

## **The Sulfur Solution By Jack Challem**

Sulfur is unquestionably an essential nutrient. So why doesn't anyone consider it that?

Imagine a nutrient more important to health than magnesium, zinc, iron, copper, sodium, iodine—and, for that matter, many vitamins. Assume that it has incredibly diverse roles, boosting resistance to disease, helping regulate blood sugar, preventing aches and pains, and even holding your skin and organs together.

It's a nutrient so essential for life that you would die without it. But get this: it has been all but ignored by dietitians, physicians, and researchers.

The nutrient is sulfur, a yellow mineral referred to as brimstone in the Bible and used medicinally for thousands of years.

Flip through most nutrition textbooks, and you'll discover that sulfur is hardly ever mentioned, despite it being the third most abundant mineral (after calcium and phosphorus) in the body, accounting for 1 percent of your weight.

"Yes, sulfur is essential," says Ekhard E. Ziegler, MD, of the University of Iowa School of Medicine, Iowa City and coeditor of the authoritative *Present Knowledge in Nutrition* (ILSI Press, 1996). "But no, it's not essential beyond it being in methionine and cysteine. You get enough sulfur from amino acids."

Mel Werbach, MD, author of the *Textbook of Nutritional Medicine* (Third Line Press, 1999), sees sulfur as a blind spot in nutrition and medicine. "The value of sulfur supplementation has been poorly investigated," he observes, "even though sulfur baths and injections are old-fashioned arthritis treatments which are still popular in many countries."

### **Found in Every Living Cell**

The dearth of research on nutritional sulfur is puzzling. Because it is an element, the body cannot make it and instead, must obtain sulfur from food.

"Here is an essential nutrient that no one sees as being that," says Ronald M. Lawrence, MD, PhD, coauthor of *The Miracle of MSM: The Natural Solution for Pain* (G.P. Putnam's Sons, 1999). "We don't learn anything about sulfur in medical school. Sulfur has been the most understudied and overlooked nutrient."

Sulfur is found in every living cell. It's part of the molecules that form the amino acids (protein building blocks) methionine, cysteine, and taurine, which are essential for health. It's a constituent of vitamin B1 and biotin, the antioxidant glutathione, the anticoagulant heparin, and coenzyme A, which drives energy production in cells. Sulfur is an integral part of the biological cement that forms skin, hair, nails, and the cartilage that shapes your nose and pads your joints.

Yet, says Lawrence, there is no officially recognized "sulfur-deficiency syndrome." That's a problem other nutrients, such as vitamin E and selenium, had to suffer with for years-before they were recognized as essential for health, he adds.

## **Long Used as a Medicine**

The medicinal use of sulfur goes back thousands of years to the Trojan Wars, when wounded soldiers healed in the sulfur Baths of Agamemnon. Sulfur baths are still popular for treating joint and other diseases around the world. Similarly, sulfur-rich garlic has been used for several millennia to prevent and treat diseases. It contains powerful antibacterial substances, which may explain the garlic's extensive use as a folk medicine.

Sulfur is also a common ingredient in homeopathic remedies, developed in the 19th century and still popular today as over-the-counter remedies. In the 1920s, "colloidal sulfur" was used to treat arthritics. Now, researchers understand that sulfur forms part of the matrix of bone joints in the form of chondroitin sulfate and glucosamine sulfate.

Before the advent of antibiotics in the 1940s, sulfur-containing drugs—sulfa drugs—were commonly used to treat infectious diseases. Sulfur has powerful antibacterial properties. Many of sulfa drugs are still prescribed by physicians, and sulfur is a component of penicillin-class antibiotics and many other medicines.

## **Sulfur-Containing Supplements**

Do you get enough sulfur from the diet you eat? Many dietitians will say that people obtain adequate sulfur as long as they eat methionine-rich meat. But other foods also provide large amounts of sulfur, including egg yolks, broccoli, cauliflower, kale, Brussel sprouts, watercress, radish, leek, onion, and of course garlic. Unfortunately, many people dislike these foods or, as in the case of eggs, avoid them.

Some of the most popular-and beneficial-dietary supplements on the market are rich sources of sulfur. A diverse group of sulfur-containing molecules in the diet provides a biochemical "toolbox" that the body can draw on. Indeed, Lawrence says research has demonstrated that supplemental sulfur is incorporated into amino acids.

Among the popular sulfur-containing supplements are: alpha-lipoic acid, chondroitin and glucosamine sulfate, garlic, glutathione, methylsulfonylmethane (MSM), N-acetylcysteine, and S-adenosyl-L-methionine (SAME). It's likely that these supplements are beneficial because they donate a variety of biologically active sulfur compounds to a multitude of body processes.

The value of any dietary supplement is often determined by its benefit, says Hugh Riordan, MD, who heads *The Bright Spot for Health Clinic* in Wichita, Kansas. "If someone benefits after taking a supplement, they obviously had a problem that the supplement corrected."

These are some of the most popular sulfur-containing supplements:

**Alpha-lipoic acid.** A vitamin-like substance found in foods (beef and spinach) and produced by the body, alpha-lipoic acid plays key roles in energy production. It is part of a process that breaks down glucose (blood sugar) and burns it for energy. Studies have found that alpha-lipoic acid can lower and stabilize glucose levels in diabetics by as much as 30 percent. It also reverses nerve pain and numbness in diabetes. Lester Packer, PhD, of the University of California, Berkeley, has reported that alpha-lipoic acid can reenergize other important antioxidants, such as vitamins C and E and glutathione. Packer believes, based on animal studies, that alpha-lipoic acid holds tremendous potential in helping stroke victims recover. Dosage: 50-300 mg daily.

**Chondroitin and glucosamine sulfate.** Both chondroitin sulfate and glucosamine sulfate help form cartilage tissue, particularly in the pads that cushion joints. Thin or absent joint cartilage results in osteoarthritis, in which bones grind against each other. Medical studies support both chondroitin and glucosamine sulfate supplements. In an analysis of 13 studies, researchers at Case Western University School of Medicine reported that supplements of each resulted in a 40 percent improvement in osteoarthritic symptoms. Some research has also found that chondroitin sulfate works better than analgesic drugs at relieving pain. In a recent U.S. Navy study, researchers found that a combination of chondroitin sulfate, glucosamine sulfate, and vitamin C reduced osteoarthritic symptoms by 26 to 43 percent (depending on the specific symptom). Dosage: glucosamine, 1,500 mg, and chondroitin, 1,200 mg daily.

**Garlic.** Sitting on the shelf, garlic has little biological activity. But dicing and cooking it triggers a cascade of chemical reactions (starting with oxidation), that lead to more than 100 sulfur-rich chemical compounds, including some sulfur-containing amino acids. Garlic boosts antioxidant levels in the body, and virtually every form of the food has some health benefits. Studies have found that garlic supplements can lower cholesterol levels in people. John Milner, PhD, of Pennsylvania State University, University Park, and other researchers have reported that garlic can block the action of cancer-causing compounds and, in laboratory animals, delay the growth of some cancers. Dosage: add garlic liberally to food, or take 500-2,000 mg daily in supplemental form.

**Glutathione.** Described by chemists as a tripeptide (composed of cysteine, glycine, and glutamic acid), glutathione is the most powerful antioxidant made by the human body. Not surprisingly, low blood levels of glutathione are associated with heart disease, cancer, and other diseases. In addition, glutathione also helps the liver break down toxic chemicals, whether they are absorbed from the environment or produced by the body. Researchers recently reported that diets high in glutathione protected against lung cancer. Good dietary sources of glutathione include beef, potatoes, winter squash, oranges, and tomatoes. More than 90 percent of the nonprotein-bound sulfur in cells is found in glutathione. Dosage: 75-150 mg daily.

**Methylsulfonylmethane (MSM).** Although scientific research on MSM is limited, 55,000 studies have been published on the closely related dimethyl sulfoxide (DMSO). Stanley Jacob, MD, of Oregon Health Sciences University, Portland, a pioneer in researching both MSM, has found MSM very effective in reducing muscle and joint pain, interstitial cystitis (a type of very painful bladder inflammation). According to Jacob, MSM also eases symptoms of scleroderma, a chronic degenerative disease that scars skin, joints, and connective tissue. By weight, MSM is 34 percent sulfur. Dosage: 1,000-2,000 mg daily.

**N-acetylcysteine.** Virtually every hospital emergency room stocks N-acetylcysteine (NAC) as an antidote for acetaminophen (Tylenol) poisoning. Acetaminophen depresses glutathione production in the liver, whereas NAC restores it. In a study of 262 elderly people, supplements of 1,200 mg of NAC daily reduced the occurrence of flu symptoms by two-thirds. Researchers at Stanford University have reported that high dosages of NAC significantly extend the life expectancy of AIDS patients. Preliminary research also suggests that it may be helpful in preventing cancer. NAC is completely safe, unlike pure cysteine, which can damage brain cells. Dosage: 500-2,000 mg daily.

**S-adenosyl-L-methionine.** Better known as SAMe (pronounced "sammy"), this nutrient plays a central role in a process biochemists call methylation. By donating "methyl groups" containing carbon and hydrogen to 40 major chemical reactions, SAMe promotes the building of new cells and essential processes in existing cells. Because of these fundamental roles in health, SAMe has been shown helpful in treating depression, controlling inflammation and pain, and speeding healing. Dosage: 200-400 mg daily.

Although each of these supplements is rich in sulfur, each also provides health benefits for other reasons as well. For example, alpha-lipoic acid is a powerful antioxidant. NAC and glutathione enhance immune function. And glucosamine sulfate and chondroitin sulfate help rebuild damaged joints.

You certainly don't need to take all of these. But keep the sulfur solution in mind—you can't go wrong.