

March 21, 1938

Dr. Sam E. Roberts
1110 Professional Building
Kansas City, Missouri

Dear Doctor Roberts:-

I have been somewhat tardy in replying to your letter of March 7th by reason of my absence from the laboratory for a time.

The problem which you raise in your letter concerning the production of deafness through the slow absorption of lead compounds is one in which I would be interested. On the other hand I am somewhat skeptical as to the likelihood of the occurrence of deafness in association with lead intoxication, since I have never seen any evidence of deafness as a symptom of lead poisoning. We would expect to find evidences of damage to hearing among plant populations in which there is known to be serious and significant lead exposure, and as yet I have seen no evidence that this occurs. On the other hand one does not set out with a preconception in experimental work, and if you have a means of studying this question, I should be quite willing to give you as much assistance as is possible in view of our own rather extensive experimental program.

As to the likelihood of lead poisoning from food distributed in tin cans, I can assure you that the use of tin cans in the distribution of food in the United States is not an important factor in lead poisoning. We have studied this problem quite extensively in an indirect way by following the lead content of foods, and by studying the daily intake of lead by persons on general diets of their own choice. Tin cans are manufactured very carefully in the United States and in general there is little or no contact of food materials with the solder. This is not true of certain imported food materials, but they do not constitute an important factor in American diet, so far as my experience goes.

We have obtained very good evidence over a period of years that the average American takes in about one-fourth of a milligram of lead per day in his food. The actual quantities vary from traces up to somewhat in excess of one milligram per day, but the average figure is around a quarter of a milligram. This is true all

over the country and there is very good evidence that it has been the case for a long time. Indeed some studies of ours in a primitive community in which all the food was obtained locally indicate that the normal and natural lead content of food materials is such that the average individual takes in something more than a tenth of a milligram from this source. From a large series of observations made in different fields, it is quite clear that these quantities of lead in the diet do not produce a state in which lead intoxication can be expected to occur. This is not to indicate that contamination of foods with lead is an unimportant matter. On the contrary there is evidence that significant contamination occurs from a variety of sources. The most important of these, so far as our observations go, are concerned with the contamination of small fruits with insecticides, the contamination of sugar in the process of inversion, and the use of a number of acids such as citric, for example, which is likely to be fairly highly contaminated with lead, and which is likely to find its way into food stuffs. I have never seen a case of lead poisoning from this source but it seems possible that they have occurred here and there. Another potential source, of course, is in drinking water which in certain parts of the country is handled through pipe systems which contain considerable quantities of lead pipe.

I do not mean to go into any dissertation on this subject, but I do wish to point out that there is already a considerable amount of information from which to arrive at certain tentative conclusions. It will be necessary, therefore, for you to set up a program for the study of patients who have more than a hypothetical lead exposure. I should be very glad to know what you have in mind and to cooperate with you if it seems feasible.

As to the influence of the administration of "basic minerals", I am afraid you are walking into a very large problem. Mineral metabolism in general has not been very adequately studied. This is a perfectly enormous problem and at the moment I see no way of attacking it without very elaborate preparation for a prolonged and extensive study. I should be interested in knowing what you have in mind in this connection. I do not believe any experimental work would answer the many questions that lie unanswered in this field without a comprehensive study of the total metabolism of these substances.

Referring again to the question of lead and deafness, I may say that if you have cases of deafness in which you suspect lead poisoning as an etiologic factor, we should be glad to study the lead content of the blood, the urine and the spinal fluid in order to see whether there are evidences of abnormality with respect to their lead content. We could do this only in a limited number of cases and we would wish to have complete clinical data on the cases

for all such data is of use to us in connection with our general studies in this field. If we were to do this, it would be necessary for us to supply you with containers prepared in the laboratory for the purpose of collecting the samples, and it would be further necessary for the samples to be collected in accordance with our precise instructions. I hope I may hear from you further as to your ideas in connection with this work.

Very truly yours,

RAK:is

Robert A. Kehoe, M.D.