sulfur-rich nutrients

What do garlic, glutathione, glucosamine, NAC, alpha-lipoic acid, chondroitin, and MSM have in common? Sulfur—a compound that helps the body heal in a variety of ways

THE BASICS: Sulfur-containing nutrients have tremendous health benefits, from maintaining healthy joints to boosting the immune system. Sulfur is found in every cell of the body. Many amino acids (protein building blocks), vitamins, and mineral compounds also contain sulfur.

HOW SULFUR WORKS: Sulfur's bioactivity appears to be strongly influenced by the chemicals it's attached to. A recent article in Nutrition & Metabolism suggested that many people, especially seniors, don't get enough sulfur from their diets. Sulfur is needed for the normal structure and function of proteins—important because, aside from water, most of the human body consists of protein.

HEALTH BENEFITS: Sulfur-rich supplements have diverse benefits.

Glutathione. This vitamin-like substance and related compounds, such as glutathione peroxidase, are the most powerful antioxidants made within the body. Glutathione also plays essential roles in breaking down hazardous chemicals. Because glutathione is generally not well absorbed, use N-acetylcysteine or alpha-lipoic acid as precursors.

N-acetylcysteine (NAC). Rich in sulfur, NAC quickly boosts glutathione levels. According to an Italian study of seniors, NAC supplements can block influenza symptoms. Recent studies have found that NAC supplements reduce drug and alcohol cravings, as well as several types of obsessive-compulsive behavior. One study found that NAC supplements eased symptoms of polycystic ovary syndrome. Try 500 to 2,000 milligrams daily. Take NAC and all other amino acids on an empty stomach.

Garlic. Garlic can help lower blood pressure and cholesterol levels; it also enhances immunity. Prepare garlic by mashing it and letting it sit for 10 to 15 minutes to allow the sulfur compounds to completely form.

Vitamin B1. This sulfur-containing vitamin helps drive the Krebs cycle, the biochemical process that breaks down food for energy. A high intake of carbohydrates increases vitamin B1 requirements. Large supplemental doses of vitamin B1 can lower levels of microalbuminuria (a sign of kidney damage) in people with type 2 diabetes. Try 50 to 300 milligrams daily.

Biotin. This little-known B vitamin plays fundamental roles by regulating genes involved in the metabolism of glucose, amino acids, and fatty acids. Large amounts of biotin can lower triglyceride levels, and a combination of biotin and chromium picolinate can

product examples

(From left)

DOCTOR'S BEST BEST STABILIZED R-LIPIC ACID defends against free radicals and helps the body recycle vitamins C and E. Ideal for diabetics to help stabilize blood sugar.

WAKUNAGA-KYOLIC AGED GARLIC EXTRACT CARDIOVASCULAR FORMULA 100 contains odorless organic aged garlic to help maintain circulatory function and support cardiovascular health.

JARROW FORMULAS GLUTATHIONE REDUCED 500 provides 500 mg of glutathione, an antioxidant involved in detox, the production of coenzymes, and free radical defense.

NATURAL FACTORS MSM JOINT FORMULA eases painful joints with a combination of MSM, glucosamine, and chondroitin.

NOW FOODS NAC assists the body in producing the amino acid glutathione, needed to utilize protein. In addition, NAC helps prevent infection and aids in detox.
lower blood sugar levels. Try 1,000 to 5,000 micrograms one to two times daily. Be sure to monitor your blood sugar and talk with your doctor about adjusting your medication if your blood sugar goes lower than normal levels.

Alpha-lipoic acid. This vitamin-like antioxidant improves insulin function and relieves nerve pain and numbness in people with type 2 diabetes. Try 300 to 600 milligrams one to three times daily. Again, be sure to monitor your blood sugar, which can also be lowered with alpha-lipoic acid.

Glucosamine sulfate. More than 40 human studies have found that glucosamine sulfate supplements reduce pain from knee osteoarthritis. Two of the studies, which were published in major medical journals, reported that glucosamine sulfate supplements actually stimulated the production of new knee cartilage. According to a small study at McGill University in Montreal, the sulfate part of the molecule may be more important than glucosamine, so be sure to use it rather than the HCl form. Try 1,500 milligrams daily in divided doses.

Chondroitin sulfate. Although the research on chondroitin sulfate is not as strong as with glucosamine, it too can reduce pain from osteoarthritis. The benefits were noticeable in a 2009 article in *Arthritis & Rheumatism*, as well as in other studies. Chondroitin forms part of the cartilage matrix in joints. Try 1,200 milligrams daily.

Methylsulfonylmethane. Commonly known as MSM, this supplement is 34 percent elemental sulfur. It is the oral form of dimethyl sulfoxide, also called DMSO. MSM supplements significantly reduced pain and improved physical functioning in a study of 50 patients, published in *Osteoarthritis and Cartilage*. Another study reported that a combination of MSM and glucosamine sulfate was far better than the latter alone in reducing pain. Try 1,000 to 5,000 milligrams daily, starting with 1,000 milligrams and increasing your dose by 1,000 milligrams per day, as some people have digestive upset from MSM.

BACKGROUND CHECK: Sulfur is the third most abundant mineral in the body after calcium and phosphorus. By sheer quantity, sulfur is more important to health than magnesium, zinc, iron, copper, sodium, iodine—and, for that matter, all vitamins.

HEADS UP: Why does garlic lower blood pressure? It's the sulfur. A recent study found that the allicin in garlic gets converted to hydrogen sulfide, which relaxes the blood-vessel cells.

WHAT YOU SHOULD TAKE: Consider taking at least one sulfur-containing supplement. If you're in generally good health, opt for N-acetylcysteine because of its broad benefits.