



# Copper

## Function:

Like most trace minerals, copper acts as an enzyme cofactor in several key metabolic processes in the body. Among its many functions, copper aids in the formation of bone, hemoglobin and red blood cells, therefore enabling the efficient transport of oxygen throughout the body.

In addition, copper works in balance with vitamin C and zinc to manufacture elastin (skin protein) as well as collagen and other structural proteins in cartilage and tendons. It is also involved in the healing process, energy production, hair and skin coloring (production of melanin) and taste sensitivity.

Copper stimulates the absorption of iron through the copper transport protein ceruloplasmin. Copper also aids in the metabolism of several fatty acids and helps prevent oxidative damage by serving as a cofactor to superoxide dismutase. In addition, copper is needed for proper insulation (myelination) of nerve cells and serves as a cofactor for the synthesis of the neurotransmitter norepinephrine.

## Deficiency Symptoms:

Due to copper's role in the formation of collagen, copper deficiency can manifest as osteoporosis. Other possible signs of deficiency include anemia (due to its role in hemoglobin formation), baldness, diarrhea, general weakness, impaired respiratory function, myelopathy, decreased skin pigment, reduced resistance to infection and increased triglyceride levels. Evidence also links copper deficiency with increased oxidative damage to cell membranes.

## Repletion Information:

The RDA for copper is 2 mg per day. Pharmacologic doses of copper in scientific studies usually range from 2-4 mg per day. Ingesting amounts over 10 mg per day regularly can result in nausea, although toxicity will typically only occur at much higher levels (200 times the RDA). Ingestion of excessive levels of zinc, vitamin C or fructose can cause copper deficiency. About 30% of dietary copper is assimilated. Good dietary sources of copper include the following:

Oysters	Seeds	Dark leafy vegetables
Organ meats	Dried legumes	Whole grain breads
Nuts	Shellfish	Chocolate
Soybeans	Oats	Blackstrap molasses