



Hair Sample Testing:

What can hair sampling results tell me about environmental exposures?

Sometimes health professionals can check whether people have been exposed to chemicals in the environment. For example, levels of chemicals can be measured in the soils, drinking water, and air where people live and work, and from these measures the amount of chemicals that people might routinely contact can be estimated. For some chemicals, urine and blood samples can be collected from people to look for evidence of actual exposure. In recent years, health professionals have debated what hair samples can tell us about environmental exposure. In this fact sheet, the Agency for Toxic Substances and Disease Registry (ATSDR), a public health agency of the U.S. Department of Health and Human Services, looks at how best to interpret results from human hair samples to evaluate environmental exposures.

Currently, hair analysis is used for purposes other than assessing environmental exposures. For example, hair analysis has been used to test for illegal drug use and to conduct criminal investigations. This fact sheet does not address these other uses.

Summary

ATSDR believes many scientific issues need to be resolved before hair analysis can become a useful tool to understand environmental exposures. Although hair analysis may answer some questions about environmental exposure to a few substances, hair analysis often raises more questions than it answers.

What are hair samples and hair analyses?

A *hair sample* is a collection of hair strands, which are most commonly cut from a person's head. Hair samples usually contain hair that has grown over the last 12 months. Although hair growth varies, 12 months of hair growth usually represents about 5 inches of hair. *Hair analysis* occurs when laboratories measure the amount of specific substances in the hair sample.

Unfortunately, no widely accepted standards specify how hair samples should be collected, stored, and analyzed, and different laboratories use different methods when conduct-

ing hair analysis. Therefore, it is possible that two laboratories will report different results for hair samples collected from the same person. The different approaches used to collect and analyze hair samples make it very difficult for health professionals to know what the results of any individual hair sample really means.

If a substance is detected in my hair, does that mean I have been exposed to environmental contamination?

Not necessarily. Generally, substances can end up in your hair in two ways. First, chemicals already in your body may get into your hair. These chemicals might have been in something you ate, the water you drank, or the air you breathed. Alternatively, the source of the chemicals could be from other exposures, or they could simply occur naturally in your body. Second, chemicals outside your body, like those in dust particles and hair care products, might stick to your hair after coming into contact with it.

Given how often most people cut their hair, hair analysis generally will not tell you anything about exposures that occurred more than one year ago. Furthermore, for most chemicals, hair analysis cannot tell you where a chemical in your hair came from. More specifically, when a chemical is detected in your hair, we often cannot tell if it is from a contaminated waste site, from your diet, or from other sources. This makes it very difficult to understand what a positive test result for a chemical in your hair truly means.

Do health professionals commonly use hair analysis to diagnose health problems?

No. For most environmental contaminants, we simply do not know enough right now to use someone's hair analysis results to predict if health problems will occur. In fact, for many chemicals, we do not even know the range of levels that are typically found in the hair of an unexposed person. Without this information, we cannot tell if one person's hair

analysis result is unusually high or low. Because of these information gaps, doctors and other health professionals *rarely* use hair analysis to evaluate health problems. It is possible that future research will help us better understand what hair analysis results mean. Until this research is done, however, hair analysis results (with few exceptions) will not provide useful information about possible health problems.

With these limitations, why do health agencies and other groups collect hair samples?

Many public health agencies, including ATSDR, have collected and analyzed hair samples when addressing community concerns regarding environmental exposure. Before deciding to use hair analysis, ATSDR carefully considers if the results can be interpreted and will add to our understanding of potential community exposure. In most cases, we choose not to collect hair samples because the results would not help us address health concerns. Given the limitations of hair analysis, health agencies almost never base health conclusions entirely on hair analysis results. Rather, hair analysis results are viewed as just one small piece of evidence that are considered along with other information when evaluating a site.

What is the bottom line? What can hair analysis results tell me?

If an environmental chemical is detected in your hair, the only defensible conclusion you can draw, with few exceptions, is that you were exposed to the substance at some point over the last year or so. You will generally not know the source of the exposure or when it occurred. Most importantly, a detection will not tell you if your exposures might cause health problems.

Remember: For almost every environmental contaminant, hair analysis results alone will not tell you if you are likely to get sick or will have health problems.

Where can I get more information on how hair analysis relates to environmental exposure?

ATSDR recently gathered a group of experts to discuss what scientists currently know and do not know about hair analysis. You can get a copy of the report that summarizes this expert panel meeting by calling ATSDR's toll-free telephone number: 1-888-42-ATSDR (or 1-888-422-8737). If you have access to the Internet, the report is available on ATSDR's Web site at "www.atsdr.cdc.gov/HAC/hair_analysis." We can also send you a more detailed and technical fact sheet that summarizes our opinions on the current state of the science regarding hair analysis.

**For more information,
contact ATSDR's toll-free
information line:**

**(888) 42-ATSDR. . .
that's (888) 422-8737**

**ATSDR's Internet address is [http://
www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)**