

Chromium

What is chromium?

(Pronounced kro' me-um)

Chromium is a naturally occurring element found in rocks, soil, plants, animals, and in volcanic dust and gases.

Chromium has three main forms chromium(0), chromium(III), and chromium(VI). Chromium(III) compounds are stable and occur naturally, in the environment. Chromium(0) does not occur naturally and chromium (VI) occurs only rarely. Chromium compounds have no taste or odor. Chromium(III) is an essential nutrient in our diet, but we need only a very small amount. Other forms of chromium are not needed by our bodies. Chromium is used for making steel and other alloys, bricks in furnaces, and dyes and pigments, and for chrome plating, leather tanning, and wood preserving.

What happens to chromium when it enters the environment?

- Manufacturing, disposal of products or chemicals containing chromium, or burning of fossil fuels release chromium to the air, soil, and water.
- Chromium particles settle from air in less than 10 days.
- Chromium sticks strongly to soil particles.
- Most chromium in water sticks to dirt particles that fall to the bottom; only a small amount dissolves.
- Small amounts move from soil to groundwater.
- Fish don't take up or store chromium in their bodies.

How might I be exposed to chromium?

- Breathing contaminated workplace air (stainless steel welding, chromate or chrome pigment production, chrome plating, leather tanning)
- Handling or breathing sawdust from chromium treated wood
- Breathing contaminated air, or ingesting water, or food from soil near waste sites or industries that use chromium
- Very small amounts of chromium(III) are in everyday foods

How can chromium affect my health?

All forms of chromium can be toxic at high levels, but chromium(VI) is more toxic than chromium(III). Breathing **very high levels** of chromium(VI) in air can damage and irritate your nose, lungs, stomach, and intestines. People who are allergic to chromium may also have asthma attacks after breathing high levels of either chromium(VI) or (III).

Long term exposures to **high or moderate levels** of chromium(VI) cause damage to the nose (bleeding, itching, sores) and lungs, and can increase your risk of non-cancer lung diseases.

Ingesting very large amounts of chromium can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death.

We don't know if chromium harms the fetus or our ability to reproduce. Mice that ingested large amounts of chromium had reproductive problems and offspring with birth defects.

Skin contact with liquids or solids containing chromium(VI) may lead to skin ulcers. Some people have allergic reactions including severe redness and swelling.

How likely is chromium to cause cancer?

The Department of Health and Human Services has determined that certain chromium(VI) compounds are known carcinogens. This is based on increased lung cancer in some workers who were exposed to chromium. Animal studies also indicate chromium(VI) is a carcinogen. We do not have enough data to determine if chromium(0) or chromium(III) are carcinogens.

Is there a medical test to show whether I've been exposed to chromium?

Chromium can be measured in the hair, urine, serum, red blood cells, and whole blood.

Tests for chromium exposure are most useful for people exposed to high levels. These tests cannot determine the exact levels of chromium you were exposed to or predict how the levels in your tissues will affect your health. Skin patch tests may indicate if you are allergic to chromium.

Has the federal government made recommendations to protect human health?

The Environmental Protection Agency (EPA) sets a maximum level for chromium(III) and chromium(VI) in drinking water of 100 micrograms of chromium per liter of water (100 µg/L).

The Occupational Safety and Health Administration (OSHA) sets limits for an 8-hour workday, 40-hour workweek of 500 micrograms chromium per cubic meter of air (500 µg/m³) for water-soluble chromic [chromium(III)] or chromous [chromium(II)] salts and 1,000 µg/m³ for metallic chromium [chromium(0)], and insoluble salts. Chromic acid and chromium(VI) compounds in the workplace air should not be higher than 100 µg/m³ for any period of time.

The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 500 µg/m³ for chromium(0), chromium(II), and chromium(III) for a 10-hour workday, 40-hour workweek. NIOSH considers all chromium(VI) compounds to be potential occupational carcinogens, and recommends an exposure limit of 1 µg/m³ for a 10-hour workday, 40-hour workweek.

The National Research Council (NRC) recommends a dietary intake of chromium(III) of 50-200 µg/day. In the United States, severe chromium deficiency is rare, but marginal deficiency may be more common. Chromium(III) is believed to help insulin maintain normal glucose levels.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for chromium. Atlanta: U.S. Department of Health and Human Services, Public Health Service.

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