HAIR TRACE METAL ANALYSIS OF INHABITANTS OF THE OK TEDI REGION OF PAPUA NEW GUINEA - VALUES FOR ENTIRE POPULATION

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The OK Tedi mining project is predicted to become the biggest money making venture in Papua New Guinea because of the immense deposits of gold and copper at Mt Fubilan. The mine site is located in the upper catchment of the OK Tedi river characterized by steep slopes, high rainfall and dense jungle (Maunsell et al. 1982). As part of a study of the environmental impact of the mine and its effects on the nutrition, health and general lifestyle of the local inhabitants, the trace metal analysis of scalp hair was performed on specimens collected in late 1982 before the mine came on stream. It is envisaged that these studies be followed up at regular intervals during the operational life of the mine.

Scalp hair has several of the characteristics of an ideal tissue for the epidemiological study of trace metals in the environment (Hammer et al. 1971). Hair analysis has important uses in screening for metal intoxication and environmental pollutants especially the highest priority toxic trace metals - lead, cadmium, mercury and arsenic (Jenkins 1980). In addition hair analysis has been widely used as a tool in the study of the nutriture of biologically important trace metals such as iron, copper and zinc although profound reservations have been expressed as to its diagnostic value despite its widespread use in this context (Deeming & Webber 1978).

Hair samples were washed thoroughly in 1% Triton X100, rinsed with copious amounts of double distilled water and dissolved in 1.5M NaOH. An aliquot was taken and prepared for mercury analysis by the cold vapour technique (Chapman & Dale 1978) and the remainder taken up into 14M nitric acid. Atomic absorption spectrometry was performed on a Varian Techtron AA-5 instrument.

Mean heavy metal concentrations in hair of OK Tedi residents for entire sample

Metal	Mean (µg/g)	Range (µg/g)	Standard deviation (µg/g)	Sample size (N)	Previous reported values for other populations (µg/g)
Iron	219.39	04.00-4805.30	442	327	141 , Range 9-132
Copper	10.29	00.74-82.81	9.02	432	15 , 9.8 , 16.0 , 8.9
Lead	23.79	04.00-135.89	22.10	430	24±24 , 19.1
Zinc	113.11	14.50-362.39	45.81	432	103.3±4.4 , 178.7
Cadmium	3.83	00.10-44.00	5.28	432	Range 0.34-1.60
Mercury	0.80	00.09-4.50	0.72	183	(1.55, 1.08) Range 0.8-3.0

The most notable feature of these results was the extremely high iron levels seen in hair from many individuals of some of the local villages. An attempt has been made to correlate mean trace metal levels for each village with proximity to mine site/river/township.

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