

## Manganese

### Facts:

- ◆ Manganese is a trace mineral that is believed to be an essential mineral. It is concentrated mainly in the bone, liver, pancreas, and brain.
- ◆ On average, most people excrete about 4 mg. of manganese each day.<sup>1</sup>
- ◆ Dietary sources of manganese include whole grain cereals, eggs, nuts, seeds, and green vegetables. The majority of manganese is lost in the processing and milling process of foods and, in the case of vegetables, manganese content varies depending on the amount contained in the soil.

### Functions:

- ◆ Manganese is a component of several enzymes and, therefore, acts as a catalyst in the synthesis of cholesterol and fatty acids, and plays a role in protein, fat, and carbohydrate production.<sup>1</sup>
- ◆ It also activates a number of other enzymes including formation of cartilage in the bone and skin.<sup>2</sup>
- ◆ Manganese is important for the production of milk, formation of urea, or part of the urine. It also maintains sex-hormone production, nourishes the nerves and brain, and is essential for the formation of thyroxine, an important component of the thyroid gland.

### Requirements:

The estimated intake (ESADDI) ranges established by the Food and Nutrition Board of the U.S. National Academy of Sciences are as follows<sup>2</sup>:

Age:	ESADDI (milligrams):
Children ages 1-3 yrs.	1.0-1.5 mg
4-6	1.5-2.0 mg
7-10	2-3 mg
11-18	2-5 mg
Adults	2-5 mg

### Signs of Deficiency:

Symptoms include: dizziness, ear noises, loss of hearing, impaired glucose tolerance and cholesterol metabolism, atherosclerosis, ataxia (failure of muscle coordination).<sup>1</sup>

### Safety:

People with liver failure should not take manganese supplements. Some patients with end-stage liver disease have been found to have high manganese levels. Manganese supplements are also contraindicated in those who are hypersensitive to manganese-containing supplements.

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### Signs of Toxicity:

According to the American Society for Nutrition, "There is no evidence of toxicity occurring from ingestion of typical diets."<sup>2</sup> Toxicity has occurred from industrial exposure, *i.e.* miners inhaling manganese dust and drinking contaminated well water. Symptoms include: weakness and psychological and motor difficulties.<sup>1</sup>

### Current Research:

General: Lower manganese levels have been noted in patients with osteoporosis, non-trauma epilepsy and Perthes' disease. In addition, low levels of manganese lower the levels of Mn-superoxide dismutase, which prevents tissue damage caused by the oxidation of fat. This, in turn, may increase one's risk for colon cancer. Manganese has been shown to be helpful in treating diabetes.

Osteoarthritis: In a recent randomized, placebo-controlled, double-blind study, manganese ascorbate, taken with glucosamine hydrochloride and chondroitin sulfate, reduced knee pain in individuals suffering from osteoarthritis of the knee.<sup>2</sup>

Schizophrenia: Many schizophrenics have high levels of copper in the body. Manganese, as well as zinc, has been shown to be effective in excreting copper from the body.<sup>1</sup>

### References:

1. Dunne, L.J (1990). In: *Nutrition Almanac* ( 3<sup>rd</sup> ed., pp. 80-81). New York, NY:McGraw-Hill Publishing Company.
2. Medical Economics Company. Manganese. In: *Physicians' Desk Reference* ( 1<sup>st</sup> ed., pp. 296-98). Montvale, NJ:Medical Economics Company.
3. Freeland-Graves J., Johnson P. American Society for Nutrition. Retrieved from:  
<http://www.jn.nutrition.org/nutinfo/content/mang.shtml>.