Prevalence of Possible Lead Toxicity as Determined by Hair Analysis

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In an earlier report (Cheraskin and Ringsdorf) the epidemiology of lead in human hair in a sample of 34504 subjects was summarized. It was clear, from the report, that there is a very wide range of lead distribution in human hair and that there were interesting age and sex relationships.

The purpose of this report is to consider the extent of lead contamination in this very large sample of 34504 subjects derived from the data bank of MineraLab Incorporated (22455 Maple Court, Hayward, California 94541, USA).

There is still considerable argument as to the delineating point for plumbism in blood, urine, and in hair. It is generally held that lead is normally present in the hair of healthy individuals but the concentration varies widely according to the diet and environment of the subjects. In the light of more recent research, the evidence suggests that hair lead values greater than 20 to 30 ppm may indeed be indicative of pathosis (Kopito et al, 1967, 1969). There is, in fact, increasing evidence that subtle forms of plumbism exist and are associated with hair lead levels even less than those recognized as presently being significant (Moore and Fleischman, 1975).

The accompanying table outlines for 34504 subjects by age and by sex the percentage distribution of elevated lead levels in hair using emission spectroscopy (Fassel, 1978). The total sample divided by age and by sex is represented by the denominators in each column. The numerators in the accompanying table indicate the number of subjects showing lead concentrations in the hair greater than 20 ppm. Five points are worthy of special consideration. First, the highest percentage of elevated lead levels occurs in the youngest age group (0-4 years) in the males, the females, and the entire sample. Second, the percentage of individuals with relatively high lead concentration declines with age and then rises again in the later years. This is especially true in the male group. Third, in every age group, the percentage of subjects with relatively high levels in the hair are much greater, often two-to threefold more, in the male than the female group. Fourth, for the entire group, the percentage of high lead levels in

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males is over twice as great as in the females. Finally, assuming that 20ppm represents a reasonable delineating point, approximately 1 out of 5 to 1 out of 4 males and about 1 in 10 females may well be suffering from lead toxicity.

While it is generally held that the current lead problems are largely due to the inhalation of exhaust products, lead may also enter our ambient air through cigarettes due to the lead arsenate applied to the tobacco as an insecticide (Pfeiffer, 1975). Apropos, a report to follow (Cheraskin and Ringsdorf, in preparation) will consider the relationship of smoking habits to lead levels in human hair.

Percent Distribution of Elevated Lead (20 ppm) Levels in Hair

Age Groups	Males	Females	Entire Sample
0- 4	66/ 199* (33.2%)	45/ 143 (31.5%)	111/ 342 (32.5%)
5-12	206/ 912 (22.6%)	88/ 558 (15.8%)	294/1470 (20.0%)
13-20	176/ 991 (17.8%)	95/1181 (8.0%)	271/2172 (12.5%)
21-30	509/2439 (20.9%)	470/4587 (10.3%)	979/7026 (13.9%)
31-40	487/2428 (20.1%)	376/4597 (8.2%)	863/7025 (12.3%)
41-50	454/1952 (23.2%)	382/3468 (11.0%)	836/5420 (15.4%)
51-60	532/1969 (27.0%)	413/3871 (10.7%)	945/5840 (16.2%)
61-70	291/1280 (22.7%)	286/2331 (12.3%)	577/3611 (16.0%)
71 +	98/ 515 (19.0%)	126/1083 (11.6%)	224/1598 (14.0%)
Totals	2819/12685 (22.2%)	2281/21819 (10.5%)	5100/34504 (14.8%)

*numerator represents number of subjects with PB hair levels >20ppm denominator indicates total sample for the group

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