Massachusetts Department of ENVIRONMENTAL PROTECTION

f a c t s h e e t

Copper and Your Health[1]

In 1991, the U.S. Environmental Protection Agency established guidelines for controlling lead and copper levels in public water supplies. The information contained in this presentation will discuss the health effects of copper and ways to reduce exposure to copper in drinking water.

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What is copper?

Copper is a reddish metal that occurs naturally in rock, soil, water, sediment, and air. Its unique chemical and physical properties have made it one of the most commercially important metals. Since copper is easily shaped or molded, it is commonly used to make pennies, electrical wiring, and water pipes. Copper compounds are also used as an agricultural pesticide, and to control algae in lakes and reservoirs.

Copper also occurs naturally in plants and animals. It is an essential element for all known living organisms, including humans. However, very large single or long-term intakes of copper may harm your health.

How are people exposed to copper?

Copper and its compounds are common in the environment. You may be exposed to copper by breathing air, eating food, or drinking water containing

[1] Excerpt from Wisconsin website

copper. You may also be exposed by skin contact with soil, water, or other copper-containing substances.

Copper forms different compounds when it joins with one or more other chemicals. These may be naturally-occurring or man-made. Most copper compounds found in air, soil, and water are strongly attached to dust or embedded in minerals, and cannot easily enter the body. These forms are not likely to affect your health. Other forms become dissolved in water and are not attached to other particles. In this form, copper is more likely to affect your health.

Levels of copper found naturally in ground water and surface water are generally very low; about 4 micrograms of copper in one liter of water (4 ug/L) or less. However, drinking water may contain higher levels of a dissolved form of copper.

High levels of copper occur if corrosive water comes in contact with copper plumbing and copper-containing fixtures in the water distribution system. If corrosive water remains motionless in the plumbing system for six hours or more, copper levels may exceed 1,000 ug/L. The level of copper in drinking water increases with the corrosivity of the water and the length of time it remains in contact with the plumbing.

What are the health effects of copper?

Copper is a necessary micronutrient and is needed in small "trace" amounts for good health but too much copper in the diet or in drinking water may cause adverse health effects. Some people who consume drinking water with copper in excess of the EPA action level of 1300 ug/L may experience nausea, vomiting, diarrhea, and stomach cramps. However, most people are unlikely to experience health problems from exposure to modestly elevated copper levels in drinking water because the human body has a natural mechanism for maintaining the proper level of copper in it. People with Wilson's disease, children less than one year old, and individuals with liver disease cannot eliminate excess copper from their bodies as well and are more likely to experience negative health effects on the liver and kidney from short-term exposure to copper levels that exceed the EPA's action level.

How much copper is safe?

On the average, drinking water accounts for less than 5% of our daily copper intake. The U.S. Environmental Protection Agency (U.S. EPA) has determined that copper levels in drinking water should not exceed 1300 ug/L. No adverse health effects would be expected if this level is not exceeded. Measures should be taken to reduce exposure to copper if this level is exceeded.

Massachusetts Department of
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How do I know if my drinking water has too much copper?

Because copper exhibits these harmful health effects, and because drinking water may be a significant route of exposure to copper, it is important to know how much copper is in your drinking water. You may find that there is a metallic taste in your drinking water before copper levels are high enough to cause adverse health effects. You may also notice blue or blue-green stains around sinks and plumbing fixtures. The only way to be certain of the copper level in your drinking water supply is to have the water tested. It is recommended that you use a laboratory that is state certified to analyze copper levels in drinking water.

If you are being served by a public water system, the owner of the utility will have results of copper sampling which has been done in parts of the distribution system. You may wish to consult the utility owner before testing your drinking water for copper.

How do I know if my school drinking water has too much copper?

In Massachusetts school officials should use the Massachusetts Department of Environmental Protection (DEP) sampling procedures identified for lead in drinking water to evaluate their schools for copper. The sample collection protocol for copper is the same as for lead. See http://www.mass.gov/eea/agencies/massdep/water/drinking/how-to-collect-a-drinking-water-sample-for-lead-and-coppe.html.

What should I do if my drinking water has too much copper?

The easiest and most effective method for reducing exposure to copper is to avoid drinking or cooking with water that has been in contact with your house plumbing for more than six hours. When first drawing water in the morning or after a work day, flush the system by running the cold water faucet until the water gets as cold as possible. (If you live in an apartment complex, flushing the system may take longer). Water used for showering or washing also helps flush the system, but each faucet where water is drawn for drinking or cooking purposes should be flushed separately.

Another option for reducing your exposure to copper is to purchase bottled water. This may be a useful option, particularly if it will be used by young children as drinking water, or for making infant formula. However, you should exercise care to obtain bottled water which meets all drinking water standards. If you are experiencing elevated copper levels in drinking water, it may be likely that lead levels are also elevated. This is especially true if the plumbing system in your home or apartment contains lead solder joints, lead service lines, or brass fixtures. Since lead and copper enter drinking water under similar conditions, it is advisable to test for lead when testing for copper.

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What action has the federal government taken to reduce my exposure to copper?

The U.S. EPA promulgated National Primary Drinking Water Standards for lead and copper on June 7, 1991. These standards are applicable to all public water systems, and require them to begin monitoring for lead and copper at consumer taps no later than July, 1993. If the EPA action level of 1,300 ug/L for copper is exceeded, the utility must conduct further testing to determine if the corrosivity of the water is contributing to an increase in the copper levels. They are also required to implement optimum corrosion control measures to reduce the corrosivity of the water to acceptable levels. If you have questions regarding copper monitoring, contact your water utility.

Additional information

If you need additional information regarding copper in drinking water, contact the Massachusetts Department of Environmental Protection Drinking Water Program at 617-292-5770 or Program.Director-DWP@state.ma.us.

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