

# Organ mercury levels in infants with omphaloceles treated with organic mercurial antiseptic

D. G. FAGAN, J. S. PRITCHARD, T. W. CLARKSON, AND M. R. GREENWOOD

*From the Departments of Pathology and Neurology, the Hospital for Sick Children, Toronto, Canada, and the Environmental Health Sciences Center, University of Rochester School of Medicine, Rochester, N. Y., USA*

**SUMMARY** Samples of fresh and fixed tissues from infants with exomphalos treated by thiomersal application were analysed for mercury content. The results showed that thiomersal can induce blood and organ levels of organic mercury which are well in excess of the minimum toxic level in adults and fetuses. The analysis of fresh and fixed tissues must be carefully controlled against normal tissues in order to interpret mercury levels accurately.

The introduction of the application of 0.1% tincture of Thimerosal (thiomersal)\* in the treatment of exomphalos is generally attributed to Grob (1957). No unequivocal cases of organic mercury poisoning have been reported after its use in patients with exomphalos though several cases of 'pink disease' have been reported (Schippan and Wehran, 1968; Stanley-Brown and Frank, 1971), as well as a case of 'mercury intoxication' (Leenders *et al.*, 1974). This is thought to be an idiosyncratic reaction unrelated to excessive dosage and should be distinguished from true poisoning.

Analysis of fresh tissue samples obtained at necropsy from an infant with exomphalos treated by thiomersal application who died unexpectedly showed raised tissue levels of mercury. This prompted us to search the records at the Hospital for Sick Children, Toronto, for other mercury-treated cases of exomphalos and carry out organ mercury analysis.

## Materials and methods

Between 1969 and 1975 there had been 13 cases of exomphalos treated by thiomersal application. 10 had died and 9 of these had necropsy examinations. Formalin-fixed wet tissues were available from 6 of the 9. Mercury assays had been carried out in 1972 on fresh tissues from 2 of these 6 cases by the Public Health Division of the Department of Health,

Toronto, using similar methods to those described below.

We performed organ mercury assays on three sets of fresh tissue samples and six sets of formalin-fixed tissues. Cold vapour atomic absorption was used to measure total mercury in blood (Magos and Clarkson, 1972). Solid tissues were weighed and homogenized in 0.9% w/v sodium chloride solutions (1.0 g tissue to 9 ml sodium chloride solution). Aliquots from the homogenate were treated and measured as described for hair samples by Giovanoli-Jakubczak *et al.* (1974). Samples of the mercury-contaminated omphalocele sac were *not* stored or transported in the same container as any of the analysed samples.

## Results

Table 1 shows that all 3 cases in which fresh tissue analysis was performed had absorbed an excessive load of mercury ranging from 65 to 2700 times the normal tissue levels. The fresh organ levels in Cases 2 and 3 suggest that the blood levels were similar to or, perhaps in Case 3, even higher than the level of 1340 ppb (parts per billion) found in Case 1. Mercury assays were repeated on the formalin-fixed tissues of the 3 cases in which fresh tissue assays had been performed, and the results are shown in Table 2 with those from the other fixed and stored samples.

These results show a general increase in mercury concentration after fixation which appears to be related more to the duration of storage than to the total dose administered. The mercury content of the formalin fixative was negligible, <6 ppb. Although analysis of all the samples indicated an excessive load

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\*The sodium salt of orthocarboxyphenylthioethyl mercury, or sodium mercurithiosalicylate, is the active ingredient of Merthiolate, Lilly, and contains approximately 49% mercury by weight.