

## **Part II**

# Chemical type of mercury in patients in the outbreak of organomercury poisoning in Iraq

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Gas chromatography was employed to identify the mercurial compound involved in the Iraq outbreak of organomercury poisoning. Only methylmercury was detected in human blood, hair, and tissues. The quantity of methylmercury present correlates well with the quantity of organic mercury determined by selective atomic absorption.

The outbreak of mass poisoning that occurred in Iraq late in 1971 was attributed to alkylmercury poisoning.

The initial assumption was that this outbreak was due to ethylmercury intoxication (Damluji & Al-Tikriti).<sup>1</sup> Differences were, however, noted between aspects of the current outbreak and a previous outbreak attributed to ethylmercury intoxication and described by Jalali & Abbasi<sup>2</sup> and Damluji.<sup>3</sup>

The early analytical results in the present epidemic were obtained by selective cold vapour atomic absorption analysis, using the method of Magos & Clarkson.<sup>4</sup> The data from analysis of blood samples from affected persons showed high levels of total mercury with much lower levels of inorganic mercury. The difference between the levels of total mercury and inorganic mercury (often termed organomercury) confirmed the involvement of an organomercurial compound in the outbreak.

In March 1972, a limited number of wheat and barley samples from Iraq were made available for analysis. These samples were analysed by gas chromatography for organic mercury compounds, using an early version of the analytical procedure of Von Burg et al.<sup>5</sup> This method was originally developed for human blood sample analysis but was shown to be applicable to a wide variety of materials. The wheat and barley samples showed high concentrations of methylmercury, the first evidence that this toxic chemical might be involved in the outbreak.

By early May 1972, a gas chromatograph (7000 series, Packard Instrument Co.) and the necessary ancillary apparatus had been installed in the Mercury Laboratory at the Medical City, Baghdad, and analysis of blood samples commenced. A large number of blood samples from a variety of affected individuals was examined. In no case was an organomercurial compound, other than methylmercury, identified.

More importantly, the methylmercury concentrations found correlated well with concentrations of organic mercury obtained by atomic absorption. Illustrative of this are the data shown in Fig. 1. These data are taken from a series of blood samples lyophilized in

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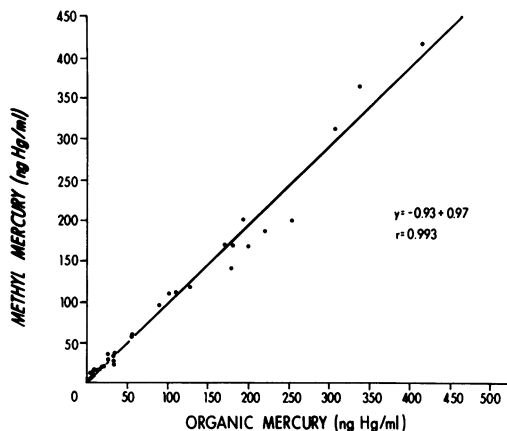
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Iraq and transported to Rochester, USA, in sealed vials. The vials were opened and the contents dissolved in sodium hydroxide solution before analysis by gas chromatography and atomic absorption. The correspondence between methylmercury and organic mercury is striking (correlation coefficient,  $r = 0.99$ ; regression equation  $y = -0.93 + 0.97x$ ).

FIG. 1. CORRELATION BETWEEN BLOOD LEVELS OF ORGANOMERCURY MEASURED BY ATOMIC ABSORPTION SPECTROMETRY AND METHYL MERCURY MEASURED BY GAS CHROMATOGRAPHY



It can therefore be concluded that, at least in the cases examined, the sole toxic agent involved was methylmercury. It cannot be over emphasized that, on the basis of simple toxicological considerations, signs and symptoms should be correlated with methylmercury concentrations, either measured directly by gas chromatography or indirectly by atomic absorption.

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#### RESUME

#### COMPOSITION CHIMIQUE DES COMPOSES MERCURIELS DECELES CHEZ LES VICTIMES DE L'EPISODE D'INTOXICATION PAR ORGANOMERCURIELS EN IRAK

On a eu recours à la chromatographie en phase gazeuse pour identifier les composés organomercuriels à l'origine de l'épisode d'intoxication en Irak. Que ce soit dans le sang, les cheveux ou les tissus, seuls des composés méthylmercuriels ont été mis en évidence. La quantité de méthylmercuriels présents correspond bien à la quantité de mercure organique déterminée par absorption atomique sélective.

## REFERENCES

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