

October 27, 1952

Dr. A. H. Wells
Saint Luke's Hospital
915 East First Street
Duluth 5, Minnesota

Dear Doctor Wells:

I regret that I cannot send you a reprint of an article published in 1940, on the normal ranges of the concentration of certain metals, including lead in human tissues, in response to your letter of October 20. Unfortunately no reprints are available, but the article may be found in J. Nutrition 19: 579, 1940. This is not the only source of information, but so far as I know it is the most precise information on the normal range of lead concentration in the kidney. The sources of material were investigated rather carefully so as to avoid the inclusion of tissues from persons who might have had some occupational or other unusual exposure to lead. (The mean value, as published, of the lead concentration in the kidneys of our original small normal group was 0.027 mg. per 100 grams of fresh tissue for results that did not exceed 0.08 mg. per 100 grams. Additional results have raised the mean value to 0.05 mg. per 100 grams, while the extreme upper range, as found in one case, was 0.16 mg. per 100 grams.

We have not published data on the lead content of the tissues of persons exposed to lead compounds shortly before death, or of persons with lead poisoning at the time of their death. Except in acute fatal tetraethyl lead poisoning, which is quite by itself and differs greatly from fatal inorganic lead poisoning, there are few data. Cases of fatal lead poisoning, except in infancy and early childhood, are rare, and most of the data that might be obtained would be concerned with persons exposed to lead (with or without signs of lead poisoning) at a time when death from other causes supervened. It is important to recognize, therefore, that the concentration of lead found in the kidney or any of the tissues at necropsy, is not to be regarded, in itself, as evidence of lead poisoning, but merely evidence to indicate that the level of lead absorption was or was not of such magnitude as to be capable of inducing symptoms. The evidence, therefore, is not diagnostic, unless the findings are too low to indicate potentially hazardous absorption, but rather, capable of excluding or supporting the diagnosis.

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Our data on other tissues from fatal human cases of inorganic lead poisoning (mostly children) show a concentration in the kidney ranging from 0.61 mg. per 100 grams to 2.59 mg. per 100 grams of fresh tissue. In one adult who died of lead encephalopathy (but who lingered for a time before dying) the renal lead concentration was 0.22 mg. per 100 grams, but I am sure that higher values than that have been found in other cases of ours which I have not attempted to dig out in order to give you a reply. (Our data have not been studied for several years, and I don't know just what they would show at this time. We have data, I should think, on fifteen or twenty children, and on five or six (perhaps more) adults exposed to inorganic lead.)

The results in the kidneys of several persons who died of other causes while working under conditions of exposure to inorganic lead compounds ranged from 0.07 to 0.32 mg. per 100 grams, the average value being about 0.16 mg. per 100 grams.

In fatal tetraethyl lead poisoning, which as I indicated, is quite different, the concentration of lead in the kidney has been found to range from 0.64 to 1.31 mg. per 100 grams of fresh tissue in some 15 or 20 cases, whereas in two cases of prolonged exposure, where death resulted from other causes, the concentration in the kidney was 0.17 and 0.25 mg. per 100 grams, respectively.

I should say, I think, that I would not accept the analytical evidence obtained on the kidney alone as being adequate or in any way satisfactory in portraying the picture of the lead exposure of an individual in the period shortly before death. It is necessary, in order to contribute effectively to the post-mortem interpretation of the picture, to analyse representative portions of a number of tissues. I always insist on having at least, the liver, kidney, spleen, striated muscle and bone (the rib can always be obtained, whereas long bones often cannot). In cases of cerebral involvement, and in all other cases in which it is possible, I insist on having brain tissue,

I trust that these bits of information will be helpful. I can refer you to the data of Tompsett, et. al., Biochem J. 29:1851, (1935) for additional information. His "normal" values are unduly high because of the exposure to lead in drinking water in certain areas of Glasgow, as he himself has informed me in a personal communication.

Cordially yours,

Robert A. Kehoe, M. D.

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