



Measuring metals in human hair

Frequently asked questions (FAQ)

This FAQ fact sheet provides information on the use of hair and hair follicle testing for determining either the exposure to metals or possible health risks posed by these contaminants.

Metals, sometimes called heavy metals, such as lead, mercury, cadmium, copper, iron and arsenic, can be measured in hair but at present hair levels are not considered a good marker of either exposure or health. Therefore, results of hair monitoring should be treated with caution.

If you, or any member of your family have had hair tested for metal levels and are concerned about what the results mean, our advice is to follow up with your medical practitioner, who can also determine if a blood or urine test is needed.

Why test for metals in the body?

Metals can enter the body from the food and drink we consume (ingestion), the air we breathe (inhalation) and, less often, by what we touch (absorption). At high enough levels some metals can cause health problems. Measuring metals in the body may help to understand if these may be contributing to poor health and if an exposure source needs to be investigated. However, to be useful the measurements should accurately reflect:

- the concentration of metals in our body
- our exposure to the metals.

How are heavy metals measured in the body?

Heavy metals can be measured in both human fluid (e.g. blood, urine and saliva) and tissue (e.g. hair, teeth and toenails).

Urine and blood are the most common samples used to test metals because they best reflect what is in our body. For some metals, there are widely accepted reference or guideline levels for blood, or urine. Reference/guideline levels are set below an amount that would result in a health impact and are used to trigger an investigation into the reason for elevated levels to prevent or reduce exposure and risk to health.

What is hair testing?

A small amount of hair, or hair follicles, is cut from a person's head and sent to a laboratory to test for the presence of heavy metals. This requires specialised equipment and very careful laboratory techniques.

Is hair testing for metals accurate?

Hair levels of metals are particularly difficult to interpret as they can reflect both external sources and the internal body levels. For most metals there is a poor relationship between hair levels and concentrations in blood and urine (internal dose). This suggests that hair concentrations are not a good measure of internal dose. Similarly, hair levels often do not reflect environmental levels.

What are the limitations of interpreting hair metal levels?

There are several problems with interpreting what hair metal levels mean. These include¹:

- a lack of evidence of a relationship between hair concentrations and health outcomes
- high variation in metal concentrations between individuals due to; hair colour, sex, age, season, race and rate of hair growth
- contamination due to the use of cosmetic procedures such as dyeing, bleaching, permanent waving and other chemical hair treatments
- where and when the hair sample is collected - hair grows about 10mm per month and levels will vary depending on the distance from the scalp
- difficulty in testing of hair and uncertainty over the quality of analytical techniques.

Due to these problems, there are currently no reference or guideline levels for hair metal levels and the results cannot be easily interpreted.

Why is hair tested if it is not accurate?

Collecting body fluids, particularly blood, is too stressful or too difficult for some people. Collecting hair is relatively simple, non-invasive and can be collected on numerous occasions.

Before undertaking or advising on hair testing the Department of Health considers if the results of hair testing can be interpreted and will add to the understanding of potential exposure. Most of the time the Department will decide against hair testing either because the testing will not reflect environmental exposure, or it won't aid in addressing health concerns.

Because of these limitations the Department and health professionals never reach a conclusion about a health effect based on hair testing alone; it is always used together with other information. Most of the time, if a hair test shows high levels of metals, the DOH will request a follow-up blood or urine test.

I've had a hair test done and I'm concerned about the results. What should I do?

If you or a member of your family have had hair tested and are worried about the results the Department's advice is to discuss your concerns with your medical practitioner who may follow up with a blood or urine test. Without these additional tests you will not have useful information about possible health problems.

More information

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¹ Gil and Hernandez. Toxicological importance of human biomonitoring of metallic and metalloid elements in different biological samples. Food and Chemical Toxicology 2015; 80: 287 – 297.

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