

## **Nutritional Supplements**

Like many people, you may feel a bit bewildered at times by the glut of conflicting information about nutritional supplements. Depending on the source—health providers, government agencies, supplement manufacturers, etc.—recommendations can vary widely regarding which supplements you should take and at what dosages, or whether you need to take any supplements at all. Even the nutritional guidelines developed by the U.S. Government’s Institute of Medicine can leave the average person scratching their head. Called the Dietary Reference Intakes (DRI), these guidelines are broken into four subgroups: Estimated Average Requirement (EAR), Recommended Dietary Allowance (RDA), Adequate Intake (AI), and Tolerable Upper Intake Level (UL).

While it has long been known that lack of certain nutrients leads to disease (for example, insufficient vitamin C causes scurvy, insufficient vitamin D causes rickets), until only recently, recommended levels of nutrients in the diet were set at the minimum required to prevent such deficiency diseases. And common wisdom had long held that a “balanced diet” was all that was needed to obtain all the nutrients required to be healthy. We now know that to be far from the truth.

In part, this stems from the fact that our food is not as nutrient rich as it used to be. Once-fertile soil has been stripped of essential nutrients through decades of intensive farming. Fruits, vegetables and grains are transported thousands of miles and stored for months, and sometimes years, allowing nutrients to fade. And the way vast quantities of our food is processed and prepared removes additional nutrients. As a result, even in developed countries with abundant food supplies, much of the population is not getting all the nutrients they need.

As research related to nutrition and disease continues to expand, however, so too does new evidence supporting the need for nutritional supplementation. For example

- A study published in *Nature Reviews Cancer* in 2002 found that deficiencies of vitamins C, B6, B12, folic acid, iron and zinc can lead to DNA damage and cause cancer.
- A 2003 study commissioned by Wyeth Consumer Healthcare found that a simple daily multi-vitamin, if taken by all Americans over age 65, would save Medicare an estimated \$1.6 billion over 5 years by improving immune function and reducing risk of coronary artery disease.
- Nutritional supplementation has been found to improve memory, lower cholesterol levels, prevent prostate problems, relieve symptoms of menopause, reduce inflammation, and lower risk of cataracts.

We feel that nutritional supplementation can serve as one of our key strategies to optimal health.

There have been recent attacks in the media against vitamins and nutritional supplements that are based on poorly designed or biased studies. For example, a highly publicized 2004 study in the *Annals of Internal Medicine* attacking usage of vitamin E reported a slight increase in the risk of death from supplementing with vitamin E. There were many serious methodological problems with the study, but the most important was that the study was not about vitamin E at all but rather alpha tocopherol, which is only one component of vitamin E. Vitamin E consists of eight components: four tocopherols (alpha, beta, gamma, and delta) and four tocotrienols (alpha, beta, gamma, and delta). Many commercial brands of vitamin E are in fact just alpha tocopherol, which is not what we recommend. The most important fraction in vitamin E, which contributes to vitamin E's well-known anti-oxidant benefits, is gamma tocopherol, which constitutes about 70 percent of the vitamin E found naturally in food. Furthermore, supplementing with just alpha

tocopherol actually depletes the body of gamma tocopherol. Studies of mixed tocopherols show substantial health benefits. We recommend, therefore, that you take a blended form of vitamin E which contains all of the vitamin E components, especially the four tocopherols.

Another well publicized study appeared in 2007 in the *Journal of the American Medical Association* which denounced antioxidants in general. There were numerous serious problems with this study. The study again used alpha tocopherol for vitamin E rather than mixed tocopherols. For vitamin A they selected a strange study incorporating a single dose which is not the recommended way to take vitamin A. Of 815 studies on these supplements that the authors of this study could have utilized, only 68 were included. Reviews of the selection of studies that were included showed substantial bias with well-designed major studies showing substantial benefits having been excluded. For example, a study of 29,000 male smokers followed for 19 years showed a 28 percent reduction in mortality for individuals with the highest levels of vitamin E compared to those with the lowest levels. Another excluded study of over 3,000 people followed for six years showed significant reductions in mortality from heart disease and colorectal cancer in those with higher levels of vitamin A. There were dozens of other excluded studies that demonstrated substantial benefits from these supplements. Furthermore, this JAMA study looked only at vitamin A and C, alpha tocopherol, and selenium, and ignored numerous other antioxidants that have antioxidant benefits and that we recommend in this book.

## **Free Radicals vs. the Antioxidants**

Not quite an NFL clash of titans, but this is a critical contest nonetheless. In fact, your life depends on it. When gasoline combines with oxygen in the cylinders of your automobile engine to provide power to the wheels, byproducts are expelled through the exhaust pipe. In similar fashion, free radicals are byproducts created when nutrients are oxidized in your cells to produce

the energy you need to survive. You can also absorb free radicals from the environment, particularly if you are exposed to high levels of toxins. Regardless of the source, free radicals play a significant role in aging your body's systems and organs.

Compared with stable molecules which have a set number of paired electrons, free radicals are missing an electron in their outer shell. Stability is the preferred state for molecules so, in order to become stable again, a free radical steals an electron from another molecule to replace the one it is missing. But that leaves the donor molecule missing an electron, meaning it is now turned into a free radical itself, and it then needs to steal an electron from another molecule. All this petty theft can damage critical cell structures, hindering their ability to function properly or worse. For example, when a DNA molecule containing your genetic code is damaged in this way, genetic mutations can get passed on as the cell replicates itself and this can lead to cancer.

If production of free radicals were to continue unchallenged, they would pile up in your body and eventually kill you. That's where antioxidants come in. Also known as free-radical scavengers, antioxidants neutralize free radicals in part by giving up electrons to them so they don't steal from the crucial molecules in your cells. Antioxidants come from two sources, those you eat and those your body creates.

Antioxidants contained in food and nutritional supplements include vitamins A, C, and E, and the mineral selenium. Also on this list are vitamins B2, B3, and B6, as well as alpha lipoic acid, grape seed extract, and coenzyme Q10. Diet alone cannot supply enough of these antioxidants to keep free radicals under control, especially as you age, so supplementation is required.

Your cells also produce free-radical scavengers known as *antioxidant enzymes*. Generally speaking, enzymes are proteins created to bring about chemical reactions that result in the formation of other substances your cells need in order to function. Your body produces thousands of different enzymes, each structured to perform a specific task, for example, the enzymes that aid in the digestion of fats, sugars or proteins. To carry out their functions, however, many of these enzymes require vitamin or mineral cofactors; that is, these enzymes must react with a specific vitamin or mineral or they can't do their job. Taking vitamin and mineral supplements ensures that enough of these cofactors are present in your body to meet the needs of your enzymes, including the antioxidant enzymes needed to battle those free radicals.

You may ask why not just take antioxidant enzymes in supplement form. The problem with that approach is that antioxidant enzymes are poorly absorbed by the digestive system. The best way to be sure your antioxidant enzymes are functioning at peak capacity is to be sure sufficient quantities of vitamin and mineral cofactors are on hand by taking them as nutritional supplements.

## **Supplement Recommendations**

Results of scientific research often take time to move from laboratory to practice and when it comes to nutritional supplementation, new discoveries can take quite some time, indeed. It wasn't until 2001 that the *New England Journal of Medicine* suggested that most adults could benefit from a daily multivitamin supplement at the RDA level, with perhaps higher levels of folic acid, vitamins B6, B12 and D for those at risk of cardiovascular disease and vitamin D and calcium for bone loss. For the majority of physicians who had been taught that supplements were a waste of their patients' money, and that all supplements did was create "expensive urine," this was a sea change. Meanwhile, dramatic new research continues to improve understanding of

how vitamins and antioxidants work in the body with numerous articles on the subject being published in scientific journals each year supporting nutritional supplementation to prevent specific diseases and promote optimal overall health.

But what do *you* need to take and how much is enough? It depends on who you are, your genetic makeup and your specific environment. It is clear, however, that you often need much more than RDA amounts as defined by the Institute of Medicine. For one thing, the RDAs don't take into account any variations you may have in your genetic code. And, as the government guidelines state, the RDA is based on "the average daily nutrient intake level sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) *healthy* individuals in a particular life stage and gender group."

This assumes, however, that the average person is "healthy" and clearly many of us are not. Do the two out of three people in the U.S. who are overweight or the one in three that are obese count as healthy? How about the tens of millions who are on medication for high blood pressure, diabetes, heartburn, headaches, allergies, arthritis, depression and erectile dysfunction? If these individuals enjoyed better nutrition thanks to eating better and taking nutritional supplements, perhaps they wouldn't need to take so much medicine and *then* could be counted as healthy. But, this is not the case.

Therefore, rather than focusing on RDA amounts, we prefer to look at what we refer to as Optimal Nutritional Allowances (ONAs), meaning dosages designed to optimize your health based on who you are, not merely to prevent deficiency diseases. Individual requirements necessarily vary due to differences in age, gender, genetic anomalies and lifestyle, so our ONA recommendations cover a broad dosage range. We suggest starting at the lower end of these

recommendations and working your way up as and if needed unless you know you have a specific health condition that calls for larger dosages.