

APPLICATION OF HAIR AS AN INDICATOR FOR

TRACE ELEMENT EXPOSURE IN MAN

A REVIEW

THE USE OF HAIR AS A BIOPSY TISSUE FOR TRACE ELEMENTS IN THE HUMAN BODY

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Abstract

Scalp hair has been recognized as a tissue which incorporates elements into its structure during the growth process, after which it becomes separated from the continual metabolic activity of the body. It has many advantages for being used as an indicator for screening population groups exposed to environmental pollutants. Such usage is not free from criticisms. Sometimes the so-called "normal ranges" of trace elements in hair quoted in the literature can be wide. Various factors can influence the trace element content of hair. In this report we have attempted to summarize the available literature on the levels of arsenic, cadmium, mercury, lead, selenium and chromium in human scalp hair.

1. INTRODUCTION

During the past three decades, the determination of trace element concentrations in human scalp hair has become increasingly popular for: monitoring environmental exposure, evaluating systematic intoxication, assessing nutritional status, and diagnosing diseases. Blood and urine analysis are the more traditional approach to evaluating trace element levels in the human body, but trace element levels in blood and urine fluctuate rapidly in response to changing physiological and/or environmental conditions. Hair provides a more permanent record of the trace elements associated with normal and abnormal metabolism as well as the trace elements assimilated from the environment.

5. CONCLUSIONS

The analysis of hair for toxic elements shows promise as an indicator of exposure or intoxication in the domestic and occupational environments. It has been proven that scalp hair is a "biological monitor" for mercury. In the case of other persistent and accumulative toxic elements such as cadmium, lead, and arsenic, and in circumstances where intakes may be in either single massive or irregular doses, the blood levels may not reliably reflect the total body burden; scalp hair can serve as a better indicator. More work is needed to determine whether or not hair analysis for other elements may have similar applications. Moreover, the hair metal levels can reflect the history of exposure. Hair has many advantages which can be exploited to screen large population groups suspected of adverse exposure. In some cases hair levels along with the biochemical parameters can be used to identify individuals suffering from heavy metal poisoning. Strong correlations between the trace element levels in hair and the abnormal physiology of various diseases have not yet been established. Also it has not been clearly demonstrated that a dietary deficiency of a particular essential element results in a value lower than the normal concentration in hair. Continued interest, research and activity in the use of hair as a biopsy tissue will establish the place of this approach as a probe for the evaluation of trace elements in the body.