Research Paper   **Zoology**

Detection of trace elements concentration from Human hairs

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ABSTRACT

A majority of elements of the periodic table probably could be considered trace elements. However, the presence of most of these elements in higher animals quite likely is just a manifestation of our geochemical origin or the result of environmental exposure. Hair is especially suitable for biological monitoring for exposure assessment as well as global, regional and local surveillance monitoring. The use of hair has advantages over other tissues. Monitoring metals in the urine measures the component that is excreted. Blood on the other hand, measures the component that is absorbed and temporarily in circulation before it is excreted and/or sequestered into storage depot.

Keywords : trace elements, human hair

Introduction

Early in the twentieth century, scientists were able to qualitatively detect small amounts of several elements in living organisms. At the time, these elements were often described as being present in "traces" or "trace amounts." This apparently led to the term "trace elements," which today is usually defined as mineral elements that occur in living systems in micrograms per gram of body weight or less.

Human hair has been accepted as an effective tissue for biological monitoring of toxic heavy metals by the U.S. Environmental Protection Agency and is being used for this purpose throughout the World . It is ideal in that it fits the following criteria.

1) Hair accumulates all the important trace elements.
2) It is a commonly available tissue.
3) It is widespread geographically.
4) Hair is easily collected, stored and transported.
5)It is suitable since specimens can easily be re-sampled.
6) It is present in polluted and non-polluted areas.

The objective of this study was to assess the concentration in between lead, cadmium, zinc, and copper and other trace elements contents in head hair, and the level of environmental exposure in the subjects' places of residence. After hundreds of hair analysis, Trace Elements has created a unique system of interpreting hair mineral analysis results. Each test report will provide the clinician with the most complete and comprehensive evaluation and discussion of significant mineral levels, ratios and toxic metals as tested in the hair.

Methodology and observations:-
Sample Collection :-
If the hair sample collected from long hair , cut a thin strand of hair that is atmost 2 inches long (about 5 cm)and in plastic envelope.

If the hair are short trim one half to one gram of hair using thining scissors and place in the plastic envelope.

The hair samples are collected according to age, sex and place, because these factors affect the nutritional value present in the person.

B. Sample Washing :-
1st Washing – First take the hair from plastic envelope in a petriplate and wash with acetone . Because of acetone the contamination in hairs removed like the oil, dust separated from hairs easily . Let it to dry for few minutes.

2nd Washing – Then, dry sample again wash with detergent and distilled water. After this washing take distilled water to wash it again. After that dry it in air .

3rd Washing – Now, these samples kept in alcohol ether mixture (1:1) for 45 minutes in separate vials.

After 45 minutes remove the mixture of alcohol and ether & let it to dry .

C. Drying :-

All the hair sample vials kept in oven at 60° C for 72 hrs for drying After drying of hair samples ,add few drops of concentrated nitric acid on the hairs which is kept in vials.

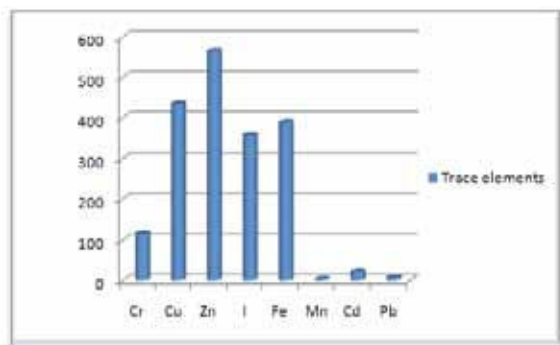**Atomic Absorbtion Spectroscophotometer analysis:-**
20 plus varian atomic absorption spectrometer with a hallow cathode lamp, using an N2O - acetylene flame for determination of traces of heavy metals. The AAS determination of all other cations was performed.

Fig.1 Showing sampling of human haris.

Fig.2 Showing digested ash of human hairs

Graph showing average concentration of trace elements

I have found low chromium in older age groups with senile dementia, suggesting that neuronal degeneration may be hastened with chromium deficiency. I also found low hair chromium in subjects with adult diabetes. Sugar metabolism was improved in over 80% of individuals who have a slight glucose intolerance by using 200 µg/d chromium supplement. The impact of this element on sugar metabolism is through its role in release of insulin. Losses of chromium in urine are related to increased mobilization in response to frequent blood sugar peaks.

Elevations of hair zinc have been reported only during the special metabolic needs of pregnancy, where the high values were present with evidence of zinc deficiency. Such a "false" high value in a tissue like hair is not indicative of systemic elevation, but possibly of the system depletion. Inadequate dietary intake or absorption problems may cause zinc deficiency.

REFERENCES

Assarian GS, Oberleas D (1977): Effect of washing procedures on trace-element content of hair. Clin Chem 23:1771–1772. | Bencko V (1995) :Use of human hair as a biomarker in the assessment of exposure to pollutants in occupational and environmental settings. Toxicology 101:29–39 | Benner BA, Levin BC (2005) :Hair and human identification. In: Tobin DJ (ed) Hair in toxicology: an important bio-monitor. RSC, Cambridge, pp 127–159. | Chittleborough G (1980): A chemist's view of the analysis of human hair for trace elements. Sci Total Environ 14:53–75. | Gordus A (1973) :Factors affecting the trace-metal content of human hair. J Radioanal Nucl Chem 15:229–243 | Julshamn K, Lundebye A-K, Heggstad K, Berntssen MHG, Boe B (2004): Norwegian monitoring programme on the inorganic and organic contaminants in fish caught in the Barents Sea, Norwegian Sea and North Sea, 1994–2001. Food Addit Contam 21:365–376 | IAEA (1977): Activation analysis of hair as an indicator of contamination of man by environmental trace element pollutants. Report IAEA/RL/50, Vienna | Obrusnik I, Gislason J, McMillan DK, Auria JD, Pate BD (1972) :The variation of trace element concentrations in single human head hairs. J Forensic Sci 3:426–439 | Rodushkin I, Axelsson MD (2000) :Application of double focusing sector field ICP-MS for multielemental characterization of human hair and nails. Part II. A study of the inhabitants of northern Sweden. Sci Total Environ 262:21–36. | Sukumar A (2002) :Factors influencing levels of trace elements in human hair. Rev Environ Contam Toxicol 175:47–78 | Tobin DJ (2005) :The biogenesis and growth of human hair. In: Tobin DJ (ed) Hair in Toxicology: An Important Bio-Monitor. RSC Publishing, Cambridge, pp 3–33 | World Health Organization (1990) :Environmental Health Criteria 101: Methylmercury. WHO, Geneva Trace Element Profiles in Single Hair Strands 259