

August 4, 1942.

Dr. William R. Bradley,
Bureau of Industrial Hygiene,
Department of Health,
Detroit, Michigan.

Dear Dr. Bradley:

Data on the lead content of the urine of infants and small children have been published in one of the series of articles from this laboratory in the Journal of Industrial Hygiene, Volume 15, page 301 et seq. 1933. Analyses made from time to time since that date have shown that the average value of the lead concentration in the urine is somewhat smaller than that given in the article referred to above. At present, I think it is fair to say that the results obtained in the case of children are of approximately the same order of magnitude as those found in adults. The blood values range from 0.01 to 0.06 mgs. of lead per hundred grams of whole blood with a mean value of slightly under 0.03. The lead concentration in the urine ranges from 0.01 to 0.08 mgs. per liter, with a mean value of 0.03 (approximately). We have not studied the urine of nurselings to such an extent as to be able to give any comprehensive information. The figures obtained on the blood, however, are very little different from those of somewhat older children. The lead content of the tissues and the blood of newborn children is derived from the maternal circulation, and since the lead passes the placenta without difficulty, it is not surprising that the conditions with respect to the circulation of lead should be approximately the same in the infant as in the mother. It is probably that the lead content of the excreta of the nursing is somewhat lower than that of the mother, since the only source of lead intake in children properly cared for is likely to be the small quantity in the milk. In the article which I referred to above, we have also given the lead content of human milk in a number of instances. It is apparent that if this were the total source of lead intake, the daily quantity would be very small. This is changed materially when the child goes on mixed diet, but perhaps the change is of not too great importance, since by this time the weight of the child will have been greatly increased, and, therefore, the intake of lead in proportion to the body weight may not be subject to great increase.

As to the findings in cases of lead poisoning in children, one usually sees wide deviations from the normal. In a few instances in our series of cases, exposure has occurred through inhalation

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of fumes. In most cases, however, the exposure has occurred from swallowing lead compounds. Most of the cases are acutely ill, and the lead content of both blood and urine is likely to be very high. We have seen two instances in children (none in adults), in which the lead content of the urine has been low while that in the blood was high. This is rare, however. Usually both will be high. The concentrations in sick children seen at the time of the onset of their illness or soon thereafter are likely to be in excess of 0.15 mgs. of lead per liter of urine or per hundred grams of whole blood. It is not unusual to find concentrations two or three times this level.

There is one sentence in your letter which intrigues me just a little, in that you refer to "cases of suspected and proven lead encephalitis". I recognize that the diagnosis is made clinically and not upon means of laboratory findings. On the other hand, I wonder how the diagnosis is proven, except on the basis of the demonstration of abnormal quantities of lead.

Very truly yours,

Robert A. Kehoe, M. D.

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