

Chapter 29

Nutrition and Healthy Aging

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Natural Grocers by Vitamin Cottage

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These are your golden years. They are years to celebrate your life and nourish your mind and body with the nutrients they need to thrive. No matter what your age, there are steps you can take to revitalize and protect your mind and body, giving yourself the gift of optimal health. Once you understand that, at every stage of life, the foundation for good health is dependant on supporting the body with an optimal amount of nutrients, you can build the foundation to support many more years of an active and vibrant life.

Nutrients include vitamins, minerals, phytonutrients, fatty acids, and amino acids, and our bodies need them all to function properly. Both macro (protein, fats, and carbohydrates) and micro (vitamins, minerals, phytonutrients, etc.) nutrients are the necessary components that drive all metabolic and biochemical reactions in the body. The right balance of these nutrients allows the body's systems — nervous, digestive, endocrine, cardiovascular, and immune systems — to function at optimal levels. Vitamins, minerals, phytonutrients, amino acids, and fatty acids help the body heal and repair itself. The nutrients you consume are fundamentally the building blocks — the “bricks and mortar” — of your body. Good nutrition provides a solid foundation for health. In contrast, poor eating habits and nutrient deficiencies lead to a shaky foundation, at best. The idea of nourishing the body with a nutrient-dense diet for optimal health isn't a new concept — Hippocrates, the father of Western medicine, said that food is our best medicine. What has changed is our knowledge of the specific ways that food and individual nutrients affect the activity of genes and, consequently, the health of the whole body.

It is important to take in adequate nutrition through whole, healthy food choices. But in today's world, depleted soils, heavy use of herbicides and pesticides, and the prevalence of overly processed foods mean that much of the nutrient value in our food has diminished, making it difficult to obtain all the nutrients we need from even the healthiest food choices. In addition, as we age, our bodies simply do not absorb and utilize nutrients as efficiently; therefore, it may become necessary to add dietary supplements to obtain optimal amounts of the nutrients that the body needs to properly function. The information presented in this chapter will discuss the various factors associated with aging that influence one's ability to absorb, utilize, and produce adequate nutrients; the importance of a nutrient-rich, natural foods diet; and dietary supplements to support optimal health specific to an aging population.

29-1. Prevalence of Nutrient Deficiencies in the Senior Population

It should be understood that it is difficult to determine the extent of nutrient deficiencies among seniors. This is partly because there are few studies that focus on this issue. It is also due to the fact that the very basis upon which any data is collected uses the Recommended Dietary Allowances (RDAs) for vitamins and minerals as the starting point. While the RDAs specify the levels of nutrients essential for maintaining normal body functioning for a healthy population, they fail to address concerns about the diet and health for seniors. It is unrealistic to assume that a healthy 60-year-old person and an 85-year-old, homebound individual have similar nutritional needs, or even that their nutritional needs are the same as a healthy non-senior individual. Older bodies simply need higher levels of nutrients to perform efficiently the same biochemical reactions that a younger body can perform with lower levels of the same nutrients. Additionally, the RDAs do not cover nutrient needs for special conditions or diseases, or the use of medication, all of which can have a profound impact on an individual's nutrient requirements.¹

¹ See www.ers.usda.gov/publications/foodreview/jan1997/jan97g.pdf.

From the studies that have been conducted on the nutrient deficiencies most common to seniors, it has been found that protein, calcium, magnesium, vitamin B-6, vitamin B-12, vitamin D, and zinc are most frequently deficient. Protein supplies the body with what it needs to make every body structure, from bones to cartilage, to enzymes and neurotransmitters. Calcium is necessary for making strong bones and is necessary for nerve cells in the brain to communicate. Magnesium is involved in more than 300 essential metabolic reactions, including the production of serotonin, a brain chemical involved in mood stability and reducing feelings of anxiety and depression. Vitamin B-6 is necessary for the function of approximately 100 enzymes that act as catalysts in essential chemical reactions, including the production of serotonin. Vitamin B-12 plays an important role in brain function and energy production. Vitamin D plays a role in regulating gene expression and supports the proper functioning of every tissue, organ, and system in the body. Zinc plays an important role in the structure of proteins and cell membranes; in fact, a finger-like structure, known as “zinc finger motif,” stabilizes the structure of our DNA. In addition to often having the above deficiencies, frail seniors (those requiring assistance to carry out daily activities) are more likely to be deficient in the B vitamins (including thiamine and riboflavin), vitamin C, and all of the minerals. These nutrients are necessary for the body to carry out day-to-day functions such as energy production, production of neurotransmitters, and making bone tissue. Low-income seniors and those older than 85 years are at an even greater risk for all of these deficiencies.²

29-2. The Significance of Nutrient Deficiencies

Undernourishment and nutrient deficiencies can contribute to or exacerbate chronic and acute diseases, hasten the development of degenerative diseases associated with aging, and delay recovery from illnesses.³ All life depends on a steady supply of high-quality nutrients, and humans are no exception to this rule. Our genes contain the biological instructions for life and influence the risk of many diseases. For example, some genes are activated to make proteins essential for fighting diseases like cancer, while others are activated to regulate blood pressure. For genes to remain healthy and functional — to be turned on and off when they are supposed to be — they must be fed the proper nutrients. Your genes are always responding, either negatively or positively, to what you eat, to your emotions, your stresses, your experiences, and to the nutritional microenvironment within each of your body’s cells. If you maintain a less-than-healthy genetic environment, such as by smoking or not getting enough nutrients, you will age faster and be more susceptible to disease.

² *Id.*

³ *Id.*

29-3. Factors that Contribute to Nutrient Deficiencies in Seniors

One of the reasons undernourishment is prevalent among seniors is that, as stated above in section 29-2, older bodies simply need higher levels of nutrients to efficiently perform the same biochemical reactions that a younger body can perform with lower levels of the same nutrients. Additionally, as the body ages, it becomes less effective at making certain nutrients, including CoQ10, melatonin, carnitine, N-acetyl-cysteine, lipoic acid, phosphatidyl-choline, EPA, DHA, and GLA. Reduced production of these nutrients can cause numerous problems, and their importance in promoting optimal functioning cannot be understated. You will see in the sections below that these nutrients are involved in the healthy functioning of numerous systems, organs, and structures of the body. Other reasons for nutritional deficiencies among seniors may include poor diets, inadequate food intake, side effects from medications, depression, and reduced absorption of nutrients due to decreased production of digestive enzymes and hydrochloric acid.

As the body ages, one of the physical changes that takes place is a decline in the production of hydrochloric acid and pancreatic enzymes, both of which play important roles in digestion. Enzymes and acids in the digestive system break down, or digest, large molecules of food into small molecules that can be passed from the small intestine into the bloodstream, where the nutrients are then carried to other parts of the body for use or storage. These molecules of food *must* be broken down before the nutrients can be utilized by the body. In other words, if the food isn't digested, the nutrients are not absorbed. A reduction in hydrochloric acid and enzymes can make it hard for the body to digest certain foods, thus leading to a problem absorbing the nutrients in these foods, especially minerals, vitamin B-12, and protein.

Along with these biological changes that influence how efficiently nutrients are absorbed and produced in the body, there are other factors that may lead to undernourishment in seniors. There is often a lack of desire or ability to shop for and prepare healthy food, leading to a diet consisting largely of convenience foods — microwave meals and boxed meals, for example. These pre-made meals are often highly processed and devoid of nutrient density, which not only deprives seniors of essential nutrients but also adds undesirable components like artificial additives and preservatives, trans fats, MSG, and sodium to the diet.

Inadequate food intake because of a lack of appetite can also affect nutrient levels. There can be a number of underlying causes for a lack of appetite. A zinc insufficiency or deficiency, common among seniors, can lead to reduced taste bud functioning, causing food to just not taste as good as it used to. Side effects from some medications may cause a decrease in appetite, changes in sense of taste, and stomach upset, all of which can lead to a decrease in food intake. In addition, medications can reduce the absorption of nutrients in the gastrointestinal tract, and may block the action or formation of nutrients at the cellular level. This is important to remember, considering that more than half of those 65 years and older take three or more prescriptions daily.⁴

⁴ H. Cass, *Supplement Your Prescription* (Basic Health Publications, Inc., 2007).

Depression is also common among seniors, leading to both inadequate food intake and poor food choices. Often, depression is driven by poor nutrient intake in the first place, which then contributes to poor food choices and low nutrient intake, which exacerbates the feelings of depression; this leads to a cycle of continued poor nutrient intake, driving feelings of depression, driving poor food choices that further reduce nutrient intake.

Finally, chronic diseases can have a wide range of negative effects on the nutritional status of the senior population. Statistics show that approximately 80 percent of those 65 and older are afflicted with one or more chronic diseases such as heart disorders, arthritis, diabetes, bone diseases, and diseases that affect the respiratory and digestive systems. Chronic disease can affect digestion, absorption, and utilization of nutrients; they may interfere with nutrient intake; and they may hinder the absorption of specific nutrients.⁵

29-4. Vitamin D Insufficiency: A Silent and Deadly Epidemic

It is pretty well established by research that insufficient levels of vitamin D increase the risk of developing multiple diseases, including multiple sclerosis, rheumatoid arthritis, hypertension, depression, heart attacks, congestive heart failure, insulin resistance, Type I and II diabetes, seasonal affective disorder, musculoskeletal pain, back pain, breast cancer, colon cancer, prostate cancer, pancreatic cancer, ovarian cancer, osteoporosis, tuberculosis, and autoimmune disorders.⁶ It is also pretty well established by research that adequate levels of vitamin D reduce the risk of developing these same diseases.⁷

Vitamin D is unique in the nutrient world in that it is the only vitamin made in the human body from exposure to sunlight, specifically from UVB rays. Our ancestors lived naked in the sun — hunting, gathering, fishing, and farming — for several hundred thousand years, producing up to 20,000 IU of vitamin D daily as a result. Our bodies developed based on a need for high levels of vitamin D; imagine that humans are much like plants that depend on the sun for growth and health.

Vitamin D has two major pathways it follows in the body. In the first pathway, it ensures that calcium is deposited in the bones rather than in soft tissues, such as the arteries. In the second pathway, it regulates gene expression, the process in which information from a gene is transformed into biochemicals the body needs to function. Vitamin D's function in regulating calcium is so important that it takes priority; if your tank is low, any vitamin D you have will be used for this purpose. It is only when there are adequate levels of vitamin D that it can be carried to receptor sites in the body, where it is used to regulate gene expression. Vitamin D influences more than 1,000 genes in the human body; furthermore, every tissue and organ in the body has vitamin D receptors. These receptors, in turn, regulate gene expression in these tissues and organs, making sure that genes are turned on or off, as needed.

⁵ See www.ers.usda.gov/publications/foodreview/jan1997/jan97g.pdf.

⁶ See www.denvernaturopathic.com/vitDSummary.html.

⁷ See www.denvernaturopathic.com/news/Dupdateaug05.html.

In order to positively regulate gene expression, it is absolutely essential that your vitamin D tank be kept full. But that's the problem: most of us have sub-optimal levels of this important vitamin. A study published in the *American Journal of Clinical Nutrition* found that as many as 60 percent of Caucasians and more than 90 percent of African Americans had insufficient levels of vitamin D. In a study conducted in Colorado (a state that sees more than 300 days of sunshine a year), it was found that 74 percent of seniors tested had sub-optimal levels of vitamin D. In another study of senior patients, the average level of vitamin D was 18 ng/ml (nanograms per milliliter), when normal is between 50 and 80. Almost 60 percent of patients had levels under 20 ng/ml. Those with the lowest vitamin D levels had the most depression and the worst performance on objective tests for dementia and cognitive function.⁸

For many years, it was assumed that everyone received more than sufficient amounts of vitamin D from sun exposure; therefore, everyone was routinely cautioned to consume no more than 400 IUs of vitamin D daily. But when was the last time you spent significant time in the sun, without slathering on sunscreen? Sunscreen blocks UVB rays from making vitamin D in the skin. Furthermore, depending on where you live, you may not be exposed to UVB rays during certain months of the year. If you live north of about 37 degrees latitude — roughly a line from Richmond, Virginia to San Francisco — you will not be exposed to sufficient amounts of UVB light to make vitamin D from at least November through February. In latitudes around 40 degrees (around Boston), there is insufficient UVB radiation available for vitamin D synthesis from November to March. Additionally, the darker your skin and the older you are, the less vitamin D you will produce from sun exposure, even at those times of the year when we receive the most UVB rays.

Vitamin D may be particularly important for seniors. Several studies have shown that supplementing with the vitamin improves muscle strength in deficient senior populations. There are more than 11,000 deaths each year as a result of falls, most of them in people 75 years and older who suffer hip fractures.⁹ By improving and maintaining muscle strength, vitamin D helps prevent falls, especially among seniors. A study published in the *Journal of the American Medical Association* indicated that 800 IU of vitamin D daily reduced by 22 percent the incidence of falls in people aged 65 and older.¹⁰

So what is an adequate level of vitamin D? Many alternative health care practitioners now routinely recommend between 2000 and 5000 IUs daily, in the form of vitamin D-3, which is the form our bodies naturally make and is the most bio-available. This is the amount necessary for most people to maintain a full tank of vitamin D to positively affect gene expression. A simple blood test, the 25-hydroxy-vitamin D test, can determine if you are deficient in this important vitamin. It is difficult to improve or maintain health without first correcting a vitamin D deficiency. Vitamin D is not a miracle cure; however, it is necessary for the functioning of so many systems, organs, tissues, and genes, that improving health becomes much more difficult if you are deficient in this particular nutrient.

⁸ C.H. Wilkins, *et al.*, "Vitamin D Deficiency Is Associated with Low Mood and Worse Cognitive Performance in Older Adults." 14 *Am. J. Geriatr. Psychiatry* 12, 1032-40 (2006).

⁹ See www.denvernaturopathic.com/news/vitDfalling.html.

¹⁰ Heike A. Bischoff-Ferrari, *et al.*, "Effect of Vitamin D on Falls: A Meta-Analysis." 291 *JAMA* 16, 1999-2006 (April 28, 2004).

29-5. The Importance of a Nutrient-Dense, Natural Foods Diet

The health of the body depends directly on the quality of what we eat. It is important to understand that certain foods are pro-inflammatory, while others are anti-inflammatory. The modern Western diet is full of processed foods, sugar, fried foods, and corn-fed meat. These foods contain large amounts of pro-inflammatory nutrients, meaning that the consumption of them tends to promote inflammation in the body. Chronic, low-level inflammation is at the root of many chronic, degenerative diseases such as arthritis, heart disease, Alzheimer's disease, and cancer — diseases that are prevalent in Western society. The connection between diet and disease is significant and cannot be ignored.

Natural foods are foods that are as close to the way they occur in nature as possible. This means whole, unrefined foods such as vegetables, fruits, wild-caught fish, grass-fed meats, naturally raised poultry, eggs, dairy, nuts, seeds, unrefined oils, legumes, and whole grains. These foods contain nutrients that are anti-inflammatory. Ideally, these foods should come from organically fed animals and organically grown plants. A natural-foods diet minimizes processed and refined foods — particularly sugar, high-fructose corn syrup, trans fats, and white flour — that are often found in bags, boxes, and cans, and promote inflammation.

29-6. The Components of a Natural Foods Diet

When planning a meal, there are three major groups that should always be included: high-quality proteins, healthy fats, and fruits and vegetables. A quality protein should always form the foundation of every meal, and may include grass-fed beef, wild-caught fish, or eggs. Start with a quality protein and build the rest of the meal around it, adding fruits and vegetables, and using healthy fats when cooking. Try to add as many fruits and vegetables as possible — try for 10 servings per day and you will be more likely to reach the five servings that are recommended. Include two servings per meal, and it will be easy to reach this goal. Corn does not count as a fruit or vegetable; it is a grain. Also limit your intake of potatoes, keeping in mind that potato chips and fries do not count as a healthy vegetable. Potatoes contain a lot of starch and can be pro-inflammatory for those who have blood sugar control issues.

Protein

Consuming quality protein with every meal is one of the keys to optimal health at any age. Protein is composed of amino acids, which the body uses to build all of the structures in it, including, but not limited to, bones, joints, arteries, muscles (including the heart), and the brain. In addition, the enzymes that drive every biochemical reaction in the body are protein based and require amino acids to build and repair cells, and to make blood proteins, antibodies, neurotransmitters, and hormones. If the body doesn't get sufficient protein, bodily functions start to fall apart. A quality protein is one that supplies the essential amino acids the body needs to function.

Whey protein and eggs are considered the most complete proteins for humans, meaning they contain the perfect ratio of amino acids that our bodies need to function optimally. Other healthy sources of concentrated protein include meats from naturally raised, grass-fed animals; wild-caught fish; naturally raised poultry; and cottage cheese. In addition to being good sources of protein, grass-fed and naturally raised meats have less saturated fat and higher levels of anti-inflammatory omega-3 fats. Less concentrated sources include other dairy products (fresh or aged cheese, milk, yogurt, and kefir), and nuts and seeds. Legumes (beans and lentils) and grains are the least quality proteins and generally have fewer nutrients than the other types of proteins. Grains and legumes must be combined to get a complete, or quality, protein.

Fats

Unfortunately, because of popular media and government campaigns, most people are afraid of fats. Products touting labels reading “low-fat” or “no-fat” are ubiquitous on the supermarket shelves, and the phrase “saturated fat” has become verboten. But before you eliminate fat from your diet, it is important to understand how important fats are for optimal health and wellness.

Fats are critical for good health. They are the primary component of every cell membrane in the body and therefore are vital to both cellular and overall body function. They are also a major energy source for the body. Cells receive 50 to 70 percent of their energy from fatty acids released by fat tissue.¹¹ Dietary fat also provides the fat-soluble vitamins A, D, K, and E.

There are three types of fats in our diet: monounsaturated, polyunsaturated, and saturated. The body needs all three types of fats, including saturated, to function properly. In addition, all dietary fats contain a combination of saturated, monounsaturated, and polyunsaturated fats. A fat is classified as belonging to one of these categories based on which type of fat is in the highest ratio in the food. Thus, while meats and dairy products are classified as containing saturated fats, they also contain monounsaturated and polyunsaturated fats. The ratio of these three types is dependant on how the animal was raised and what it was fed. For example, the meat from a conventionally raised animal fed a diet of corn, soy, and animal by-products will contain a higher ratio of saturated fat and the pro-inflammatory omega-6 fatty acids. On the other hand, meat from a naturally raised animal, fed a diet that is close to its natural diet (grass for beef, and insects for poultry) and free of by-products, will be lower in saturated fats and have a higher ratio of monounsaturated and polyunsaturated fats, including higher levels of anti-inflammatory omega-3 fats. Coconut and palm oils are also classified as saturated fats. Monounsaturated fats include olive oil, canola oil, and high-oleic safflower oil. Avocados and many nuts, including peanuts, almonds, Brazil nuts, pecans, pistachios, filberts, macadamias, and cashews, are also classified as monounsaturated fats. Unrefined, monounsaturated fats are anti-inflammatory. Polyunsaturated fats are found in vegetable oils (corn and soybean), walnuts, pumpkin seeds, hemp seeds, chia seeds, and flax seeds. Remember, although one type of fat is dominant in each of these foods, they all contain a combination of saturated and unsaturated fats.

¹¹ G. Taubes, *Good Calories, Bad Calories*, 386 (Alfred A. Knopf, 2007).

In addition, certain polyunsaturated fats supply what are called the essential fatty acids (EFAs). The body requires EFAs to function optimally, but cannot make them so they must be acquired through food or supplements. Strictly speaking, there are two EFAs: linoleic acid (omega-6) and alpha-linolenic acid (omega-3). In general, linoleic acid (omega-6) drives inflammation, while alpha-linolenic acid (omega-3) is anti-inflammatory.

In optimal health, the body is able to convert alpha-linolenic acid into EPA and DHA (the anti-inflammatory omega-3s found in fish oil), which are important in everything from brain and heart health, to healthy immune function. As the body ages, though, it just isn't able to make that conversion as effectively. Consequently, it is important to supplement with fish oil or cod liver oil to boost levels of these critical, yet often lacking, anti-inflammatory fatty acids.

The ideal dietary ratio of omega-6 and omega-3 fatty acids is between 1:1 and 2:1. But the ratio in the American diet is estimated to range between 15:1 and 30:1, due to the high use of vegetable oils, processed foods, and consumption of meats that are raised on corn and soy. Most Americans over-eat omega-6s and under-eat omega-3s, a situation that leads to inflammation in the body, which is believed to be an underlying cause of most chronic diseases. It is best to minimize consumption of plant oils such as corn, soybean, and safflower oil, processed foods, and grain-fed meat, all of which are high in omega-6s. Eat more foods containing omega-3 fatty acids, such as wild coldwater fish (salmon, tuna, sardines, and herring), grass-fed meats (which have a similar ratio of fats as healthy fish and game meat), and whole nuts and seeds. Healthy fats to cook with include extra-virgin olive oil, coconut oil, palm oil, organic butter, and ghee (clarified butter). Healthy fats are also found in avocados, nuts and seeds (preferably organic), eggs from naturally or organically raised chickens, flaxseed meal, and organic dairy products (yogurt, cheese, and kefir).

The one fat that should always be avoided is trans fat. When choosing dietary fats, it is particularly important to avoid hydrogenated and partially hydrogenated oils, which contain trans fats. These fats are pro-inflammatory and have been a key factor in America's deteriorating health. They are associated with a host of chronic, degenerative diseases such as cancer, heart disease, diabetes, obesity, immune system dysfunction, birth defects, sterility, and problems with bones and tendons.¹² In contrast, eating healthy animal fats has not been correlated with any of these problems. Hydrogenated fats are ubiquitous in our food supply, but they are most often found in margarine, vegetable shortening, and other processed foods such as salad dressings, crackers, baked goods, and deep-fried foods. Become an informed consumer — read labels, ask questions, and make an effort to completely avoid this unhealthy fat.

A new manmade fat that may prove even more harmful than trans fat is interesterified (IE) fat. IE fats are the food industry's answer to trans fats, which have recently fallen

¹² S. Fallon, *Nourishing Traditions* (ProMotion Publishing, 1995). M.G. Enig, *Health Risks from Processed Foods and Trans Fats*. Interview with Richard Passwater. See www.healthy.net/scr/interview.asp?Id=162. M.G. Enig, *Trans Fatty Acids in the Food Supply: A Comprehensive Report Covering 60 Years of Research* (Enig Associates, Inc., 2d Ed. 1995). B.A. Watkins, et al., 32 *Br. Poli. Sci.* 5, 1109-19 (Dec. 1991).

out of favor in the public eye. IE fats have been shown to lower “good” HDL cholesterol and increase blood sugar levels — both significant risks for heart disease and diabetes.¹³ Interesterified fats can be recognized on food labels by terms such as “interesterified soybean oil,” “interesterified vegetable oil,” “fully hydrogenated oil,” “high stearic acid,” and “stearate-rich.”

Carbohydrates

There are three main types of carbohydrates to consider: sugar, starch, and fiber. Like fats, sugars and starches are energy sources for the body. Generally, they are broken down during digestion into glucose, or blood sugar, which circulates in the blood and provides energy to cells. Fiber is an indigestible form of carbohydrate that helps prevent constipation and diarrhea, removes toxins and metabolic waste products, and aids in controlling blood sugar levels.

Sugars are often referred to as simple carbohydrates and can be further classified as natural or refined. Natural sugars are found in foods such as fruit, raw honey, maple syrup, and milk. These sugars come “packaged” with the nutrients and enzymes needed for their digestion and assimilation. Refined sugars include white and brown table sugar, crystallized or liquid fructose, and corn syrup. When sugars are refined, they are separated from the nutrients that aid their metabolism, making them empty calories that drain your body’s nutrient reserves.¹⁴ Most sugars — natural or refined — are absorbed quickly into the blood and thus pose a significant challenge to the body’s mechanisms for controlling blood sugar and insulin levels.

Starches and fibers form the complex carbohydrates. In nature, starch and fiber are usually “packaged” together in plant foods (vegetables, fruit, legumes, and whole grains). During food processing and/or refining, the starch and fiber are often separated (for instance, in the processing of white rice or white flour and in processed fruit juices) or the food is ground so finely (as in most flours, even whole grain) that the normal delaying effects of the fiber are greatly diminished, and the starch is broken down to glucose and absorbed into the blood very quickly — sometimes more quickly than white sugar. This wreaks havoc on the body’s ability to keep blood sugar and insulin under control.

Excessive refined and processed carbohydrate consumption promotes inflammation, which is associated with almost all major modern diseases, including cancer,¹⁵ osteoporosis,¹⁶ heart disease,¹⁷ hypoglycemia, and asthma. Excess sugar and other refined

¹³ K. Sundram *et al.*, “Stearic Acid-Rich Interesterified Fat and Trans-Rich Fat Raise the LDL/HDL Ratio and Plasma Glucose Relative to Palm Olein in Humans,” 4 *Nutrition & Metabolism* 3, doi:10.1186/1743-7075-4-3 (2007).

¹⁴ S. Byrnes, *Digestion Made Simple* (Wellspring Publishers, 1999).

¹⁵ M. Bostick, *et al.*, “Sugar, Meat, and Fat Intake, and Non-Dietary Risk Factors for Colon Cancer Incidence in Iowa Women,” 5 *Cancer Causes and Controls* 38-52 (1994).

¹⁶ N. Appleton, *Lick the Sugar Habit*, 36-38 (Avery Publishing Group, 1989).

¹⁷ R.J. Katz, *et al.*, “Are Insulin and Proinsulin Independent Risk Markers for Premature Coronary Artery Disease?” 45 *Diabetes* 6, 736-41 (June 1996).

carbohydrates can also suppress the immune system,¹⁸ raise triglycerides,¹⁹ and elevate LDL cholesterol.²⁰ It's best to eat as few refined and processed carbohydrates as possible. When you eat sugar, choose natural over refined and avoid artificial sweeteners altogether. If you eat products made with flour, opt for whole grain.

Fruits and vegetables should form the foundation of your carbohydrate intake. The carbohydrates found in fruits and vegetables are bound up with phytonutrients that are essential to optimal health. Non-starchy vegetables, such as leafy greens, summer squash, and cauliflower, provide high amounts of fiber and small amounts of starch. Fruits combine natural sugars with plenty of fiber. Starchy vegetables such as winter squash and sweet potatoes are a good source of many phytonutrients, but should be limited if blood sugar control is an issue. And remember: potato chips and French fries don't count as healthy vegetables or a source of healthy carbohydrates!

Grains tend to be a challenge for everyone except individuals with a very high carbohydrate tolerance. In fact, approximately two million Americans suffer from celiac disease, in which the body isn't able to digest gluten proteins found in wheat, rye, barley, and oats.²¹ This, in turn, makes it difficult for the body to absorb many nutrients, vitamins, and minerals, and for those who cannot tolerate them, grains become pro-inflammatory in the body. In addition, grains have the least nutrient content of any food. If you do choose to eat grains, eat them in a form nearest to their whole form as possible. (Think cooked cracked wheat as opposed to whole-wheat bread.) If you do eat bread or bread-like products, opt for sprouted-grain or sourdough versions. Legumes have a slightly higher nutrient content than grains, but many people have a problem digesting them. Soaking legumes overnight, though, can greatly increase their digestibility.

High-fructose corn syrup (HFCS) is a particularly problematic processed carbohydrate that is almost surely a significant contributor to the global epidemic of obesity and insulin-resistant diabetes. The HFCS typically used in soft drinks and many processed foods is made by chemically converting some of the glucose in corn syrup into fructose. While fructose is not harmful in small amounts (as found naturally with fiber in fruits), in large quantities — as in soft drinks and processed foods — it promotes fat production and storage, interferes with appetite control, raises blood pressure and triglycerides, reduces glucose tolerance, and promotes insulin resistance.²² Avoid HFCS as much as possible.

¹⁸ A. Sanchez, *et al.*, "Role of Sugars in Human Neutrophilic Phagocytosis," 26 *Am. J. Clin. Nutr.* 11, 1180-84 (Nov. 1973).

¹⁹ S. Scanto and J. Yudkin, "The Effect of Dietary Sucrose on Blood Lipids, Serum, Insulin, Platelet Adhesiveness and Body Weight in Human Volunteers," 45 *Postgrad. Med. J.*, 602-07 (1969).

²⁰ G.F. Lewis and G. Steiner, "Acute Effects of Insulin in the Control of VLDL Production in Humans: Implications for the Insulin-Resistant State," 19 *Diabetes Care* 4, 390-93 (April 1996). R. Pamplona, *et al.*, "Mechanisms of Glycation in Atherogenesis," 40 *Med. Hypotheses* 40, 174-81 (1990).

²¹ National Digestive Diseases Information Clearinghouse, "How Common is Celiac Disease?" See <http://digestive.niddk.nih.gov>.

²² H. Basciano, *et al.*, "Fructose, Insulin Resistance, and Metabolic Dyslipidemia," 2 *Nutrition & Metabolism* 5 (2005).

29-7. Your Specific Diet

When planning your meals, start with a quality protein (as defined in section 29-6 under “Protein”), then add two to three servings of vegetables and/or fruit, and, finally, when cooking make sure to use a healthy fat (see the “Fats” discussion in section 29-6 for choices). Keep in mind, the best diet for any one person should be based upon his or her individual response to food as determined by various factors such as lifestyle, digestion, food sensitivities, blood sugar stability, etc. Watch your own reactions as you make changes in your protein, fat, and carbohydrate ratios. Experiment until you find the balance of foods that makes you feel the best. You will know it is right if you feel focused, energized, and strong between meals. It is ideal to center meals around fresh ingredients; however, we know that this is not always possible. Therefore, we have included ideas for increasing the nutrient density of convenience foods.

Tips and Ideas for Increasing the Nutrient Density of Meals

Turn a canned soup into a hearty meal by adding any and/or all of the following:

- ▶ Before heating, stir in a serving of frozen broccoli, spinach, green beans, or another vegetable of your choice.
- ▶ Add more protein and calcium by melting some cheese on top.
- ▶ Add canned beans to a variety of soups — vegetable, chicken and rice, or meat-based soups.
- ▶ Add freshly diced tomato, red onion, and red pepper for an extra dose of vegetables and antioxidants.
- ▶ Dice a couple of slices of nitrate-free sandwich meat and add to your soup.

Freshly sliced vegetables add extra vitamins, minerals, and antioxidants to your diet and make wonderful side dishes. Freshly slice and add any of the following to a frozen dinner to improve its nutritional quality:

- ▶ Cucumber;
- ▶ Red, yellow, and green peppers;
- ▶ Avocado; or
- ▶ Tomato, carrot sticks, or celery.

You can try any of these vegetables with a hummus dip. Also, try celery sticks, carrot sticks, or apple slices with a natural nut butter, one that doesn't contain partially hydrogenated oils or trans fats.

Canned sardines or salmon provide the all-important omega-3 fatty acids and are a quality protein:

- ▶ Try either sardines or salmon on whole-grain crackers with freshly sliced avocado or sliced cucumber, tomato, or alfalfa sprouts.
- ▶ Add canned fish (sardines, salmon, or tuna) to salads.
- ▶ Mix canned tuna or salmon with a little chopped celery and onion, and either olive oil and lemon juice or a spoonful of mayonnaise to make an easy and healthy salad.

Try replacing slices of bread with a lettuce leaf:

- ▶ Fill a lettuce leaf with tuna, top with a pickle, bell pepper slices, and grated carrot.
- ▶ Make a sandwich using a lettuce leaf wrapped around nitrate-free turkey or ham, sliced cheese, sliced cucumber, and grated carrot.

Fresh fruit is nature's perfect treat:

- ▶ Banana slices can be dipped in yogurt or peanut butter.
- ▶ Make a simple fruit salad by cutting up your favorite fruit of the season (apples, pears, and grapes); add some thawed, frozen blueberries; and top with yogurt (optional).
- ▶ Roll melon balls in shredded coconut.
- ▶ Enjoy fresh fruit and cottage cheese.
- ▶ Try a traditional European dessert of fresh fruit with cheese slices.

Frozen fruit is another great option:

- ▶ Thaw frozen berries, and mash them into plain yogurt.
- ▶ Frozen berries can be eaten by themselves.

29-8. The Importance of Eating a Quality Breakfast

Don't forget that breakfast is the most important meal of the day. It sets up the energy quotient for the day — a quality breakfast should provide you with the energy you need to accomplish the day's tasks and take joy in living. Numerous studies show that starting the day with breakfast helps people maintain a healthy weight throughout life and leads to overall better energy and performance. A quality breakfast should include sufficient protein, along with fruits and/or vegetables, and possibly a serving of a whole-grain or other com-

plex carbohydrate such as beans or root vegetables. Break your night-long fast with protein for blood sugar stability and energy production. Some breakfast ideas include:

- ▶ Two eggs (poached, fried, or soft or hard boiled) on top of a bed of steamed kale or spinach (seasoned with a little olive oil and 1½ ounces of grated cheddar cheese), along with a bowl of fresh fruit (melon, berries, or diced apple or pear).
- ▶ Vegetable omelet made with broccoli, zucchini, spinach, onions, and olives; organic eggs; and feta cheese, served with a grapefruit.
- ▶ Egg and cheese omelet served with sautéed greens and mushrooms, and fresh fruit on the side.
- ▶ Leftover dinner from the night before — for example, 2 ounces of broiled salmon, sautéed broccoli, and brown rice topped with a little butter and Parmesan cheese.
- ▶ Protein smoothie made with 1 cup milk (cow or goat) or a milk alternative (almond, hazelnut, or coconut), a cup of frozen berries, and a scoop of protein powder (derived from whey, hemp, or rice). Additional options: some slivered almonds and green drink powder.
- ▶ One-half cup cottage cheese or 1 cup unsweetened full-fat yogurt and fresh fruit (blueberries, strawberries, peaches, or diced apple), and topped with raw nuts, such as almond slices or walnut pieces, to increase nutrient density.
- ▶ Old-fashioned oatmeal with a tablespoon of raisins and a dash of cinnamon, or sweetened with a couple drops of stevia or a little honey and topped with raw nuts, such as almond slices or walnut pieces, to increase nutrient density and protein content. May also be topped with butter and a little half-and-half to taste. (Fat and fiber slow the carbohydrate conversion to sugar, supporting blood sugar stability.)
- ▶ A toasted corn tortilla, ½ cup of red beans, one over-medium egg, cheddar cheese, and freshly sliced avocado, topped with salsa.
- ▶ Tofu scramble or egg scramble, with turkey sausage rolled into a sprouted grain or whole-wheat tortilla with some sliced avocado and tomatoes. Add seasonal fruit or frozen berries that have been thawed to make a complete meal.

Lastly, don't forget to enjoy your food. Make mealtime a celebration — you are nourishing your body, after all. If you usually eat alone, invite a friend or family member to join you now and then. And if you do eat alone, turn off the television and focus on the tastes, smells, and textures of the food you are eating. This not only helps with digestion, but makes mealtime an enjoyable event, rather than a chore. Remember: the health of your body depends on the food you put in it!

29-9. Supplements to Support Optimal Health

It is important to nourish the body with a nutrient-dense, natural foods diet, but sometimes our diets fall short. When this happens, dietary supplements act as kind of a nutritional insurance policy, filling in nutritional gaps. A high-quality multivitamin and mineral formula is the starting point for a supplementation plan to support overall health; in addition, there are supplements available to support the health and functioning of specific body systems. We have broken them down into cardiovascular, bone and joint, brain, immune, and gastrointestinal health.

Cardiovascular Health

The cardiovascular system consists of the heart and a network of vessels called veins, arteries, and capillaries. The role of the cardiovascular system is to supply the body with oxygen and deliver nutrients to all the organs, tissues, and cells that need them. It also plays an important role in removing waste products from organs, tissues, and cells and transporting them to where they can be eliminated. The vital role of maintaining homeostasis, or equilibrium, in the body depends on the continuous and controlled movement of blood through the thousands of miles of capillaries that permeate every tissue and reach every cell in the body. In addition, nutrients and oxygen pass from the capillaries into fluids surrounding the cells as waste products, such as carbon dioxide, and are removed. Therefore, it is vitally important that we supply the cardiovascular system with the nutrients it needs to function and keep it functioning as well as it can for as long as it can. Cardiovascular disease is responsible for 40 percent of all deaths in the United States, more than all forms of cancer combined, making it the number one killer of both men and women.²³

Vitamin D: Vitamin D plays multiple roles in maintaining the health of the cardiovascular system. First, it helps to ensure that calcium is carried to and deposited in the bones and therefore does not get deposited in the arteries. Many researchers have postulated that vitamin D deficiency leads to the deposition of calcium in the arteries, resulting in atherosclerosis. Second, vitamin D improves muscle tone, including the tone of the heart, the most important muscle in the body, and it is known to affect contractility of the heart. People who develop congestive heart failure have much lower vitamin D levels when compared to people who don't develop this disease. Third, vitamin D may also affect blood pressure. Experiments in which people are exposed to ultraviolet light have been successful at increasing their vitamin D levels and decreasing their blood pressure. Treating elderly women with vitamin D even in the short term lowered their blood pressure and their heart rates.²⁴ Finally, vitamin D modulates the inflammatory response.

²³ "Cardiovascular Disease 101: Understanding Heart and Blood Vessel Conditions."
See www.mayoclinic.com.

²⁴ See www.denvernaturopathic.com/news/VitDandCVD.html.

Inflammation plays a role in the development of most diseases of the cardiovascular system.

Dosage: Many experts recommend that for optimal health, a healthy adult should take between 2000 and 4000 IU daily in the form of vitamin D-3.²⁵

Vitamin C: Vitamin C strengthens collagen structures of the arteries. It may also aid in lowering total cholesterol and blood pressure while it raises HDL (good) cholesterol. Vitamin C also acts as an antioxidant, mopping up free radicals that may damage the interior lining of blood vessels.

Dosage: A common recommendation is 500 mg two to three times daily.

CoQ10: CoQ10 is the spark of life; it is the nutrient that keeps the heart beating and every cell in the body functioning. It is absolutely essential for energy production; when there are sub-optimal levels, cells perform poorly, resulting in less energy being produced in the body. The heart has the second highest need, just behind the brain, for energy production in the body. Therefore, it has the second highest need for adequate levels of CoQ10. Scientists investigating the role of CoQ10 in human biochemistry have estimated that once body levels of it become more than 25 percent deficient, many conditions, including cardiovascular disease, start to flourish.²⁶ Deficiency of this nutrient is common among cardiac patients. CoQ10 enhances the mechanical function of a failing heart by providing optimal nutrition at the cellular level. It enhances energy production, improves contractility of the heart muscle, and prevents the oxidation of LDL (bad) cholesterol.

Dosage: Doses vary, but a recommended daily dose is 100 to 300 mg.

Vitamin K: Increasing research suggests that vitamin K is an important nutrient for cardiovascular health, apart from its role in blood clotting. Calcium deposits in the walls of blood vessels can lead to "arterial calcification," which contributes to hardening of the arteries. Vitamin K activates proteins, which ensure that calcium is delivered from the blood to the bone and is not deposited in the arteries.

Dosage: Some physicians recommend between 1000 mcg and 5000 mcg per day.

Note: Those on blood-thinning medications should consult their doctor before taking vitamin K.

²⁵ See www.denvernaturopathic.com/news/vitDdoses.html.

²⁶ E.G. Bliznakov and G.L. Hunt, *The Miracle Nutrient CoEnzyme Q10* (Bantam Books, 1987).

Vitamin E: Vitamin E prevents oxidation of LDL cholesterol; prevents unneeded coagulation; enhances nitric oxide production in the arterial wall, which helps keep the arteries open; and supports overall cardiovascular health.

Dosage: A general recommendation is 400 IU daily.

Note: Look for natural forms of vitamin E, as they are more bio-available. Natural forms include d-alpha, d-beta, d-gamma, and d-delta; supplements beginning with “dl” are synthetic.

EPA/DHA: EPA and DHA are two of the most important nutrients that the body becomes less efficient at making as it ages. They are omega-3 fatty acids found in certain coldwater fish. They have been found to inhibit COX 2, an enzyme involved in inflammation response, thus helping to reduce inflammation in the body. Excessive stickiness of blood platelets is an independent risk factor for heart disease and strokes. Once platelets adhere to each other or aggregate, they release pro-inflammatory compounds that dramatically promote the formation of arterial plaque and/or clots. EPA and DHA maintain normal platelet aggregation and reduce the production of pro-inflammatory compounds. They also help maintain the elasticity of artery walls, lower blood pressure, reduce fat levels (triglycerides) in the blood, and stabilize heart rhythms.

Dosage: Between 3000 and 6000 mg of fish oil daily, making sure to get at least 400 mg of EPA and 200 mg of DHA.

L-Carnitine: Carnitine is another important nutrient that the body becomes less efficient at making as it ages. It is absolutely essential for the production of energy in the body. Carnitine transports fatty acids to the mitochondria, the energy centers found in every cell in the body, where they are metabolized into energy. The heart is highly dependant on this process for normal functioning; therefore, normal heart function relies on adequate levels of carnitine. In fact, carnitine may be one of the most important nutrients for the prevention of a range of ailments that affect the heart and cardiovascular system, including, but not limited to, arrhythmia, cardiomyopathy (inflammation of the heart), and angina. Essentially, carnitine helps the heart work more effectively, particularly as the body ages. Carnitine has also been shown to lower fat levels (triglycerides) in the blood while raising HDL (good) cholesterol.

Dosage: Common doses fall between 1000 mg and 3000 mg daily.

B vitamins: All the B vitamins play a role in supporting the functioning of the cardiovascular system, and, as mentioned above in section 29-2, B vitamins tend to be deficient for many seniors. Therefore, taking a quality, high-potency multivitamin that supplies all the B vitamins is important to support cardiovascular function. Additionally, some of the B vitamins are particularly important for cardiovascular health: B-1, B-6, B-12, and folic acid. B-1 deficiency can result in the cardiovascular manifestations of “wet beriberi,” sodi-

um retention, peripheral dilation of blood vessels, and heart failure. Lasix, the most widely prescribed diuretic, has been shown to cause B-1 deficiency. Studies have shown that after only four weeks of Lasix use, B-1 concentrations and the activity of the thiamin-dependent enzyme transketolase were significantly reduced. Studies have shown that B-1 supplementation in those with congestive heart failure (CHF) has resulted in an increase in the left ventricular ejection fraction. The significance of an increase in ejection fraction is associated with a greater survival rate in patients with CHF. Vitamin B-6 inhibits abnormal or unhealthy platelet aggregation. Vitamins B-6 and B-12, as well as folic acid, reduce homocysteine levels in the blood; high levels of homocysteine are believed to be a risk factor for cardiovascular disease. Additionally, high homocysteine levels have been found to interfere with collagen cross-linking, leading to weak collagen. Collagen is one of the primary proteins that form the structure of blood vessels. Weak collagen in blood vessels leads to many problems, including increased risk of blood vessel rupture.

Dosage: Optimal intake ranges for B-1 are 50 to 250 mg; for B-6 are 25 to 100 mg; for B-12 are 400 to 1000 mcg; and for folic acid are 400 to 800 mcg.

Magnesium: Magnesium is essential to the proper functioning of the entire cardiovascular system. It is involved in several hundred enzymatic reactions, many of which contribute to energy production and cardiovascular function. The level of magnesium in the blood correlates with the ability of the heart muscle to manufacture enough energy to beat properly. Magnesium has been shown to be particularly important for those who develop heart arrhythmias. Magnesium depletion within the heart muscle leads to potassium depletion as well. Given the importance of both of these nutrients for proper nerve and muscle firings, it is little wonder that arrhythmias will be produced when magnesium intake is sub-optimal. Finally, magnesium is necessary for your muscles to relax. It is a key component in the vasodilation (relaxation) of the arteries; by supporting healthy vasodilation, magnesium helps maintain healthy blood pressure levels. It also helps balance calcium levels in the body.

Dosage: Optimal intake ranges for magnesium are between 250 and 1000 mg. Magnesium glycinate is the best absorbed form.

Lipoic Acid: Lipoic acid, a powerful antioxidant, is simultaneously water soluble and fat soluble; therefore, it provides antioxidant protection throughout the body. It also enhances the effectiveness of other antioxidants and directly regenerates vitamin C and CoQ10, and indirectly renews vitamin E. Lipoic acid has been shown to oxygenate the heart while decreasing inflammation in the body. It is produced in very small amounts by the body, but the trace amount that the body does produce slows down with age and there is evidence that it barely makes enough for its metabolic functions.

Dosage: For general health and maintenance, 50 to 100 mg daily is recommended.

Note: If you have diabetes or hypoglycemia, consult your doctor before taking lipoic acid, as it can lower glucose levels, thereby reducing drug requirements.

NAC: NAC is necessary for the body to produce glutathione, one of the body's primary antioxidants. It also decreases the production of pro-inflammatory compounds and reduces the damage done to healthy cells by pro-inflammatory compounds. Low-level, chronic inflammation is thought to be one of the primary factors in cardiovascular disease.

Dosage: A general dose is between 500 and 600 mg twice daily.

Bone and Joint Health

Bone is dynamic living tissue composed of a protein-mineral matrix. This matrix is constantly being broken down and rebuilt, even in adults. Minerals such as calcium, phosphorus, magnesium, and zinc, to name a few, make bones hard, while proteins provide the flexibility that allows bones to bend without breaking. Without protein, bones would become too brittle and break; without minerals, bones would become soft and lose their density. Bones act as reservoirs in the body, storing extra minerals for the body to use for other important functions. When there are inadequate amounts of these minerals in the diet, the body will "overdraw" the minerals it needs from the bones' supplies, resulting in de-mineralized and weak bones. It is important to include an adequate amount of these minerals, either through diet or supplementing, to maintain strong, healthy bones.

Joints are formed when two or more bones are joined together and held in place by muscles and tendons. The joints are covered with cartilage, and membranes within the joints secrete a fluid that lubricates the joint and eases movement. Both the bones and the joints are living tissue that is constantly being built up and broken down, but inflammation in the body hastens the breakdown of both the bones and the joints. Problems like arthritis and osteoporosis arise when the rate of breakdown exceeds the rate of building and replenishing.

Vitamin D: Vitamin D is vital to bone health. Originally, researchers thought the only role vitamin D played in bone health was ensuring calcium absorption and decreasing calcium excretion in the kidneys. While these functions are important, new research shows that vitamin D also protects the bones by improving muscle strength, particularly in seniors. This is significant because stronger muscles mean fewer falls. Falls are a leading cause of death or disability among seniors. A recent study indicates that a daily vitamin D dose of 800 units reduces by 22 percent the incidence of falls in people aged 65 and older.²⁷ It is also necessary for the body to absorb strontium, another important mineral involved in bone health. In addition, vitamin D regulates the synthesis of osteocalcin, a protein that binds calcium to the bones. If vitamin

²⁷ See *supra* n. 9.

D levels are low, blood levels of calcium and phosphorus drop, causing the body to pull these minerals from the bones. This creates de-mineralized, weak bones.

Dosage: Many experts recommend that for optimal health, a healthy adult should take between 2000 and 4000 IU daily in the form of vitamin D-3.

Vitamin K: Vitamin K plays several crucial roles in bone health. It activates two important proteins: osteocalcin, which binds calcium to the bones, and matrix Gla protein. If osteocalcin isn't activated, it cannot efficiently bind calcium to the bones; vitamin K is necessary for the activation of osteocalcin. Matrix Gla protein, once activated by vitamin K, ensures that calcium is delivered from the blood to the bone and not deposited in places where it should not be, such as in the joints or arteries. Vitamin K has been shown to increase osteoblasts, or bone-building cells, while it decreases the number of osteoclasts, cells that break down bones. In addition, vitamin K may reduce bone loss caused by cortisone, blood-thinning drugs, diabetes, and other health issues.

Dosage: Some physicians recommend from 1000 mcg to 5000 mcg per day.

Note: Those on blood-thinning medications should consult their doctor before taking vitamin K.

Magnesium: Magnesium is part of the mineral-protein matrix that makes up bone tissue and is considered calcium's co-pilot when it comes to bone health. Magnesium comprises about one percent of bone mineral and is known to influence both bone protein and bone mineral metabolism. As the magnesium content of bone mineral decreases, bone crystals become larger and more brittle. It also regulates the transport of calcium into the bone. People who are deficient in magnesium have decreased levels of vitamin D, which is necessary for the body to absorb calcium. Between 75 and 85 percent of the population consume less than the RDA of magnesium for their age group.²⁸

Dosage: Most alternative medical practitioners recommend a 2:1 ratio of calcium to magnesium. In other words, if you are consuming 1500 mg of calcium each day, you would take 750 mg of magnesium. Magnesium glycinate is the best absorbed form.

Calcium: Calcium is the most abundant mineral in the body, but is also easily depleted. Ninety-eight percent of the calcium in the body is contained in the bones, so there is no doubt that calcium plays a key role in bone health. In general, calcium bound to organic substrates is better absorbed than calcium bound to

²⁸ See www.jacn.org/cgi/content/abstract/4/2/195.

inorganic substrates. Organic substrates include amino acids (such as glycine), and intermediates like citrate, malate, fumarate, succinate, and aspartate. When you are buying a calcium supplement, look for these forms. Supplementing calcium in the evening appears better for bone health than taking calcium in the morning. This is due to the circadian rhythm of bone reabsorption.²⁹

Dosage: When bone loss is an issue, doctors often recommend up to 1500 mg a day from food and supplement sources combined.

Strontium: Not to be confused with Strontium-90, a by-product of nuclear fission, elemental strontium is a mineral that naturally occurs in food and water. The body naturally contains strontium, 90 percent of which is found in the bones. Strontium imparts strength to bone tissues. It also draws extra calcium into the bones, increasing bone density. At the cellular level, strontium, like vitamin K, enhances the activity of osteoblasts, bone-building cells, while reducing osteoclastic activity, cells that break down the protein-mineral matrix in the bones.

Dosage: A general recommendation is between 250 mg and 1,000 mg daily.

Vitamin C: Vitamin C is a recognized key player in bone health. It is absolutely essential for the production of collagen, the most abundant protein in the protein-mineral matrix of the bones. The combination of hard minerals and flexible collagen makes bones hard without being brittle; therefore, it is important to make sure that the bones are supplied with an abundant amount of collagen.

Dosage: Research suggests that adding 500 to 1000 mg of vitamin C to a supplement plan can enhance long-term bone health.

Glucosamine sulfate: Glucosamine is a sulfur-based compound found in the body. It enhances the production of hyaluronic acid, the compound responsible for lubricating the joints. It is also a component of cartilage and is needed by the body for the synthesis of joint cartilage. Studies indicate that glucosamine reduces symptoms of osteoarthritis and may reverse cartilage damage in mild forms of the disease. Several studies also indicate that glucosamine is superior to non-steroidal anti-inflammatory drugs (NSAIDs) for pain reduction, but it may take several weeks before improvement is seen.

Dosage: A general recommendation is 1500 mg daily.

²⁹ A. Blumsohn, *et al.*, "The Effect of Calcium Supplementation on the Circadian Rhythm of Bone Reabsorption," 79 *J. Clin. Endocrinology & Metabolism* 3, 730-35 (Sept. 1994).

Chondroitin: Chondroitin is found throughout the body, especially in the skin, bones, arterial walls, and cartilage. It plays an important role in cartilage synthesis and aids “shock absorption” in the joints. Researchers suspect that it provides cartilage with the necessary elements to rebuild, while blocking the enzymes that lead to joint deterioration.

Dosage: A general recommendation is 400 mg daily.

MSM: MSM is a bio-available form of sulfur that the body needs to make cartilage and other collagen-based structural tissues, such as the bones, skin, and arteries. It has the ability to donate sulfur to important reactions in the body, including cartilage synthesis. Research shows that MSM modulates inflammation and can help decrease pain caused by inflammation. A key cause of bone loss and joint cartilage damage is chronic, low-level inflammation.

Dosage: Between 1000 and 2000 mg daily, divided in two doses.

EPA/DHA: EPA and DHA are the most important members of the omega-3 family of fatty acids. They are found in high amounts in certain coldwater fatty fish. They have been found to inhibit COX 2, an enzyme involved in inflammation response. A key cause of bone loss and joint cartilage damage is chronic, low-level inflammation. Some studies have found a decrease in morning stiffness with patients who took fish oils.

Dosage: Between 3000 and 6000 mg of fish oil daily, making sure to get at least 400 mg of EPA and 200 mg of DHA.

Turmeric: Curcuminoids found in turmeric reduce inflammation and hinder tissue degeneration by blocking enzymes responsible for inflammation response.

Dosage: A standardized extract of turmeric supplying 400 to 600 mg of curcumin can be taken three times daily.

Note: Avoid if you are suffering from bile duct obstructions, and use it under close supervision if you have gallstones.

Boswellia: Boswellia is the extract of the gum resin of the boswellia tree. It reduces inflammation and improves circulation to joints and inflamed tissue by repairing blood vessels damaged by inflammation. Studies have shown that boswellic acid has an anti-inflammatory action much like conventional nonsteroidal anti-inflammatory drugs (NSAIDs), but without the negative side effects of NSAIDs.

Dosage: A general dose is 150 mg of boswellic acid, three times daily.

Brain Health

The brain is the center of the nervous system. It is an extremely complex organ, with more than 100 billion neurons, linked with up to 10,000 synaptic connections each. These neurons are constantly communicating with one another, controlling every activity in the body. The brain allows you to think, learn, and understand; to see, hear, feel, and taste; to move and breathe. It is the computer that keeps the body going. Your brain is what makes you uniquely human.

Vitamin D: Vitamin D influences the brain, spinal cord, and hormone-producing tissues in the body important in mood regulation. There are a large number of vitamin D receptors in the brain, which, in turn, affects the proteins in the brain that are known to be involved directly with learning, memory, motor control, and possibly even social behavior. Activated vitamin D in the adrenal gland regulates tyrosine hydroxylase, the rate-limiting enzyme necessary for the production of dopamine, epinephrine and norepinephrine. Low levels of vitamin D may contribute to chronic fatigue and depression.³⁰ Researchers from Ireland demonstrated that vitamin D-3 acts as an anti-inflammatory agent and invigorates the brain. This research suggests vitamin D may prevent, or even treat, age-related cognitive decline.³¹

Dosage: Many experts recommend that for optimal health, a healthy adult should take between 2000 and 4000 IU daily in the form of vitamin D-3.

EPA/DHA: The human brain is approximately 60 percent fat, and the majority of that fat is suppose to be EPA and DHA. As the body ages, it becomes less able to make EPA and DHA from linolenic acid; hence, levels in the brain decline unless they are supplied via the diet or supplementation. When supplied in sufficient amounts through diet, EPA and DHA are incorporated into the fatty membranes (walls) of cells, where they influence how cells communicate with each other. When other fats are incorporated in their place, due to an insufficient supply in the diet, communication between brain cells is disrupted. EPA and DHA help ensure that there is adequate fluidity in brain tissues for the optimal transmission of brain signals. Studies have shown that the physical properties of brain cell membranes, including their fluidity (which is improved when sufficient amounts of EPA and DHA are supplied), directly influence neurotransmitter synthesis, signal transmission, uptake of serotonin and other neurotransmitters, neurotransmitter binding, and the

³⁰ See www.westonaprice.org/basicnutrition/vitamindmiracle.html.

³¹ M.E. Moore, *et al.*, "Evidence that Vitamin D3 Reverses Age-Related Inflammatory Changes in the Rat Hippocampus," *Biochem. Soc. Trans.* 573-77 (Aug. 2005).

activity of monoamine oxidase, the enzyme that breaks down serotonin, epinephrine, dopamine, and norepinephrine. All of these factors have been implicated in depression and other psychological disturbances.

Dosage: Between 3000 and 6000 mg of fish oil daily, making sure to get at least 400 mg of EPA and 200 mg of DHA.

N-Acetyl-Cysteine (NAC): NAC is an amino acid that is a precursor to glutathione, the principal antioxidant made by the body that helps to protect us from toxic chemicals. It is important to protect the brain from exposure to toxic chemicals. People with depression, bipolar disorder, other mood disorders, and Parkinsons have low levels of glutathione, which often complicates their disorders. Furthermore, glutathione levels decline as we age and higher levels are associated with better health. NAC increases brain levels of glutathione when coupled with vitamin C supplementation. Finally, while NAC is not a neurotransmitter, it plays a vital role in normal neurotransmitter activity. It appears to restore normal brain levels of glutamate, a calming neurotransmitter that is also needed for GABA production.

Dosage: Between 500 mg and 2 grams daily in divided doses.

N-Acetyl-Carnitine (ALC): Production of ALC declines with age. Its main function is to help cells, particularly brain cells, produce energy and remove toxic waste products. All cells need a constant amount of energy to remain healthy, and brain cells especially must maintain a constant supply of energy to protect against cell loss. ALC ensures that brain cells receive a constant supply of energy. Additionally, ALC helps protect brain cells from the effects of stress and aging, which increase the production of toxic waste products. ALC facilitates the removal of these waste products. ALC also increases the brain's production of acetylcholine, a key neurotransmitter involved in the thinking process, memory, motivation, and arousal. Low levels of acetylcholine may interfere with concentration and memory and may lead to emotional instability. Inadequate acetylcholine is the main neurotransmitter deficiency that occurs with age, so it is unsurprising that the drugs prescribed to treat senility and/or Alzheimer's are aimed at preventing the breakdown of acetylcholine. ALC is also chemically similar in structure to acetylcholine, and it is thought that it may be a neurotransmitter in and of itself, with functions similar to acetylcholine. Finally, ALC increases levels of nerve growth factor, an important brain and nerve-healing compound.

Dosage: Common doses fall between 1000 mg and 3000 mg daily.

Ginkgo biloba: Ginkgo is extracted from the leaves of the ginkgo biloba, one of the oldest trees in the world, and has been used in China for thousands of years. It contains flavonoids, which are powerful antioxidants. It has been shown to reduce oxidative damage to neurons. Because it increases the blood flow to the brain, ginkgo is also especially useful in helping conditions such as dizzi-

ness, headache, short-term memory loss, and depression. Furthermore, it is extremely useful in increasing the quality of life for seniors. Many symptoms common in seniors are a result of insufficient blood and oxygen supply; ginkgo has demonstrated that it improves blood and oxygen supplies to tissues. This herb has been shown to help improve memory, poor concentration, depression, headache occurring with dementia, and attention and memory loss in Alzheimer's disease. In fact, ginkgo has been approved in Germany as a therapy for memory loss related to Alzheimer's disease. It improves blood flow to the brain and is thought to increase the rate at which information is transmitted at the nerve cell level.³²

Dosage: A standardized extract of 120 to 240 mg daily, divided into two or three doses.

Turmeric: Curcumin, one of the constituents of turmeric, is believed to help protect the brain against mental decline and Alzheimer's disease. This may be because of its anti-inflammatory action. Curcumin is an effective inflammation modulator. It's also an antioxidant, which means it protects the brain from free radicals. Free radicals and inflammation appear to go hand-in-hand in causing many diseases, so one supplement that helps the body deal with both is a very good thing. Studies also suggest that curcumin helps promote normal functioning in the brain by restoring the activity of certain immune cells when they become defective. These cells, called macrophages, are supposed to eat and thus destroy a substance in the brain called amyloid protein. In people with Alzheimer's disease, the macrophages stop eating amyloid protein. It appears curcumin may reprogram the mis-performing macrophages so that they once again destroy the amyloid protein. Additionally, curcumin triggers amyloid plaques to break apart.

Dosage: Studies have used quantities ranging from 500 to 4000 mg, with the 500 mg range used as a daily protective or maintenance amount and the 4000 mg range used in studies actively treating serious diseases like cancer and Alzheimer's.

B Vitamins: All the B vitamins play a role in supporting healthy brain function, and B vitamins tend to be deficient in many seniors. Therefore, taking a quality, high-potency multivitamin that supplies all the B vitamins is important to healthy brain function. All the B vitamins are necessary to make neurotransmitters and help support healthy mood, cognitive function, and memory. Folic acid, B-6, niacin, and B-12 are also involved in the conversion of tryptophan into serotonin, a "feel good" chemical in the brain. In addition, folic acid, B-6, and B-12 have been shown to treat the symptoms of depression; people with depression tend to be deficient in these B vitamins.

³² B. Gessner, *et al.*, "Study of the Long-Term Action of a *Ginkgo Biloba* Extract on Vigilance and Mental Performance as Determined by Means of Quantitative Pharmaco-EEG and Psychometric Measurements," 35 *Arzneim Forsch*, 1459-65 (1985).

Immune Health

The immune system is the body's defense system. It protects us from disease and infection by identifying and killing pathogens (bacteria, viruses, and parasites) and tumor cells. That defense system is weakened or strengthened by how you nourish it. For the body to stay healthy and function at an optimal level, the immune system must be strong. A healthy diet and lifestyle may be the cornerstones of a strong immune system, but there are additional supplemental measures that can be taken to further enhance your body's natural infection-fighting system.

Vitamin D: Vitamin D plays a major role in regulating the immune system. In fact, vitamin D deficiency is strongly associated with an increased risk of developing an autoimmune disease (where the immune system begins to attack the body) including rheumatoid arthritis, thyroiditis, and Crohn's disease. It also helps calm inflammation, an underlying cause of many degenerative diseases. Finally, decreasing vitamin D levels during the winter appear to trigger the seasonal cycle of cold and flu. Vitamin D has profound and multiple effects on human immunity and is known to stimulate innate immunity, something that is important in preventing infections caused by viruses. Vitamin D deficiency is common especially among the elderly in the winter. The elderly only make about 25 percent of the vitamin D that 20-year-olds do after exposure to the same amount of sunlight.

Dosage: Many experts recommend that for optimal health, a healthy adult should take between 2000 and 4000 IU daily in the form of vitamin D-3.³³

EPA/DHA: EPA and DHA are the most important members of the omega-3 family of fatty acids. They are found in high amounts in certain coldwater fatty fish. They have been found to inhibit COX 2, an enzyme involved in inflammation response. Chronic, low-level inflammation suppresses the immune system and is a leading cause of many degenerative and chronic diseases.

Dosage: Between 3000 and 6000 mg of fish oil daily, making sure to get at least 400 mg of EPA and 200 mg of DHA.

Selenium: Selenium is a trace mineral that plays a vital role in the functioning of the antioxidant enzyme system glutathione peroxidase. As such, it affects all components of the immune system, including the development and activity of all white blood cells. Selenium deficiency results in depressed immune function, whereas selenium supplementation results in augmentation and/or restoration of immune functions. Selenium deficiency inhibits resistance to infection; increasing intake has been shown to stimulate white blood cell and thymus function.

Dosage: Between 50 and 200 mcg per day.

³³ See *supra* n. 28.

Vitamin C: Vitamin C stimulates the immune system by increasing levels of interferons, proteins that inhibit viruses from replicating within cells. It also enhances the activity of other immune cells, like killer cells and macrophages.

Dosage: 1000 to 3000 mg daily is a general recommendation.

CoQ10: Coenzyme Q10 is a nutrient critical for energy production. Tissues and cells involved with immune function are highly energy dependent and require an adequate supply of CoQ10 for optimal function.

Dosage: Between 60 and 120 mg daily is an acceptable dose for maintenance. Dose may be increased in the case of an infection.

Zinc: In addition to increasing immune function, zinc has been shown to maintain the health of the thymus gland, which is vitally important for immunity.

Dosage: 30 mg daily of either zinc picolinate or zinc citrate is acceptable. Zinc supplements should be offset by a small amount of copper, 1 to 2 mg daily.

Garlic: Raw garlic, in particular, has a broad spectrum of antifungal, antibacterial, and antiviral effects. If you can't stand to eat raw garlic, standardized tablets or capsules are available.

Dosage: Can be taken in amounts from 600 to 900 mg daily, divided into two or three doses.

Mushrooms: Mushrooms such as maitake, reishi, and shiitake are among the most researched immune-boosting, infection-preventing foods. Their principle active ingredients are polysaccharides, including beta-D-glucan and lentinan, which have been shown to improve the body's germ-fighting abilities. These polysaccharides have also been shown to have antibacterial and antiviral properties.

Dosage: Supplement with 3 to 7 grams daily.

Probiotics: Probiotics, such as *Lactobacillus acidophilus*, may help protect the body from harmful organisms in the intestine that may cause infection. *Lactobacillus acidophilus* in particular has been shown to improve phagocytosis, a process in which phagocytes, a type of white blood cell, destroy bacteria and viruses. Some strains of probiotics produce natural antibodies that kill harmful bacteria.

Dosage: To support your immune system, look for a product that contains 3 to 4 billion organisms per gram. Take 1 gram daily for maintenance. Eat yogurt and kefir, which encourage probiotic proliferation.

NAC: N-acetyl-cysteine (NAC) is a powerful immune booster; it also helps your liver break down hazardous chemicals. NAC has been shown to be very effective in fighting cold and flu symptoms, while it shortens their duration.

Dosage: Take 500 to 600 mg daily, doubling the dose during cold and flu season. On the first day of cold or flu symptoms, you can increase the dose to up to 4000 mg to reduce the symptoms.

Note: After the first day, any cold or flu remedy will be less effective because viral concentrations will have increased.

Gastrointestinal Health

The digestive system is a series of connected organs whose purpose is to break down, or digest, food into small molecules that can be absorbed into the bloodstream, thus delivering nutrients to all of the cells in the body. Without proper digestion, the body simply cannot absorb the nutrients it needs to function; this can ultimately alter any system in the body. In addition to digesting food to be delivered as nutrients to the body, the gastrointestinal tract is home to trillions of beneficial bacteria, or probiotics. These invisible residents help fight disease, enhance immune function, and aid in digestion.

Fiber: There are two types of dietary fiber: insoluble and soluble. Insoluble fiber does not dissolve in water; it acts like a brush that sweeps through the colon. It aids digestion and elimination, promotes regularity, and contributes to bowel cleansing. Soluble fiber has the ability to soak up water. It stimulates the peristaltic wave in the colon and binds to fats and toxins in the gastrointestinal tract and carries them out of the body.

Dosage: The daily recommendation is 20 to 35 grams. It is best to get fiber from a mixture of sources such as oats, lentils, beans, seeds, fruits, and raw or lightly cooked vegetables. If you want to supplement, psyllium, pectin, bran, or flax seeds are good options.

Probiotics: Our bodies house trillions of microorganisms, with the majority residing in the digestive tract. Most of the estimated 400 to 500 species of these microorganisms are essential for optimal health. Our body has a symbiotic relationship with these friendly bacteria, also known as probiotics. Probiotics promote healthy digestion by secreting essential enzymes, encouraging peristalsis (the wave-like contractions of the intestine), and assisting in breaking down nutrients, which enhances food digestibility. *Lactobacillus acidophilus* is found in the small intestine and produces both lactase, to digest milk sugars, and lactic acid, which suppresses bacteria and yeast growth in the intestines. *Bifidobacterium bifidum* and *longum* are found in the large intestine. They produce acids that prevent bacteria, yeasts, and viruses from colonizing.

Dosage: Recommended doses for maintenance of intestinal microflora are about 1 to 2 billion units of *acidophilus* daily. A more specific recommendation is 5 billion *Lactobacillus acidophilus*, 20 billion *Bifidobacterium bifidum*, and 5 billion *Lactobacillus bulgaricus*.

FOS: Fructo-oligosaccharide (FOS) is a naturally occurring carbohydrate that is not digested or absorbed in the digestive tract, but supports the growth of certain probiotics. FOS has also been shown to reduce blood sugar and cholesterol, as well as increase calcium absorption.

Dosage: Research suggests that 4 grams of FOS daily significantly increases the number of *Bifidobacterium* in the gut.

Betaine hydrochloride: As mentioned earlier, hydrochloric acid is essential in digestion, which allows nutrients to be absorbed by the body. As the body ages, hydrochloric acid production slows significantly. Betaine hydrochloride (HCL) is the most common hydrochloric acid-containing supplement. It is available in tablets or capsules measured in grains or milligrams. Only people who have reduced levels of stomach acid, or “hypochlorhydria” should take this supplement; a doctor can diagnose this condition.

Dosage: When appropriate, doctors recommend taking 325 to 650 mg with a meal that contains protein.

Note: Large amounts of betaine HCL can burn the lining of the stomach. If you experience a burning sensation, discontinue use immediately. You should not take more than 650 mg of betaine HCL without the recommendation of a doctor. Those with a history of ulcers, gastritis, or other gastrointestinal symptoms such as heartburn should consult with a doctor before taking betaine HCL. In addition, betaine HCL should not be taken with nonsteroidal anti-inflammatory drugs (NSAIDs) or cortisone-like drugs.

L-Glutamine: Glutamine is the most abundant amino acid in the body and is the preferred source of fuel used for cells lining the small intestines; without it, these cells waste away. Research shows that glutamine supports overall intestinal health, which results in better digestion and assimilation of nutrients.

Dosage: Common doses fall between 500 and 1000 mg, three times daily.

Note: Try to take glutamine at least 20 minutes before, or 90 minutes after, a meal that contains protein.

Digestive enzymes: The body relies on digestive enzymes to help it digest and absorb food, but its ability to produce these enzymes decreases with age and the enzymes produced are not as active. Enzyme deficiency can lead to indigestion, bloating, immune dysfunction, food allergies, and lethargy. There are three main types of supplemental enzymes: animal, plant, and microbial. The best supplements contain a combination of three enzymes: lipase (breaks down fats), protease (breaks down proteins), and amylase (breaks down starches).

Dosage: Take one to two tablets with meals to enhance digestion and absorption.

RNA/DNA: RNA and DNA are nucleic acid supplements that can improve the healing of “gut” injuries, such as those caused by NSAIDs, and can significantly reduce the symptoms of irritable bowel syndrome (IBS), including abdominal pain, diarrhea, bloating, constipation, flatulence, and urgency to have a bowel movement.

Dosage: A general therapeutic dose is 500 mg three times daily.

Ginger: Ginger is a classic tonic for the digestive tract and is used for abdominal bloating, vomiting, and diarrhea. It stimulates digestion and keeps the intestinal muscles toned. Ginger may also help protect the stomach from the damaging effect of nonsteroidal anti-inflammatory drugs and ulcers.

Dosage: Herbalists suggest taking 2 to 4 grams of ginger powder two to three times daily. For treatment of nausea, approximately 250 to 500 mg should be taken every two to three hours.

Licorice: Licorice protects and heals the mucous membranes lining the digestive tract by increasing the production of mucin, a substance that protects against stomach acid and other harmful substances.

Dosage: Take one to two chewable tablets of licorice root in its deglycyrrhizinated form (DGL) 15 minutes before meals or one to two hours before bedtime.

Note: DGL has the glycyrrhizic acid removed; this is the portion of licorice root associated with increasing blood pressure in some people.

A Note on Dosages: Keep in mind, more is not always better. Everyone is unique, so it is important to look at individual lifestyles and other factors before you decide on a dosage. Large doses of certain nutrients may have undesirable effects in some individuals with medical conditions, or may reduce or enhance the effectiveness of prescription drugs. For your protection, consult your doctor or health care provider before taking therapeutic amounts of any nutrient.

29-10. Exercise for Optimal Health

Regular physical activity is essential for gaining and maintaining health. Exercise can improve blood pressure; increase bone density; strengthen cartilage, tendons, and ligaments; strengthen immunity; increase muscle strength; and improve mental function. Regular physical activity is also associated with decreased mortality and age-related morbidity in older adults. In one study, after following a five-month exercise program, senior participants saw a significant improvement of flexibility, balance, muscle strength, and walking ability, and a decrease in falls.³⁴ Despite all of this, up to 75 percent of older Americans are insufficiently active to achieve these health benefits.³⁵ Few contraindications to exercise exist, and almost all seniors can benefit from physical activity.

There are three major types of exercise: aerobic exercise, strength training, and balance and flexibility. Aerobic exercise should be continuous, steady, and use the body's largest muscles, such as the thighs. Aerobic exercises include walking, water aerobics, and dancing. Even moderate, daily activity like gardening, mowing the lawn, or taking the stairs instead of the elevator can be beneficial — every little thing adds up. Most experts agree that aerobic exercise should be done at least three to four times a week (more, if you can) for about 30 minutes each time.

In addition to aerobic exercise, you should also include resistance, or strength, training, for 30 minutes two days a week. This may include lifting light weights, using resistance bands, doing yoga, and/or unipedal standing. One study found that standing on one foot (unipedal standing) for one minute has the same effect on bone density as walking for 53 minutes.³⁶

Balance and flexibility exercises are particularly helpful in preventing falls because they improve both balance and mobility. These types of exercises also seem to bring a sense of calm and peace with them and may include yoga, tai chi, qi gong, and unipedal standing. Walking on textured surfaces such as smooth river stones, cobblestones, or sand may also help with balance and mobility. One study found that seniors who walked on cobblestone mats three times a week experienced significant improvements in balance and stability, and even reduced their blood pressure.³⁷

Remember that exercise should not be exhausting or unbearable. It should be uplifting and fun. Choose physical activity that best suits your individual needs, ability, and lifestyle, but above all, choose activities that you enjoy and look forward to!

³⁴ J. Iwamoto, *et al.*, "Preventative Effect of Exercise Against Falls in the Elderly: A Randomized Controlled Trial," *Osteoporos Int.* (Nov. 15, 2008).

³⁵ R.J. Nied and B. Franklin, 65 *Am. Fam. Nutr.* 3, 419-26 (Feb. 2002).

³⁶ K. Sakamoto, "Effects of Unipedal Standing Balance Exercise on the Prevention of Falls and Hip Fracture," 16 *Clin. Calcium* 12, 2027-32 (Dec. 2006).

³⁷ L. Fuzhong, *et al.*, "Healthy Benefits of Cobblestone-Mat Walking: Preliminary Findings," 11 *J. Aging and Phys. Activity* 4 (Oct. 2003).

29-11. Go Thrive!

Now you know how vital nutrition is in supporting your optimal health. You know that nutrients drive all of the biochemical processes that happen every second of every day in your body. Nutrients drive life. Unfortunately, though, deficiencies are common among the senior population, leading to many mind and body health problems. Be the exception; arm yourself with a natural, whole-food diet and consider the supplements that may benefit you the most. Remember that certain foods promote inflammation, and it is believed that chronic, low-level inflammation is the root of so many modern-day degenerative diseases such as arthritis, asthma, cardiovascular disease, and even cancer. There are also foods and certain nutrients that are anti-inflammatory, quenching inflammation in the body. In addition, you know that regular physical activity, including aerobic exercise, strength training, and balance and flexibility exercise will help keep you healthy, strong, and mobile. You have the knowledge you need to nourish, maintain, and protect your health. Go thrive!