 80% of serotonin is made in the gut. Drop the dose and your body will adjust Consult with your health care professional if you are taking an antidepressant before using this supplement
Omega-3 essential fatty acids	For healthy brain function and to boost mood	Salmon, mackerel, sardines, herring, walnuts, tuna, halibut & flax seeds or flax seed oil	Fish or flax seed oil: 2-4 1000 mg capsules or tablespoons of flax or fish oil a day in divided doses	Omega-3 has blood-thinning properties. Consult with your health care professional if you are on blood-thinning medication. Stop taking 2 weeks prior to surgery Fish oil can increase the risk of mania in patients with bipolar disorder People who have hypersensitivities or allergies to fish or shellfish may also be allergic to fish oil supplements. Signs of an allergic reaction include a rash or hives, difficulty breathing and swelling of the throat, face or mouth. An allergic reaction to fish oil should be considered a medical emergency
Folic acid	Helps with the conversion of tryptophan into serotonin Often people with depression have a folic acid deficiency	Chick peas, navy beans, lentils, spinach, broccoli, asparagus, romaine lettuce, chicken liver, whole grains, salmon & avocados	200-400 mcg a day for mild to moderate depression 800–1200 mcg a day for chronic or severe depression and those with a known folic acid deficiency. These doses are only to be used under the direction of a health care professional Best taken with a multi-vitamin or in a B complex Most active form is folic acid 5-methyl-tetra-hydrofolate	Take with 100 mg of Vitamin B6 Best taken in a multivitamin but also individually supplemented if deficiency identified Don't take more than 400 mcg per day unless directed by your health care provider High doses of folic acid might cause abdominal cramps, diarrhea, rash, sleep disorders, confusion, irritability, nausea, stomach upset, behavior changes, skin reactions, seizures, gas, excitability and other side effects Consult with your health care professional if you are taking anticonvulsant medications
IMPORTANT				
Phenylalanine	Needed to help make dopamine, norepinephrine and adrenaline which helps you to stay focused, feel motivated and awake Converts to phenylethylamine (a mood-elevating neurotransmitter that gives you the feeling of bliss and love)	Fish, chicken, turkey, eggs, fish, spirulina, grass-fed beef, lamb & veal	500 mg a day before breakfast Best taken on an empty stomach as amino acids tend to compete for absorption	Best to eat a phenylalanine-rich diet as opposed to supplementing Consult with your health care professional first if you have a heart condition or hypertension Do not take if you are on antidepressants, have a seizure disorder, are diabetic, experience panic attacks, or have PKU – phenylketonuria It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
Tyrosine	To help make norepinephrine, adrenaline and dopamine which help to boost mood, alertness and motivation	Fish, chicken, eggs, whole grains, oats, yogurt, avocados, bananas, legumes & beans	500-1000 mg 30 minutes before breakfast Best taken on an empty stomach as amino acids tend to compete for absorption	Best to eat a tyrosine-rich diet as opposed to supplementing Tyrosine increases mental alertness so should not be taken at night People with an overactive thyroid (hyperthyroidism) or Graves disease should not take tyrosine Take at a different time than tryptophan as it will compete for absorption into the body Do not take if on antidepressants, if you have hypertension or are prone to getting migraine headaches It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
HELPFUL				
Vitamin B3 (niacin)	For healthy brain function. Helps with balancing dopamine and adrenaline as well as boosting energy levels Helps regulate blood sugars which can cause depression symptoms	Spelt, salmon, beef, chicken, turkey, veal, lamb, sunflower seeds & tuna	50 mg 2 times a day Best taken in a multivitamin or in a B complex	If taken in high doses of more than 100 mg a day, can cause liver damage, loss of vision, stomach ulcers or gout People with liver disease, kidney disease, high blood pressure, diabetes, gout and peptic ulcers should avoid this supplement You should not drink large amounts of alcohol if you take Vitamin B3 High doses may cause skin flushing. Niacinamide, nicotinamide and inositol hexaniacinate are non-flushing forms of niacin Avoid time-release niacin as this can be toxic to the liver. Niacin may affect anticonvulsant medications and should be used under the care of a medical professional
Vitamin B6	Helps with the conversion of tryptophan into serotonin and for people who experience depression as a result of low Vitamin B6 levels	Beef, venison, sunflower seeds, chicken, avocados, bananas, lentils, brown rice & tuna	50-250 mg a day Best taken in a multivitamin or in a B complex Most active form: Pyridoxal-5-phosphate Less active form: pyridoxine hydrochloride	Not dreaming or remembering dreams can be a sign of a Vitamin B6 deficiency Although Vitamin B6 is abundant in food, it is not usually in high amounts and gets easily lost with cooking and processing. You may need to supplement to get best results Do not take higher than 1000 mg as this can cause peripheral neuropathy, a condition characterized by damaged nerves that cause pain and numbness in the extremities Side effects may include loss of appetite, sleepiness, headache, tingling and vomiting

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
HELPFUL				
Vitamin B12	Assist with conversion of tryptophan to serotonin	Salmon, lamb, beef, venison, sardines, eggs & fish	500-800 mcg a day Best taken in a multivitamin or in a B complex Methylcobalamin is the more active form as opposed to cyanocobalamin	Consult with your health care practitioner before supplementing with B12 due to its impact on the nervous system Take in conjunction with other B vitamins as this increases absorption but can also individually supplement if deficiency identified If you take antibiotics, acid reflux, ulcer or diabetic medications, it may interfere with your body's ability to absorb and use Vitamin B12 May cause skin itching, diarrhea, a feeling of being swollen, muscle weakness, cramps and pain, excessive thirst and urination, confusion shortness of breath, fatigue, headaches, dizziness and difficulties breathing or swallowing
Vitamin C	To help convert dopamine to norepinephrine which helps you to feel upbeat, driven and motivated	Parsley, papaya, pineapples, bell peppers, citrus fruits, tomatoes, strawberries, kiwi, broccoli, Brussels sprouts, cabbage, cauliflower, kale & peas	2000-5000 mg in divided doses Best taken with food Buffered forms of Vitamin C are easier on the stomach Taking Vitamin C supplements with bioflavonoids will help increase absorption	Sulfa antibiotics increase elimination of Vitamin C High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication as Vitamin C can act as a natural blood thinner
St. John's wort	Works best with mild to moderate depression (not severe) Also helps to improve sleep and reduce pain	NA	300 mg 2 to 3 times a day for mild depression and 600 mg twice a day for moderate depression	It takes a couple of weeks to begin to feel results Side effects may include gastrointestinal symptoms, allergic reactions, anxiety and dizziness Do not take if on antidepressants Can cause photosensitivity and can reduce the effectiveness of certain medications such as contraceptives, antidepressants (especially SSRI), immunosuppressants, anticoagulants and anti-convulsants. If taking these medications, please consult with your health care professional first

CHAPTER 15

Nutrition for Anxiety

1. Eat foods high in calcium & magnesium
2. Balance blood sugar levels
3. Eat foods high in Vitamins B1 & B3
4. Avoid stimulants such as sugar, caffeine, alcohol & recreational drugs
5. Identify & avoid food intolerances

SCI and Anxiety

Sustaining a spinal cord injury (SCI) can have a negative effect on your physical, emotional and mental health. Experiencing some anxiety post-injury is normal and healthy, but intense, long-term anxiety can be debilitating, lead to physical and mental exhaustion and interfere with your ability to perform everyday activities.

Poor nutrition can contribute to anxiety, and in turn, anxiety can cause poor dietary habits (such as skipping meals). If you are deficient in certain vitamins, minerals and essential fats, your nervous system becomes weakened, making you more susceptible to anxiety.

Additionally, low blood sugar levels (hypoglycemia) can cause the hormone **cortisol** to be released. Releasing high levels of cortisol continuously can also lead to anxiety. If not managed, abnormally high amounts of cortisol can be toxic and damaging to your brain and nerve cells.

Maintaining a healthy lifestyle through nutrition, exercise and rest is essential in achieving optimal health and managing your anxiety.

This chapter will describe nutritional and lifestyle factors that can help boost your mood and improve your anxiety symptoms.

13%-44%

Between 13% and 44% of individuals with SCI experience anxiety.

Symptoms

Symptoms of anxiety* typically include the following:

- Increased heart rate
- Muscle tension
- Tendency to hyperventilate
- Fear of dying
- Inability to relax
- Headaches
- Dry mouth
- Excessive perspiration
- Insomnia
- Fatigue
- Dizziness
- Muscle spasms
- Digestive disturbances
- Constant need to urinate or defecate
- Irritability
- Impatience and trouble concentrating

** Some of these symptoms can be related to other conditions such as autonomic dysreflexia. Consult with your physician to determine the cause of these symptoms.*

Nutrition for Anxiety

1 Eat foods high in calcium & magnesium

Calcium and magnesium help relax the mind and calm your nerves and muscles. Individuals with SCI are commonly deficient in both of these minerals.

People with a deficiency in magnesium may show symptoms such as nausea, muscle cramping, gastrointestinal problems, constipation, cravings for chocolate, insomnia, restlessness, bone spurs, weakness and/or muscle tremors.

Foods high in magnesium include: black beans, swiss chard, spinach, avocados, whole grains, quinoa & bran.

A calcium deficiency can cause joint pain, nervousness, irritability, anxiety, unusual sensitivity to noise, heart palpitations, insomnia and muscle cramps. Sugar, refined carbohydrates, coffee, alcohol, salt, and vinegar can interfere with calcium absorption and should therefore be avoided.

Foods high in calcium include: broccoli, almonds, kale, salmon, sardines, cheese & yogurt.

2 Balance blood sugar levels

Consuming sugar and processed carbohydrates causes blood sugar levels to go up. But what goes up must come down, so after eating foods high in sugar, your blood sugar will quickly rise and then quickly fall. When this happens, your body releases the stress hormone cortisol to help bring blood sugar levels back up to a normal range. Increased cortisol can contribute to anxiety. Cortisol also increases appetite and food cravings, and this can create a vicious anxiety-inducing cycle.

Eating 3 small meals and 2 snacks a day (at approximately 2-3 hour intervals) helps provide a steady amount of energy to your body and balances blood sugar levels. Consuming complex carbohydrates, proteins and high fiber foods, which are all slow-burning fuels, provides a slow release of glucose into your body, helping to maintain balanced blood sugar levels throughout the day and helping to keep cortisol levels low.

Chromium, a trace mineral, can also help to balance blood sugar levels. People who eat a diet high in refined carbohydrates and sugars are commonly deficient in chromium. A chromium deficiency can contribute to symptoms of nervousness, shakiness and anxiety.

Eat foods high in chromium such as: whole grains, grass-fed lean beef, chicken, green peppers, spinach, apples & bananas.

Eat foods that also contain minerals such as magnesium, calcium, phosphorus and potassium, which can be depleted during periods of anxiety.

These include apricots, asparagus, avocados, bananas, brown rice, fish, garlic, green leafy vegetables, legumes, raw & unsalted nuts and seeds, whole grains & yogurt.

3 Eat foods high in Vitamins B1 & B3

Lactic acid buildup occurs with high intensity activities or exercise, hyperventilating (which changes the acid level of the blood), or when oxygen supply is hindered (as is often the case for individuals with tetraplegia). Lactic acid buildup can contribute to anxiety. Studies show that people with anxiety tend to have elevated blood levels of lactic acid. For individuals with SCI the ability to clear lactic acid may be compromised.

– Murray, Pizzorno 1997

When someone has healthy circulation, lactic acid is transported to the liver where it is converted into other substances such as ***pyruvic acid.*** To reduce your anxiety, you want to reduce your levels of lactic acid and increase your levels of pyruvic acid. One way to this is to *eliminate alcohol, caffeine, and sugar from your diet*.

Another way to decrease lactic acid is to ensure you are getting plenty of B-vitamins. Lactic acid levels can increase when you have a deficiency of Vitamins B1 and B3.

Eat foods high in Vitamins B1 and B3, such as: avocados, cauliflower, spinach, nuts, legumes (navy beans & pinto beans), lentils, salmon, lamb & chicken.

THE BENEFITS OF PYRUVIC ACID

- Gets rid of excess lactic acid
- Helps slow the aging process
- Lowers blood pressure & cholesterol
- Increases endurance
- Helps retain lean muscle mass
- Increases body protein uptake
- Increases fat utilization and resting metabolic rate important for weight loss

4 Avoid caffeine, sugar, alcohol & recreational drugs

People often try to “self-medicate” when they are anxious by consuming certain foods, beverages and drugs, as these contain substances that can affect brain chemistry and mood. For example, cheese contains a substance that acts as an antidepressant, and chocolate has a substance in it that produces feelings of love and bliss.

Studies show that refraining from drinking **caffeine** can have a marked improvement on anxiety symptoms. **Instead, drink herbal teas such as chamomile, passion flower, and hops which are relaxing and can have a mild sedative effect.**

Cannabis, alcohol and tranquilizers are sometimes used to reduce anxiety as they help promote the production of the neurotransmitter GABA, which helps you to feel relaxed, happy and calm. GABA helps to counteract abnormally high levels of adrenaline and dopamine, which when present in excess, result in feeling on edge, anxious and nervous. While use of these substances may make you feel better in the short term, in the long term they will suppress GABA and actually make you feel even more anxious.

Sugar (glucose) is another stimulant people often consume to comfort themselves when feeling anxious. Although glucose is the number one fuel source for the brain, when eaten in excess it can cause damage to the nerve cells, which can affect a person’s mood and emotional state. For example, too much sugar can cause anxiety and irritability.

Eat foods that are high in the amino acid GABA to help you feel relaxed and calm. These foods include: fish, chicken, eggs, salmon, avocado & flax seeds.

5 Identify and avoid food intolerances

If you have an intolerance to certain food(s), your brain can be more sensitive to the effects of this food. As a result, mood or behavioral changes such as anxiety may manifest themselves before physical symptoms occur.

To help determine if a food intolerance is contributing to your anxiety, you may want to complete the **Food Elimination Diet (for more details see Appendix).** This diet involves eliminating the most common known food intolerances from your diet for a two-week period. If you notice anxiety symptoms improve, it is highly likely you were consuming a food that you were negatively reacting to.

Even though you may not have had a problem with certain foods pre-injury, when your body has been under continuous emotional, mental or physical stress, food intolerances can manifest themselves.

Q **Why are the foods you crave the MOST – the ones you are most likely intolerant to?**

When you eat a food that you have an intolerance or a sensitivity to – it can have an opiate-like response in your brain. This can give you a physical or mental energy boost.

Despite any negative reactions related to these food intolerances, you can become addicted to the opiate-like boost they create. This is why you often crave foods that aren't good for you.

Fennel relieves anxiety-related gastrointestinal upsets and helps relax the large intestine.

It is best to take this as a tea before or after meals.

Anxiety-Free Eggs

This meal is high in B vitamins, which are important in reducing the buildup of lactic acid and subsequent feelings of anxiety. Eggs are a key ingredient in reducing anxiety as they contain GABA, which helps to calm the brain. ***Servings: 2***

Ingredients:

- 1/4 teaspoon of extra virgin olive oil
- Pinch of sea salt
- 4 teaspoons of chives
- 2 pieces of nitrite-free low-fat turkey bacon, cut into 1/4 inch pieces
- 2 tablespoons of ground flax seeds
- 1/2 a medium tomato, diced
- 4 eggs
- 1/8 of a teaspoon of pepper or paprika

Directions:

1. Preheat oven to 350F/176C (or can cook in microwave for convenience)
2. Divide bacon, tomato and half of the chives into 2 oiled serving bowls on baking tray
3. Pour 2 eggs into each bowl and season with pepper or paprika
4. Sprinkle flax seeds and sea salt on top of eggs
5. Place in oven until eggs are set (about 20 minutes)
6. Remove and top with remaining chives and flax seeds and serve immediately

NUTRITIONAL CONTENT PER SERVING:

Proteins: 24 grams
Carbohydrates: 8 grams
Fats: 28 grams
Calories: 382

Worry-Free Smoothie

This smoothie is high in calcium and magnesium, which are anti-anxiety minerals. It also contains chromium and protein, important nutrients for managing blood sugar levels.
Servings: 1

Ingredients:

- 1/4 cup of raw rolled oats
- 1/4 cup of plain Greek yogurt
- 1/2 cup of water
- 1 scoop of whey protein powder
- 1/2 cup of unsweetened almond milk
- 1/2 a frozen banana

Directions:

1. Combine all ingredients in a blender and puree on high speed until smooth

NUTRITIONAL CONTENT:

Proteins: 21 grams (will vary depending on protein powder)
Carbohydrates: 29 grams
Fats: 6 grams
Calories: 296

Black Bean Salad

Black beans are loaded with magnesium, making this a powerful anti-anxiety dish.
Servings: 4

Ingredients:
- 2 cans of black beans
- 1 red pepper, chopped
- 1/4 cup of white wine vinegar
- 1/2 teaspoon of sea salt
- 2 teaspoons of ground cumin

Directions:
1. Strain black beans and add to large bowl with pepper
2. Add cumin and sea salt to vinegar and pour over beans

NUTRITIONAL CONTENT OF DIP:
Proteins: 8.3 grams
Carbohydrates: 22.7 grams
Fats: 0 grams
Calories: 128

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
ESSENTIAL				
Magnesium	Anti-stress mineral which helps to calm the nerves, muscles and mind	Black beans, quinoa, sunflower seeds, sesame seeds, bran, spinach, flax seeds, tomatoes, oats & almonds	250 to 500 mg daily Best absorption forms are magnesium aspartate, malate, succinate, fumarate, glycinate and citrate Poor absorption forms include: magnesium oxide, carbonate, gluconate, sulfate and chloride	Too much magnesium can cause loose stools, so best to slowly increase dosage Absorbs better when taken with an acid-based drink such as apple juice or tomato juice Best taken in conjunction with calcium People with kidney disease, gastrointestinal disorders, severe heart disease and those taking magnesium medications such as antacids and laxatives should consult with their health care professional first
Calcium	To assist with reducing stress and anxiety	Kale, broccoli, sardines, almonds, sesame seeds, cheese, spinach & yogurt	500–1000 mg a day	Best to get calcium from foods as opposed to taking supplements, as food sources raise blood calcium levels slowly and reduce risk of kidney and bladder stones If supplementing, best take with meals to maximize absorption, or can take at night to help with sleep Avoid calcium from oyster shell, dolomite or bone meal as they are known to be high in lead Best to take with magnesium to maintain a calcium balance and prevent accumulation of calcium in unwanted areas such as soft tissue If you are on diuretics or suffer from hypercalcemia, hypoparathyroidism, renal stones, renal impairment, kidney or heart disease, consult with your health care professional before taking supplements
Vitamin B1 (thiamine)	Helps reduce lactic acid buildup	Navy beans, black beans, pinto beans, sesame seeds, lentils, spinach, oats & nuts	25-50 mg a day Best taken as a Vitamin B-complex	Coffee and tea tannins can make it difficult for your body to use B1, so drink these in moderation
Vitamin B3	Enhances breakdown of lactic acid and reduces anxiety and depression	Spelt, salmon, lamb, beef, chicken & eggs	25-50 mg a day Best taken as a Vitamin B-complex	If taken in high doses (more than 100 mg a day) Vitamin B3 can cause liver damage, loss of vision, stomach ulcers and gout People with liver disease, kidney disease, high blood pressure, diabetes, gout and peptic ulcers should avoid this supplement You should not drink large amounts of alcohol if you take Vitamin B3 High doses may cause skin flushing. Niacinamide, nicotinamide and inositol hexaniacinate are non-flushing forms of niacin Avoid time-release niacin as this can be toxic to the liver Niacin may affect anticonvulsant medications and should be used under the care of a medical professional

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
IMPORTANT				
L-theanine	Increases serotonin, dopamine and GABA which help calm the mind	Green tea (decaffeinated)	50-200 mg a day on an empty stomach	It is important not to take it in combination with some antidepressants. Consult with your health care professional before taking Contraindicated in patients receiving chemotherapy treatments and people taking cholesterol medication(s) It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
GABA	Natural relaxant, helps calm the brain	Eggs, fish, chicken, salmon, avocado & flax seeds	500 to 600 mg, 1 to 3 times day Should be taken on an empty stomach, i.e. 20 minutes before a meal or 2 hours after a meal	People with liver or kidney disease should not take GABA supplements without first consulting with their health care professional It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body
HELPFUL				
Herb combination: Passion flower Hops Valerian	For anxiety, calming nerves and relaxation	Can drink as tea	As recommended on label	Valerian and passion flower have antispasm properties as well. Valerian is a sedative so may be better taken at night Important to note that 10% of people experience the opposite effect when taking valerian. Check with your health professional to ensure no interactions with your medication will occur
Taurine (amino acid)	Reduces nervous tension Also helps with relaxation, insomnia and depression	Fish, eggs, milk, yogurt & chicken	500 to 1,000 mg 2 times a day Best to take on an empty stomach with juice as amino acids compete for absorption	Best taken with Vitamin B6 Do not exceed more than 3,000 mg per day Talk to your doctor or a health care professional before supplementing A high taurine intake may reduce urination frequency and can slow lithium excretion through your urine. As a result, taurine may cause your body to store excess lithium, which can cause diarrhea, dizziness, stomach pains, nausea, vomiting and weakness Avoid taurine if you are taking insulin or steroids Consult with your health care professional if you have liver or kidney problems It is not recommended to take a single amino acid for an extended period of time without supplementing with other amino acids as well. Long-term isolated amino acid supplementation can create an imbalance in the body

CHAPTER 16

Nutrition for Overall Health

1. **Protein**
   - **Eat 2-3 servings of lean protein a day**
2. **Carbohydrates**
   - **Eat 1-2 servings of legumes/lentils a day**
   - **Eat 1 serving of grain a day**
3. **Fruits**
   - **Eat 1-2 servings of fruit a day**
4. **Vegetables**
   - **Eat 5+ servings of vegetables a day**
5. **Fats**
   - **Eat 2 servings of healthy fats a day**
6. **Fluids**
   - **Drink 6-8 cups of fluids a day**

SCI & Overall Health

In the previous chapters you learned about many specific nutritional recommendations for a number of secondary health complications associated with spinal cord injury (SCI). If you are not experiencing any health issues and just want to maintain and protect your long-term health, or if you are struggling with a number of different conditions and don't know where to start, then this chapter will provide you with the foundation for healthy eating.

Individuals with SCI need to pay extra attention to the foods that they eat, as they often require a higher than normal level of nutrients. This is due to changes in digestive function, their tendency to have poor diets and because of the increased nutrient demands secondary health conditions place on their body.

Eating a wholesome, nutrient-dense diet is essential for eating well, living well and reducing the high risk of nutrient deficiencies that can lead to the development of secondary health complications.

Common SCI Nutrient Deficiencies

- Vitamin A
- Vitamins B1, B2, B6 & B12
- Folic Acid
- Vitamin C
- Vitamin D
- Vitamin E
- Vitamin K
- Calcium
- Magnesium
- Potassium
- Zinc
- Fiber

In this chapter you will learn about eating the right portion sizes of proteins, carbohydrates and fats, as well as good quality sources of these foods. It will also provide an example of a weekly menu plan to help you start your journey to eating well and feeling great.

Nutrition for Overall Health

1 Protein

Eat 2-3 servings of lean protein a day
Serving size: the palm of your hand (not including fingers)

Examples of healthy lean proteins:

- ***Red meat (limit to 1-2 times a week)***
- ***Fish (salmon, tuna, sardines, mackerel, herring and pickerel)***
- ***Chicken***
- ***Turkey***
- ***Eggs***
- ***Plain Greek yogurt***
- ***Low-fat cottage cheese***
- ***Protein powders (whey isolate is the most absorbable)***

2 Carbohydrates

Eat 1 serving of grain a day
Serving size: 1/2 a cup of grain or 1 slice of bread

Good sources of grains include:

- ***Quinoa***
- ***Cream of wheat***
- ***Amaranth***
- ***Barley***
- ***Kamut***
- ***Wheat germ***
- ***Steel-cut oats/oatmeal***
- ***Brown/wild rice***
- ***Bulgur***
- ***Spelt***
- ***Millet***
- ***Whole grain bread/pasta***

Eat 1-2 servings of legumes/lentils a day
Serving size: 1/2 a cup, cooked

Examples of legumes and lentils include:

- ***Kidney beans***
- ***Black beans***
- ***Hummus***
- ***Split peas***
- ***Navy beans***
- ***Chick peas (garbanzo beans)***
- ***Green peas***
- ***Lentils (red, green, yellow)***

3 Fruits

Eat 1-2 servings of fruit a day
Examples of fruits and serving size:

- ***1 apple***
- ***15 cherries***
- ***1 nectarine***
- ***3 apricots***
- ***1 orange***
- ***1 pear***
- ***1 peach***
- ***2 kiwis***
- ***2 cups of watermelon***
- ***Lemons/limes***
- ***1 cup of berries (blackberries, raspberries & blueberries)***

4 Vegetables

Eat 5 + servings of vegetables a day
Serving size: 1/2 a cup

Examples of vegetables:

- ***Asparagus***
- ***Brussels sprouts***
- ***Butternut squash***
- ***Celery***
- ***Spinach***
- ***Swiss chard***
- ***Tomatoes***
- ***Broccoli***
- ***Cabbage***
- ***Carrots***
- ***Eggplant***
- ***Arugula***
- ***Leeks***
- ***Artichoke***
- ***Cauliflower***
- ***Sweet potato***
- ***Beets***
- ***Kale***
- ***Green beans***
- ***Onions***
- ***Peppers (green, red & yellow)***

5 Fats

Eat 2 servings of healthy fats a day
Serving size: 1 tablespoon of oil or golf ball size of nuts/seeds

Examples of good fats:

- ***Olives/olive oil***
- ***Avocados/oil***
- ***Flax seeds/oil***
- ***Coconut butter/oil***
- ***Raw and unsalted nuts (almonds, pecans, walnuts)***
- ***Raw and unsalted seeds (sunflower, sesame, pumpkin)***
- ***Nut and seed butters, e.g. almond butter***
- ***Chia or salba seeds***

6 Fluids

Drink 6-8 cups of water/fluids a day
Serving size: 1 cup = 240 ml / 8 fluid oz.

Examples of fluids include:

- ***Herbal teas, water, broths & diluted juices (1/4 juice to 3/4 water)***

Water helps to:

- Fill you up and control your appetite
- Support kidney/bladder function
- Lubricate joints
- Maintaining skin integrity
- Assist with fat metabolism
- Transport nutrients throughout the body
- Remove toxins from the body
- Prevent constipation
- Improve mood
- Improve mental and physical energy

What Foods to Avoid:

1. **Avoid refined carbohydrates such as white flour, white rice, white pasta, cakes, cookies, bagels & store-bought juice**
2. **Avoid trans fats which are found in processed or packaged foods, salad dressings, crackers, frozen dinners & commercial baked goods**
3. **Avoid sugar & artificial sweeteners**
4. **Limit alcohol as much as possible**
5. **Avoid or limit caffeine**
6. **Avoid soda**

BE HAPPY!

Maintain a healthy psychological state and reduce negative feelings and stress as much as possible.

Depression, stress, anxiety, negative moods and attitudes can interfere with your ability to make the most out of your nutrition program. Your emotional state can have a major impact on factors affecting your eating habits and behaviors. This can include your food choices and cravings, emotional eating, binge eating, and skipping meals, as well as digestive dysfunction.

You may want to consider trying these stress management strategies to enhance your overall health:

- Meditating
- Exercising
- Completing positive affirmations
- Removing negative influences or emotional robbers in your life and replacing them with things that make you happy, laugh & feel good

Weekly Nutrition Meal Plan

Below is a one-week meal plan that implements the above recommendations. (Evening snack is optional.)

	BREAKFAST	SNACK	LUNCH	SNACK	DINNER	SNACK
Monday	Lemon juice and water Protein shake w/ spinach, frozen berries and water	Celery and almond butter	Chicken salad w/ peppers, chick peas and olive oil dressing	Pear	Salmon w/ quinoa and steamed asparagus & mushrooms	A glass of almond milk
Tuesday	Lemon juice and water 2 scrambled eggs w/ spinach and 1/4 avocado Green tea	Apple and 6 almonds	Mixed bean salad	Protein shake w/ water and banana	Beef stir-fry w/ brown or wild rice	2-3 pieces of dark chocolate (75% or more)
Wednesday	Lemon juice and water Chocolate protein shake w/ avocado and water	8 walnuts	Can of tuna on fresh green salad w/ broccoli, onions & tomatoes Plain Greek yogurt for dressing	1 hard-boiled egg	Vegetarian bean burrito on whole wheat wrap w/ salad	Unsweetened apple sauce
Thursday	Lemon juice and water Oatmeal w/ a handful of berries, mixed raw nuts, seeds and cinnamon	1/2 cup Greek yogurt	Carrot and ginger soup	Hummus w/ sliced cucumbers and peppers	Fish w/ baked sweet potato and steamed broccoli	Apple slices with almond butter
Friday	Lemon juice and water 2 egg omelet w/ mushrooms and tomatoes Green tea	Peach	Chicken spinach salad w/ goat cheese, and tomatoes	Strawberries w/ a handful of raw unsalted walnuts	Vegetarian quinoa/black bean salad	Air popped popcorn
Saturday	Lemon juice and water Greek yogurt, blueberries and green tea	Unsweetened apple sauce w/ cinnamon	Salmon salad w/ 1 slice of whole grain bread	Cauliflower and broccoli w/ taziki dip	Turkey chili w/ goat cheese on top	Pumpkin and sunflower seeds

Healthy Snack Ideas

Here are some great ideas for quick and nutritious snacks to help keep you going throughout the day!

- 1 tablespoon of almond butter on apple wedges
- 1/3 cup of low-fat cottage cheese with veggie sticks or pineapple
- Hummus with raw vegetables such as: baby carrots, sugar snap peas, cauliflower, broccoli, grape tomatoes, peppers, zucchini, etc.
- Trail mix – almonds, walnuts, brazil nuts, cashews, pumpkin & sunflower seeds with dried apricots
- Unsweetened apple sauce with protein powder & a pinch of cinnamon
- 3/4 cup plain Greek yogurt & berries
- Popcorn (plain) with melted coconut oil/butter
- Smoothies (see recipes in book for details)
- Black bean dip with whole grain pita bread
- Hard-boiled egg
- Nut butter on celery sticks
- Edamame
- Frozen fresh fruit popsicles

Food & Supplement Recommendations

- Consult with your medical or health care professional before starting any dietary changes and/or supplement use.
- If you are pregnant or nursing, do not take any supplements before consulting with your medical health care professional.
- References for this chapter are listed in the back of the book.

NUTRIENT	PURPOSE	FOODS	SUPPLEMENT DOSAGE	CONTRAINDICATIONS/CONSIDERATIONS
Probiotics	Boosts the immune system, maintains a healthy gut flora, improves digestion and helps to regulate bowel function	Fermented foods such as yogurt, kefir, sauerkraut, pickled foods, tempeh & miso	1-2 capsules a day on an empty stomach at bedtime	If you are taking antibiotics you can take probiotics, but just ensure that they are consumed 2 hours apart. If you have completed a course of antibiotics, you will need to continue probiotics for at least 2-3 months When purchasing probiotics, make sure you look for the following: • A minimum of 8 billion active micro-organisms • Contains at least several types of bacteria strains including Lactobacillus acidophilus and Bifidobacterium bifidus • Freeze-dried probiotics as this keeps the flora dormant until it enters your body • Keep stored in the fridge
Multivitamin	To address nutrient deficiencies which are common in people with SCI	Eat a wholesome diet of fresh fruits, vegetables, eggs, nuts/seeds, seafood, legumes & poultry	As directed on label	May cause nausea
Fish oils (omega-3)	To reduce acute and chronic inflammation, maintain healthy nerves, cardiovascular system and skin, boost mood and memory, and help maintain a healthy weight	Salmon, mackerel, sardines, herring, walnuts, tuna & halibut	Fish or flax seed oil: 2-4 1000 mg capsules or tablespoons of flax or fish oil a day in divided doses	Omega-3 has blood-thinning properties. Consult with your health care professional if you are on blood-thinning medication Stop taking 2 weeks prior to surgery Fish oil can increase the risk of mania in patients with bipolar disorder People who have hypersensitivities or allergies to fish or shellfish may also be allergic to fish oil supplements. Signs of an allergic reaction include a rash or hives, difficulty breathing and swelling of the throat, face or mouth. An allergic reaction to fish oil should be considered a medical emergency
Vitamin D3	For bone health and prevention of osteoporosis	Salmon, cod liver oil, sardines, goat's milk, eggs & tuna	800 to 1000 IU of D3 a day for first 2 years following SCI 3000-4000 IU of D3 a day for chronic SCI with no history of renal or bladder stones, renal impairment or heterotopic ossification Craven, Robertson et al, 2009	Best taken in supplement form as minimal amount is obtained from food Consult with your health care professional as dosages may vary considerably based on individual needs. Vitamin D3 supplementation doses should be based on Vitamin D 25-OH blood levels. Once optimal intake is maintained, then monitoring is recommended
Vitamin C	Helps maintain and repair skin and muscle, enhances liver detoxification, boosts immune system, aids in respiratory health as well as combats stress and fatigue	Red & green peppers, broccoli, mangos, strawberries & papaya	2000-3000 mg a day	Sulfa antibiotics decrease Vitamin C levels in the body High doses of Vitamin C can cause loose stools or gastrointestinal problems, so reduce dosage if needed Take in divided doses throughout the day as Vitamin C is quickly used up in the body Take lower doses if you are prone to kidney stones Consult with your health care professional if you are on blood-thinning medication as Vitamin C can act as a natural blood thinner

APPENDIX

Food Elimination Diet

The Food Elimination Diet is a cost-effective way to help you identify whether you have a food sensitivity or intolerance. This process can help to reduce or eliminate certain health symptoms, facilitate weight loss and reduce inflammation.

Step #1: Review the list below and create a meal plan with the items listed in ***Foods to Eat*.**

Step #2: **For 2 weeks only eat the foods listed in *Foods to Eat*. Do not eat any other foods listed in *Foods to Avoid*.**

Step #3: **Reintroducing foods.** After 2 weeks choose one food from one category of the **Foods to Avoid** list to reintroduce back into your diet. Eat this food twice in the same day. Do this for 2 days. Monitor any negative reactions you may experience over these two days (such as bloating, headaches or diarrhea). If you have a negative reaction to the food most recently introduced, then you should refrain from eating this. If there is no reaction, you can continue to include this in your diet.

Step #4: Repeat Step #3 introducing another food from another category into your diet and continue this process until all categories are completed.

TYPE OF FOOD	FOODS TO EAT	FOODS TO AVOID
Fruits	All fruits except citrus fruits	All citrus fruits
Vegetables	All vegetables	Corn (popcorn, corn chips)
Grains	Gluten free – Brown rice, oats, quinoa, millet, amaranth, tapioca, teft & buckwheat (including rice cakes, rice crackers etc)	Gluten-based grains and cereals – wheat, corn, barley, couscous, spelt, kamut, rye & bran
Legumes	All beans, peas & lentils	Soy beans, tofu, tempeh, soy milk & other soy products
Nuts/seeds	Almonds, cashews, walnuts, sesame, sunflower, pumpkin seeds, nut & seed butters made from the above	Peanuts, peanut butter & pistachios
Protein (Fish, meat & eggs)	Fish, chicken, turkey, wild game & lamb	Beef, pork, cold cuts, bacon, hot dogs, frankfurters, sausage, canned meats, shellfish & eggs
Dairy products	Milk substitutes, rice milk, almond milk, oat milk, coconut milk, vegetable-based protein powders, goat & feta cheese	Cow's milk, ice cream, cheese, cottage cheese, yogurt, frozen yogurt, non-dairy creamers & whey protein powders
Fats	Cold-pressed oils such as olive, flax seed, canola, safflower, sunflower, sesame, walnut & avocado	Margarine, butter, shortening, soy bean oil, palm kernel oil, cotton seed oil, vegetable oil, processed/hydrogenated oils, mayonnaise & spreads
Beverages	Filtered or distilled water, herbal teas & mineral water	Pop, alcohol, caffeine, coffee, black tea & carbonated beverages (including sparkling water)
Spices & condiments	All spices unless otherwise specified, e.g. cinnamon, cumin, basil, parsley, dill, garlic, ginger, carob, rosemary, oregano, tarragon, thyme, turmeric & vinegar	Chocolate, ketchup, mustard, relish, chutney, soy sauce, BBQ sauce & other processed condiments
Sweeteners	Brown rice syrup, stevia, agave nectar, blackstrap molasses & fruit sweeteners	White or brown sugar, honey, corn syrup, maple syrup, high-fructose corn syrup, candy, desserts & artificial sweeteners

Strategies for Healthy Eating on a Budget

- ☐ Plan meals for the week – this will help you budget your meals and avoid overbuying
- ☐ Create a food budget – and stick to it
- ☐ Cook more and eat out less – you'll be surprised at how much money you can save
- ☐ Buy in bulk and avoid packaged foods
- ☐ Skip all the middle aisles of your grocery store where all the processed foods are kept – instead, shop on the outside edges where all the fresh, whole foods are located
- ☐ Take a pass on pre-chopped prepared foods, frozen meals and/or vegetables in sauces (these foods may save you time, but they also cost more and are usually chock full of salt, sugar & preservatives)
- ☐ Buy fruits and vegetables that are grown locally and in season – they are fresher & less expensive
- ☐ Collect coupons, check out weekly grocery flyers and buy healthy foods on sale
- ☐ Meat is expensive – try substituting meat for legumes or making vegetarian meals – this helps to save money and maximize your vegetable and fiber intake
- ☐ Grow your own herbs – they have many therapeutic properties and add flavor to food
- ☐ Prepare foods in large quantities and freeze left-overs – this makes for quick and easy meals during the week that are healthier and cheaper than frozen ready-made meals from the store
- ☐ Soups are a great way to get water and vegetables into your diet – they are inexpensive and nutrient dense
- ☐ Don't throw out wilted vegetables or fruits – save them for smoothies, stews and soups or freeze them to use later
- ☐ Take your own teabag when you go out so all you have to order is hot water – or carry a thermos or canteen of your favorite drink
- ☐ Eat nutrient-dense foods such as fruits, vegetables, nuts/seeds and legumes – these fill you longer so you'll eat less
- ☐ Avoid refined carbohydrates, processed foods and sugars – these cause cravings, binge eating and overeating, which in turn means spending more
- ☐ Don't grocery shop when you are hungry - you are more likely to overshop and purchase unhealthy foods
- ☐ Shop late on Saturday night or early Monday morning and take advantage of marked down meat and produce

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Eat Well, Live Well with Spinal Cord Injury is a practical nutritional guide written specifically for people with spinal cord injuries, as well as their families, friends, caregivers, health care and medical professionals. *Visit us online at:*

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