CONFERENCE ON INTOXICATION DUE TO
ALKYLMERCURY TREATED SEED

Baghdad, Iraq, 9-13 November 1974

SIGNIFICANCE OF MERCURY LEVELS IN HAIR

by

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Sequential measurements of total and inorganic mercury in 1 cm segments from bundles of human hair have been used as a convenient method for tracing the history of exposure of people to methylmercury compounds. One key item of information sought in epidemiological studies of this kind is the time of initial uptake of high doses of the mercurial derivatives. Extrapolation of the accumulation curve back to the background level have, however, been ambiguous because the curves were sigmoid, although the history of exposure indicated a linear accumulation in hair after initial acute exposure. This discrepancy was explained by postulating that the distribution of mercury in individual hair fibres was in accord with theory, but the fibres were displaced in relation to each other in the tested bundle. The hypothesis was confirmed by analyses of 1 cm segments of individual hair fibres and two models were investigated to account for the displacement.

Data on the distribution of mercury in hair were converted by a mathematical model into information about the key indices of exposure, including times of onset and termination, peak concentration in hair, and half-time of retention in blood. A computer simulation of a displacement due to differential rates of growth of individual hair will be demonstrated (first model). The second model will be to measure the consequences of disturbing the alignment of hair before cutting the bundle into segments.

Conventional methods of hair sampling and fitting the resulting data to a curve were shown to introduce systematic errors underestimating peak concentrations and overestimating retention times. These errors were minimized by practical modification of hair sampling procedures and by a new graphic method for deriving the measurements of distribution of the trace mercury in hair.

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