Elevated Concentrations of Mercury in Dentists' Hair

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The exposure of dentists to mercury present in amalgams used in dental restorations has been studied and reviewed (RUPP and PAFFENBARGER 1971; GRONKA et al. 1970; JOSELOW et al. 1968; CHAN and SVARE 1972; HOOVER and GOLDWATER 1966). Since mercury can be cumulative in certain species (BACHE et al. 1971), it was of interest to learn if accumulation of it occurs in dentists as a function of their number of years in practice under a variety of typical operating conditions. Owing to the difficulty of obtaining samples of body fluids for monitoring mercury in a significant number of dentists, hair was chosen as the biopsy material for analysis. The analysis of human hair as an indicator of the extent of body exposure to heavy metals has been performed in other studies (MAHLER et al. 1970; YURACHEK et al. 1969; ANONYMOUS 1970; SUZUKI et al. 1972; KLEVAY, 1970b; MCBEAN et al. 1971).

Experimental

Samples of hair were obtained by mail request from 115 dentists throughout the central New York area. Each sample was milled to a powder and mixed. One half grain of the hair sample was pelletized in a pellet press using a 0.5 inch dye. The pellet was combusted in a Schöniger flask (GUTENMANN and LISK 1960) and mercury was determined by flameless atomic absorption (HATCH and OTT 1968).

Results and Discussion

The results of analysis of hair samples for mercury are illustrated in Figure 1. Mercury concentration in the hair of individual dentists is plotted as a function of the number of years each was in practice. The correlation coefficient (r) was 0.11 and was not significant. Although mercury levels did not appear to be cumulative with age in kidney and liver of humans not abnormally exposed to mercury (HATCH and OTT 1968), the concentration of mercury in human hair has been correlated with the quantity of fish consumed among Japanese (SUZUKI et al. 1972). The range of mercury in the hair of Americans not exposed to other than "normal" sources of the element is about 0.01 to 2.5 ppm (JOSELOW et al. 1967; JOSELOW et al. 1972; YAMAGUCHI et al. 1971). A major portion (89%) of the hair samples in this study were above this range.

There are many factors to be considered which can influence

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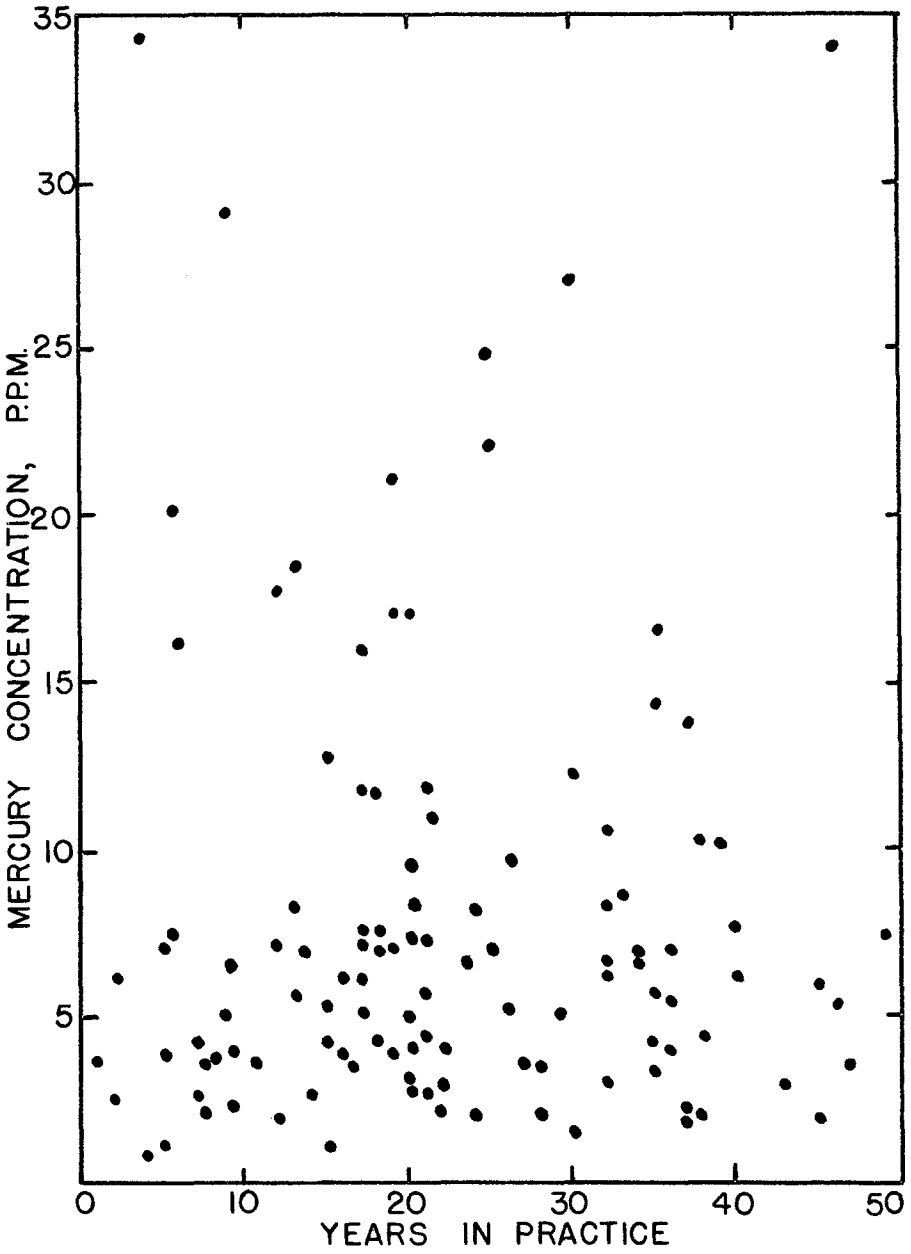

Figure 1. Hair concentration versus time in practice.

the extent of exposure of dentists to mercury and affect the concentration of it in hair. Certain of these have been enumerated (RUPP and PAFFENBARGER 1971). The number of amalgam restorations per unit time, the method of dispensing and mixing the ingredients of the amalgam, the procedure for storing and discarding scrap amalgam, the method of cleaning up mercury spills and the type of floor covering may all influence mercury absorption by dental personnel. The content of mercury in the diet as might be present in fish (YAMAGUCHI et al. 1971) would be a minor factor. The contamination of hair externally by certain metals in dust, hair preparations (MCBEAN et al. 1971) or perspiration (KLEVAY 1970a) may be important. The nature of the metal is important. It has been reported that the zinc content of hair correlates with plasma concentration (MCBEAN et al. 1971) whereas there is no correlation in the case of copper (KLEVAY 1970b). The quantity of hair provided for this study was about one gram from each dentist. Probably variation would have been less if more had been available. No relationship was noted between the concentration of mercury in hair and the proximity of the subject to urban industrial sources of the element.

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