

# Nutrition and Repetitive Strain Injuries

## Part I: Injury Prevention



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Everywhere we turn, we are encouraged to eat right. But what does “eating right” mean? It seems like a moving target. Science uncovers more mysteries about the molecules in our food every day. Therefore, should we just give up and stuff ourselves with Twinkies and Coke...or should we swear off carbohydrates, or fat, or meat, or *what?* Generally we end up choosing our own version of “moderation in all things” which runs quite a gamut, and leaves most Americans plump and unhealthy. In this article, we will explore some of the current facts and theories about food science and then try to help you decide what mix of foods is right for you.

Repetitive Strain Injuries (RSI) arise primarily from forceful, awkward, repetitive motions, but there are some people who do these motions for years and do not suffer RSI, or if they do, they are able to heal and recover quickly. One of the reasons for this is because they “eat right.” Nutrition is extremely important in building healthy tissues, improving circulation and cardiovascular health, and aiding in healing when injuries happen.

### *Nutrition Overview*

It is difficult to know where to start and easy to get misled when seeking information regarding proper nutrition. There are many different ways to look at nutrition and there is a lot of false or unverified information.

Some researchers view our current diet in terms of how it has changed over the past 5-7 million years. We found this approach to be most helpful when trying to find out how RSI is affected by nutrition. Before agricultural development and animal husbandry, dietary choices were limited to minimally processed wild plant and animal foods.<sup>1</sup> The Neolithic and Industrial Periods altered the crucial nutritional characteristics of our ancestors’ diet, which is a probable cause underlying chronic diseases that increase risk of RSI. Contemporary hunter-gatherers and other less Westernized people rarely suffer from such diseases. Our genes are not adapted to process most of the foods that we eat today.<sup>1</sup> Clinical trials that use dietary treatments with nutritional characteristics similar to those found in pre-industrial and pre-agricultural diets have confirmed the health benefits of this theory.<sup>1</sup>

It is in light of this knowledge that we present our discussion of nutrition as one method of preventing RSI through overall health. But nutrition and diet alone will not prevent RSI. A lifestyle of healthy choices that includes: exercise; sleep; proper equipment and practices while at work and home, in the car, and during sports; stress reduction; self-care; and smoking abstinence is extremely important in preventing RSI and other disorders.

### ***Importance of weight management***

There are several chronic diseases and health conditions that are known to contribute to the development of RSI. Diabetes, rheumatoid arthritis, thyroid disease, gout, hormone conditions (including pregnancy, hysterectomy or removal of both ovaries), fluid retention (pregnancy, birth control, and sudden weight gain), previous injuries, and smoking are all conditions that increase the risk of injury.<sup>2</sup> Being in a healthy weight range dramatically affects these conditions.

Type 2 diabetes, which is closely tied to obesity, negatively affects blood vessels, nerves, and energy transportation, depriving muscles and other soft tissues of nutrients and oxygen.<sup>3</sup> It not only predisposes people to RSI, it makes recovery much more difficult.<sup>3</sup>

Osteoarthritis (OA) is another chronic health problem closely related to RSI. It is generally caused from overuse, and obesity leads to increased wear and tear on the lower extremities. A force of 3-6 times one's body weight is exerted on the knee while walking, so losing even one pound results in about a 4-pound reduction in the knee joint with each step!<sup>4, 5</sup> In fact, some studies have shown that overweight may also be associated with higher rates of hand osteoarthritis, suggesting involvement of a systemic factor as well.<sup>5, 6, 7, 8</sup> From the standpoint of OA, being overweight is detrimental to health and even minor weight losses can be very beneficial.

Obesity and overweight also pose a major risk for cardiovascular disease, hypertension (high blood pressure) and stroke.<sup>9</sup> These problems affect the health of the circulatory system, which in turn is a major factor in the development of RSI. Poor circulation and RSI are closely related. Drugs and surgery can help control some aspects of these diseases, but they do not get to the root of these health problems, which is often extremely poor eating habits.

Being underweight is also stressful for the body and increases risk of RSI and other types of injury. The body is more susceptible to sprains and strains due to unhealthy, starving soft tissues.<sup>3</sup>

The use of Body Mass Index (BMI) is an accepted way to determine if a person is within a healthy weight range. Body mass index is calculated by dividing body weight (in kilograms) by height (in meters), squared. To avoid dealing with metric conversions and math, we have put this calculation on our website at [www.working-well.org/bmi.html](http://www.working-well.org/bmi.html).<sup>5</sup>

Underweight: less than 18.5 kg/m<sup>2</sup>

Desirable BMI: 18.5-24.9 kg/m<sup>2</sup>

Overweight: 25-29.9 kg/m<sup>2</sup>

Obese: over 30 kg/m<sup>2</sup>

Once you have determined your BMI, you can see if you should plan weight loss (or gain) in your future.<sup>5</sup> An additional aid in determining health risk is waist circumference, since abdominal fat is closely linked to this measurement. Those who have a BMI of 25-34.9 and a waist circumference of over 40 inches (men), or 35 inches (women), are at increased risk of chronic disease.<sup>5,10</sup>

### **Repetitive Strain Injury Prevention Through Diet**

We begin by looking at the array of foods available in the current cornucopia of the American diet. There are seven characteristics which determine how food is used by the body: 1) glycemic load, 2) fatty acid composition, 3) macronutrient composition, 4) micronutrient density, 5) acid-base balance, 6) sodium-potassium ratio, and 7) fiber content.<sup>1</sup> No matter what diet you decide is right for you, a very helpful breakdown of some common foods by these characteristics is on Barry Sears' website: <http://www.drsears.com/drsearspages/foodblockguide.jsp>

### 1) Glycemic index/glycemic load.

Research indicates that long-term consumption of a diet with high glycemic food is a significant predictor of developing type-2 diabetes.<sup>11</sup> Further research indicates that a low-glycemic diet may help to protect against obesity, colon cancer, and breast cancer.<sup>11</sup>

The glycemic index (GI) of a food tells how quickly the carbohydrate in a food turns to sugar, causing a spike in blood sugar level. A low index (55 or less) indicates a slower rise in blood sugar. A moderate rise is 56-69, and a rapid rise in blood sugar is 70 or more. Several studies have shown that the dietary GI is a good predictor of High Density Lipoprotein (good cholesterol) concentrations, whereas type of fat was not.<sup>11</sup>

A newer, more complete way of looking at this issue is glycemic load (GL). Glycemic load tells how much carbohydrate there is in a typical serving. A food may have a high GI, but if a typical serving does not contain much of that carbohydrate, it will have a low GL. A GL of 20 or more is high, 11-19 is moderate and 10 or less is low. The least confusing list available on the internet is at: <http://www.mendosa.com/gilists.htm>.<sup>12</sup> A very nice search capability is available at: <http://www.glycemicindex.com>.<sup>13</sup> No fats, meats, or salad-type vegetables are included in these tools, since the amount of available carbohydrate is little to none in these foods. Nuts are generally low.<sup>12</sup>

Diets that are primarily based on the glycemic load concept are the Zone and Atkins. Of the two, the Zone is a much healthier diet overall. Although the percentage of fat is higher than other diets, the Zone diet specifies avoidance of saturated fats, trans fats, and Omega-6 fats, while allowing “a dash” of monounsaturated fat (e.g. olive oil and nut oils) and daily Omega-3 fatty acid.<sup>10</sup> Overall, this diet is probably too high in protein and too high in fats to be truly healthy, but it may follow the profile of our ancient ancestors more closely than most other diets.<sup>1</sup> We will discuss this more in the macronutrient subtopic below. Since the Zone diet eliminates almost all grains, corn, potatoes, and other starches, it may, in the long run, shortchange the body on nutrients these foods provide.<sup>14</sup>

Atkins is a high-protein, high-fat diet that ignores a lot of nutritional research and can actually be dangerous if followed long-term.<sup>15</sup> Low carbohydrate diets can raise low density lipoproteins (LDL). High protein diets can accelerate calcium losses, contribute to heart problems, kidney abnormalities, osteoporosis, and other health concerns.<sup>15</sup> The Atkins diet permits a high level of consumption of fat including saturated, trans and Omega-6 fats which is known to be extremely unhealthy.<sup>16, 17</sup> In terms of weight loss, research has found that there is no difference between people who follow a low-fat diet or the Atkins-type diet.<sup>18</sup>

Overall, glycemic content of foods has proven to be a more useful nutritional concept than classification of carbohydrates as simple, complex, sugar, or starch. In general, many low-glycemic foods are less refined than high-glycemic foods and are more difficult to consume and digest. This causes people to take longer to eat them and to feel full longer, in addition to preventing spikes in blood sugar levels.<sup>11</sup>

### 2) Fatty acids

Substantial evidence indicates that the absolute amount of dietary fat is less important than is the type of fat in preventing chronic disease.<sup>1</sup> Saturated fats (e.g., animal and milk fat) and polyunsaturated and trans-fats (e.g., margarine and Crisco) are known to increase blood levels of LDL (bad cholesterol).<sup>1, 19, 20</sup> In addition, a diet of 30% fat, as recommended by the American Heart Association, has been shown repeatedly *not to* reverse heart disease and vascular

blockages.<sup>19</sup> If you have high blood pressure or a family history of cardiovascular problems, reducing your daily fat intake to 20% or less is advisable.<sup>19</sup>

If you are trying to lose weight, it is very important to limit fat intake since it contains 9 calories per gram; about twice the calories of carbohydrate and protein.<sup>19,20</sup> In addition, fat calories are more likely to be stored as body fat. However, if you substitute all of the fat calories for carbohydrate, you will not lose weight!<sup>19,21</sup>

Try to eat and cook with monounsaturated fats (canola and olive oil) and avoid foods that contain trans, polyunsaturated, and saturated fatty acids.<sup>1, 19,20, 22</sup> For higher-heat cooking, use rice bran oil or grapeseed oil which have a higher smoke point.<sup>23, 24</sup> Butter is the most saturated of all animal fats and contains the most cholesterol (almost twice as much as beef fat!).<sup>25</sup> In addition, avoid foods that contain Omega-6 fatty acids and make sure you consume 1.0 to 2.5 g of Omega-3 fatty acids daily in the form of fatty fish (sardines, mackerel, wild-caught salmon) or refined fish oils. Higher dietary intakes of Omega-3 fatty acids are beneficial in preventing many inflammatory and autoimmune diseases.<sup>1</sup> (See our series of articles on Inflammation for more information on Omega-3 fatty acids and their benefits.)

Foods that are high in saturated fatty acids are meats, baked goods, cheese, milk, margarine, and butter. With the exception of meat, none of these were a part of our ancient ancestors' diets. In earlier days, animals tended to be very lean most of the year, they ate grass, and were killed at 5-6 years of age.<sup>1</sup> Today, most animals are grain fed, are obese (30% body fat) with marbling (fat mixed with muscle), and are slaughtered at 14 months. They have much higher saturated fatty acid content with low Omega-3s and high Omega-6s.<sup>1</sup>

Nuts and seeds have more fat than any other macronutrient, but they contain mostly unsaturated fats and no cholesterol.<sup>26</sup> However, because the fat content is so high, it is extremely important to limit your daily intake of nuts to about 1/3 cup (1.5 ounces) or 1 Tablespoon of nut/seed butter. Choose raw, dry-roasted, or baked nuts and seeds, not deep-fried and salted varieties.<sup>26</sup> Read the label to determine the number of nuts in 1.5 ounces.<sup>26</sup> Peanuts are actually legumes, but they can be considered nuts. According to the FDA, research has found that the following types of nuts may reduce the risk of heart disease: almonds, hazelnuts, peanuts, pecans, pine nuts, pistachios, and walnuts.<sup>26</sup> More research on other types of nuts is required to determine their usefulness in reducing the risk of heart disease. There is some research to support the claim that eating this small quantity of nuts facilitates weight loss.<sup>26</sup> Most likely this is because nuts make us feel full for a long time without feeling deprived.<sup>26</sup> A complete listing of all nuts and nutrients is available through the website: <http://www.nuthealth.org/nutrition/nutrient1oz.html>.

The diet most commonly associated with very low fat is the Ornish diet. There are actually two separate diets: one for people who have high blood pressure and/or cardiovascular disease and one for people who want to prevent it.<sup>19</sup> The table at the end of this article shows that intake of calories is skewed very much in favor of carbohydrates, with low protein and very low fat allowances.<sup>19</sup> Ornish has been attacked by many diet gurus, especially Barry Sears (Zone Diet), but he has decades of successful heart cases to support his theories, and he is unique in emphasizing a total change in lifestyle which includes exercise and meditation rather than simply changing diet.<sup>19</sup> This is very effective in reducing risk for RSI.

In the Ornish prevention diet, small amounts of fish and skinless white meat chicken are recommended. The reversal diet is essentially vegan (i.e., no meat, fish, or cheese), although a bit of skim milk and skim milk products are permitted.<sup>19</sup> Nuts are not allowed in either diet. It has been accused of being one of the hardest diets to follow, especially for people who like to eat at

restaurants.<sup>19</sup> However, a great deal can be learned from Ornish's recipes, many of which were developed by famous chefs who use imaginary ways of cutting out fat while packing big flavor into cooking healthy foods. The recipes are very tasty and present complete proteins through the use of beans, lentils, grains, and vegetables. See the list of recommended cookbooks at the end of this article.

We will continue our discussion of the seven characteristics of food and RSI prevention in the next article of this series. The next two pages contain our diet comparison chart and cookbook recommendations.

## DIET COMPARISON CHART

To convert grams to ounces, multiply by 0.0353 or use the calculator at:  
<http://www.metric-conversions.org/weight/grams-to-ounces.htm>

	<b>Carbohydrate</b>	<b>Protein</b>	<b>Fat</b>	<b>Cholesterol</b>
<b>Zone</b>	40% low glycemic foods	30% avg. male: 12 oz/day avg. female: 9 oz/day	30% monounsaturated, Omega-3's	
<b>Ornish (prevention diet)</b>	70-75% complex carbohydrates and starches	15-20% vegetarian, limited skinless chicken, fish	10% monounsaturated, Omega-3s	5 mg/day
<b>American Heart Association</b>	55%	15%	30%	
<b>Dr. Weil</b>	40-50% complex carbs/starches	20-40% (2-4 oz/day) vegetarian, limited skinless chicken, fish, shrimp	20-30% monounsaturated, Omega-3s	
<b>World Health Org<sup>27</sup></b>	45-65%	10-35%	20-35%	
<b>Typical American Diet<sup>19</sup></b>	20-35%	25%	40-50%	400-500 mg/day
<b>Hunter-gathers<sup>1</sup></b>	22-40%	19-35%	25-59%	
<b>OUR RECOMMENDATION for injury prevention</b>	50%	20-30%	20-30% monounsaturated, Omega-3s	

## ***COOKBOOK RECOMMENDATIONS***

### For Vegetarian, Vegan, Low fat, and/or Reduced Protein Cooking

Note: Asian cooking contains little or no dairy of any kind. Avoid vegetarian recipes that are very heavy on dairy products and Indian recipes that include large amounts of ghee and whole milk. Here are a few favorite cookbooks to get you started!!

Secrets from a Healthy Asian Kitchen. Ying Chang Compestine. ©2002. Avery, N.Y. ISBN: 1-58-333127-1.

Hot, Sour, Salty, Sweet: A Culinary Journey Through Southeast Asia. Jeffrey Alford and Naomi Duguid. ©2000. Artisan, N.Y. ISBN: 1-57965-114-3.

Dr. Dean Ornish's Program for Reversing Heart Disease. Ornish, D., M.D. ©1996. Ivy Books, New York. ISBN: 0-8041-1038-7

Everyday Cooking with Dr. Dean Ornish. Ornish, D., M.D. ©1996. HarperCollins Publishers, Inc. N.Y. ISBN: 0-06-017314-9

Eat More, Weight Less. Ornish, D., M.D. ©2001. HarperCollins Publishers, Inc., N.Y. ISBN: 0-06-095957-6

Classic Indian Vegetarian and Grain Cooking. Julie Sahni. ©1985. William Morrow and Co., Inc. N.Y. ISBN: 0-688-04995-8.

Mediterranean Grains and Greens. Paula Wolfert. ©1998. HarperCollins Publishers, Inc. N.Y. ISBN: 0-06-017251-7.

The Voluptuous Vegan. Myra Kornfeld and George Minot. ©2000. Clarkson Potter Publishers, N.Y. ISBN: 0-609-80489-8.

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