

Nutrition and Repetitive Strain Injuries

Part II: Injury Prevention

By Tamara Mitchell
Edited by Sally Longyear



Before we continue the discussion of how nutrition and diet affects your risk of developing repetitive strain injuries (RSI) and other related disorders, we wanted to summarize our last article with the following story.

THE CREATION STORY

In the beginning, God created the heavens and the earth and populated the earth with broccoli, cauliflower, spinach, and green, yellow and red vegetables of all kinds so Man and Woman would live long and healthy lives.

Then, using God's great gifts, Satan created Ben and Jerry's Ice Cream and Krispy Creme donuts. He asked, "You want chocolate with that?" Man said, "Yes!" and Woman said, "as long as you're at it, add some sprinkles." And they gained 10 pounds. Satan smiled.

Then God created healthful yogurt so that Woman might keep the figure that Man found so fair. And Satan brought forth white flour from the wheat and sugar from the cane and combined them. Woman went from size 6 to size 14.

So God said, "Try my fresh green salad." And Satan presented Thousand-Island dressing, buttery croutons and garlic toast on the side. Man and Woman unfastened their belts following the repast.

God then said, "I have sent you heart healthy vegetables and olive oil in which to cook them." Satan brought forth deep fried fish and chicken-fried steak so big they needed their own platter. Man gained more weight and his cholesterol went through the roof.

God created a light, fluffy white cake, named it "Angel Food Cake," and said, "It is good." Satan then created chocolate cake and named it "Devil's Food."

God brought forth running shoes so that His children might lose those extra pounds. Satan gave cable TV with a remote control so Man would not have to toil changing the channels. Man and Woman laughed and cried before the flickering blue light and gained pounds.

Then God brought forth the potato, naturally low in fat and brimming with nutrition. Satan peeled off the healthful skin and sliced the starchy center into chips and deep-fried them. God then gave lean beef so that Man might consume fewer calories and still satisfy his appetite. Satan created McDonalds and its 99-cent double cheeseburger. Then he said, "You want fries with that?" And Man replied, "Yes! And super size them!" Satan said, "It is good."^{Source unknown}

Seven characteristics of food

In the previous article you learned how glycemic foods and fatty acids affect your overall health. We continue the discussion of the characteristics that determine how food is used by your body.

3) Macronutrient composition

Macronutrients are the big three: fats, carbohydrates, and proteins. This is where most of the confusion originates when trying to determine what is healthy. It is amazing to see how the diets differ regarding the recommended limits of these nutrients. In addition, due to a strong influence from industry, the USDA food pyramid recommends an over-abundance of milk and beef products.¹

Fats

The common factor is that everyone should cut back on fats as much as possible, and most importantly, we should try to eliminate all sources of saturated fats, trans-fats, and limit Omega-6s. This requires limiting foods from animal sources and fatty foods like pastries, salad dressings, mayonnaise, chips and deep-fried foods. Be aware of the fat content of every bite you consume and learn to substitute healthy fats or use no fat at all when you cook! A good goal is to keep dietary fat to 20%. More than 30% is dangerous, especially if you have cardiovascular disease or high blood pressure in your genes.²

Carbohydrates

Almost all diets recommend the consumption of complex carbohydrates (e.g., whole grains) while minimizing simple carbohydrates (e.g., sugar, honey, corn syrup).^{2,3,4,5} The new food pyramid allows people to eat half of their grains as refined grain products which is truly *not* a good goal!¹ *The goal should be to eat all whole grains* which contain a wide array of nutrients and roughage. Eating white bread and refined grains should be an exception, not a part of everyday meals. This doesn't mean you can never enjoy a piece of sourdough French bread or a serving of pasta again, but simple carbohydrates should be an occasional treat, not an everyday staple.

Eating carbohydrates is necessary! The body changes carbohydrates to glucose, which is the main source of energy for the body.^{3,6} Glucose that is not needed immediately is stored as glycogen in the liver and muscles for later use.^{3,6} Active people and athletes require more carbohydrates than sedentary people, but a daily supply is required to maintain energy levels and glycogen supplies.^{3,6} Chronic glycogen depletion may lead to decreases in strength and possible soft-tissue damage, which increases the risk for RSI.⁷

Protein

Proteins are needed to build muscle, bone, and skin, to repair damaged tissues and to act as neurotransmitters.^{3,8} Proteins are complex arrangements of molecules called long-chain amino acids. There are 20 amino acids that can be arranged in almost endless arrangements to compose different body proteins. The body can manufacture all but eight of the amino acids. Therefore, these eight essential amino acids are required in the diet.^{3,2} They can be obtained by eating meat or fish, and plant sources such as beans, grains, lentils, and soy products. None of the vegetable sources contain all of the essential amino acids, but if you eat a variety of beans, grains, lentils, and soy products, your body combines them to create all eight essential amino acids.^{2,3}

The advantage of getting your proteins from vegetable sources is that there is little (or no) fat, and they are less likely to contain chemicals, antibiotics, growth hormones or mercury that is present

in our meat and fish sources today. Most of the vegetable sources are both high in protein and in carbohydrate, so they are often listed in both categories, such as in the new USDA food pyramid.¹

There are major health problems associated with eating too much protein. Three of them are:

- Calcium leaching from the bones. Excess protein prevents reabsorption of calcium by the bones.^{3,9} This appears to be a result of the protein in red meat, eggs, fish, milk and poultry, but does not occur with plant-based protein.¹⁰ Loss of calcium from the bones is especially important for women prone to osteoporosis.
- Fatigue. Excess protein requires the body to break down the complex amino acids to produce energy, which can produce feelings of fatigue.³
- Dehydration. The by-product of the breaking down process releases nitrogen wastes that the body must get rid of, taxing the liver and kidneys, and requiring large amounts of water to flush the urea from the body.³ If insufficient water is consumed, the resulting weight loss from high-protein diets is merely a temporary dehydration of body tissues in the attempt to flush urea out.³ Dehydration is another enemy of healthy tissues, especially the fascia, the tissue that surrounds muscles and allows them to slide and glide easily. This sets the stage for serious RSI.¹¹

Therefore, it is important to limit protein intake from 2 to 6 oz. per day, especially for injury prevention.^{2,3} To determine the number of grams of protein you should consume daily, multiply your weight in pounds by 0.36 (eg. 160 lbs. x 0.36 = 57.6 g).⁹ To calculate the number of ounces, multiply by 0.035 (eg. 57.6 x 0.035 = 2.016 oz.). Considering that there are 16 oz in a pound, the ideal daily protein allowance is probably about *half of what most people consume in one meal!* Athletes can eat about twice this amount of protein.¹² The new food pyramid recommends about double this amount of protein for the average person.¹

One essential amino acid in particular, leucine, has drawn recent attention because one of its metabolites, hydroxymethyl butyrate (HMB), appears to reduce the occurrence of overuse injuries in athletes.¹³ HMB is naturally produced by the body when muscle tissue is broken down during heavy use. When the body can't quite keep up with the healing process of small-scale muscle, tendon, and ligament irritations, these daily irritations eventually become injuries.¹³ In studies with athletes, HMB supplementation appears to prevent muscle breakdown during very strenuous training.¹³ Studies to date are small and are not focused on non-athletes. We do not yet recommend HMB supplements to avoid Repetitive Strain Injuries until further research is done.^{13,14}

We need to discuss the fallacies that milk is a good source of protein and is a weight-loss aid. The new USDA pyramid recommends a whopping amount of milk and milk products in the diet (3 cups daily for adults). This recommendation is simply not founded by research and fact:

- Humans are the only mammals that consume milk beyond the time of infancy, and it's particularly odd that we consume the milk of another species.¹⁵ Only about 25% of the world's adult population can easily digest milk, primarily because adults usually stop producing lactase, the enzyme needed to break down milk sugar.¹⁵
- Recombinant bovine growth hormone (rBGH or rBST, or Prosilac) is injected into about 1/3 of all cows at conventional dairies. Milk produced by these cows may pose an increased risk of cancer in humans due to elevated levels of insulin-like growth factor-1

(IGF-1).¹⁶ Some research has shown that IGF-1 acts on the intestinal wall lining and may promote the growth of existing cancers, such as colon cancer.¹⁶

- Pasteurization kills many beneficial bacteria and active enzymes in milk that aid in digestion and absorption of nutrients, and reduces vitamins B1, B6, B12, and C.¹⁶
- When cows graze on grass, their milk contains almost the ideal balance of Omega-6 to Omega-3 fatty acids and has 5 times more conjugated linoleic acid (CLA), a cancer-fighting fat, than grain-fed cows. Grain feeding alters the balance of Omega-6 and -3 fatty acids. Commercially raised cows also are fed blood and bone meal results in a more detrimental fatty acid composition and almost no CLA in the milk.¹⁶
- Allergies, eczema, asthma, chronic bronchitis, autoimmune diseases, prostate cancer and acne all appear to be linked to consumption of dairy products according to Walter Willett, M.D., chairman of the nutrition department at Harvard School of Public Health.¹⁵
- Milk generally contains a lot of fat. Even 2% low-fat milk contains 38% of its calories in fat...not a low fat food at all!²
- The claim that milk aids in weight loss is being challenged in two lawsuits against the dairy industry regarding false advertising. Research shows that milk has either no effect on weight loss or may actually result in weight gain.^{15,16}

4) Micronutrient density

Vitamins and minerals are micronutrients required to maintain health. It is estimated that 36.2% of the calories consumed in the typical American diet is comprised of refined sugars, foods containing refined sugars, refined vegetable oils, and foods containing refined oils.⁵ These foods are essentially devoid of vitamins and minerals.⁵ Refined sugars, grains, vegetable oils and dairy products actually promote the development of vitamin deficiency and the associated chronic and infectious diseases.⁵

At least half of the U.S. population fails to meet the recommended dietary allowance for vitamins B-6, A, magnesium, calcium, and zinc.⁵ 33% of the population does not meet the RDA for folate.⁵

If we look again at the model of hunter-gatherers, wild plant foods and animals were a large part of their diet.⁵ These wild plants and animals contained a much higher micronutrient concentration than our domesticated plants and animals of today.⁵ Grains and milk contain some of the lowest micronutrient density in the diet. The emphasis on these in our diets tends to displace more nutrient-rich foods such as fruit, vegetables, lean meats, and seafood.⁵

Micronutrients such as calcium and iron are known to be important in injury prevention.

- Calcium is essential for healthy bone density; calcium deficiency may increase the risk of stress fractures.⁷ This is particularly important to athletes.
 - Milk is not an especially good source of calcium since milk contains protein, which may encourage calcium loss, just as meat does.¹⁰ Most of the world's population consumes few or no dairy products and has much lower fracture rates than the U.S.¹⁵ Good nondairy sources of calcium are kale, collards, spinach, broccoli, beans, sardines and canned salmon with bones, and calcium-fortified soy milk, orange juice, tofu, and cereals.¹⁵

- Several other factors such as too little physical activity (especially weight-bearing exercise), too little Vitamin D and K, smoking, and consumption of too much protein are as important (or more important) than the absolute amount of calcium in the diet.^{15, 16} In fact, if you are active, don't smoke, eat a vegan diet, and limit salt intake, 400-500 mg of calcium daily is recommended by the World Health Organization (WHO).¹⁰ The WHO recommended calcium intake for adult males and females with average eating habits is 1,000 to 1,200 mg daily.¹⁷
- Iron is essential for healthy muscles and soft tissues.
 - Low blood-iron levels reduce the oxidative potential in the muscles, creating a higher potential for muscle injuries.^{13,7} Low blood-iron may also decrease the rate of muscle and connective tissue repair which speeds the progression from minor to major injuries.¹³
 - Too much iron, however, may be linked to an increased risk of heart attack. It can inhibit the absorption of zinc, another important mineral.¹³ In addition, iron interferes with the body's natural antibiotic system. It turns out that when you have an infection, your body temperature rises and your blood-iron level drops.¹³ Microorganisms are unable to grow when they are confronted with higher temperatures and reduced iron levels, so taking too much iron when you have an infection may actually be feeding the infection!¹³
 - You can get enough iron through diet, cooking with cast-iron pans (which flakes off in minute quantities into the food), and by consuming Vitamin C with meals, which enhances iron absorption.¹³

We'll talk a lot more about micronutrients in Part III where we address treatment and healing.

5) Acid-base balance

After digestion, absorption, and metabolism, nearly all foods release either acid or bicarbonate (base) into the body.⁵ It is known that a net base producing diet has many benefits including prevention and treatment of osteoporosis, age-related muscle wasting, calcium kidney stones, hypertension, exercise-induced asthma, and the progression of age and disease related chronic kidney failure.⁵

Fish, meat, poultry, eggs, shellfish, cheese, milk, and cereal grains are net acid producing. Fresh fruit, vegetables, tubers, roots and nuts are net base producing. Legumes yield near-zero mean acid values. Saturated fats and refined sugars contribute to neither the acid nor the base balance. Salt is net acid producing because of the chloride ion.⁵ Throughout most of human history, the diet was net-base producing due to an absence of cereals and energy-dense, nutrient-poor foods.⁵

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In general, replacing grains, cereal products, meat proteins, fats and oils with fruits and vegetables in the diet will result in a healthier acid balance in the body.^{5, 18}

6) Sodium-potassium ratio

Diets low in potassium and high in sodium may be a source of many chronic illnesses including high blood pressure, stroke, kidney stones, osteoporosis, gastrointestinal tract cancers, asthma, exercise-induced asthma, insomnia, air sickness, and high-altitude sickness.⁵

The average sodium content of the typical U.S. diet is a lot higher than its potassium content.⁵ Historically, our diets represent an estimated 400% decline in potassium and a 400% increase in sodium from that of our ancestors.⁵

Manufactured salt (sodium chloride) is 90% of the sodium in our diet.⁵ Vegetable oils and refined sugars are essentially devoid of potassium and constitute 36% of our total calorie intake.⁵ Potassium concentrations in vegetable and fruits are many times higher than whole grains and milk products.⁵

7) Fiber content

The fiber content of the average American is much lower than recommended.⁵ Refined sugars, vegetable oils, dairy products, and alcohol contain little to no fiber, and constitute an average of 48.2% of the calorie consumption in the typical diet.⁵

Refined grains contain 400% less fiber than whole grains.⁵ Fresh fruit contains about twice the amount of fiber in whole grains. Non-starchy vegetables contain almost 8 times the amount of fiber in whole grains, calorie-for-calorie.⁵ Soluble fibers found in fruits and vegetables help reduce total and Low Density Lipoprotein (LDL) cholesterol levels, may reduce appetite and help control caloric intake.⁵

Diets low in dietary fiber appear to be related to constipation, appendicitis, hemorrhoids, deep vein thrombosis, varicose veins, diverticulitis, hiatal hernia, and acid reflux.⁵

The Bottom Line

Our diets have changed a lot since the days of our hunter-gatherer ancestors, and with that change, we have become a society afflicted with RSI, chronic disease, and obesity. Displacement of fruits and vegetables with too much unhealthy fat, refined grains and sugars contributes to these problems.

One simple diet is not right for everyone since we all have different genetic predispositions, digestive systems, lifestyles, and metabolisms. But, we can all be healthier if we eat a few vegan meals a week, learn to enjoy fresh fruits and vegetables with no fatty adornments, and perhaps even plant an organic garden. Please refer to the list of cookbook recommendations in our previous article on Nutrition: Prevention to get you started eating a healthier diet.

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