June 15, 1939

Dr. K. N. Bagchi
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Calcutta, India

Dear Doctor Bagchi:-

I have your letter of May 18th and the reprint which you so kindly sent me, and for both of these I wish to express my thanks. I am very much interested in the analytical data which you have provided and I am gratified to find that it corresponds in very large measure to our own. I have no doubt that the work of Lynch and Tompsett in this field was very well executed but I have very great skepticism concerning the "normality" of the tissues which they examined. I can not but feel that Tompsett was dealing with certain cases of significant lead exposure, and that his figures failed to represent the true picture of the lead content of the tissues of persons without occupational or other accidental or significant exposure to lead compounds. It is possible, of course, that conditions with respect to the lead content of food and water differ widely in various parts of the world. However our results obtained on a rather large number of persons indicate that it would take much larger quantities of lead in the food than are likely to have existed to have produced the picture which Tompsett found. It is quite certain that the average American takes in with his food, quantities of lead which vary from one tenth of a milligram to two milligrams per day, with an average figure of approximately one-third of a milligram daily. Persons who eat large quantities of food take in more lead than those who eat smaller amounts. Moreover persons who naturally select articles low in lead take in considerably smaller quantities than persons with a well mixed diet. Moreover persons who drink water containing lead up to .02 to .03 milligrams per liter take in slightly more than those who drink water containing .002 to .003 milligrams per liter. The latter, however, is an insignificant factor and need not be considered in relation to the final lead content of the body, since this quantity is very small in proportion to the lead content of the entire food intake. All of our evidence indicates that within the rather wide variations in dietary lead, only small changes occur in the lead excretion and in the lead content of the tissues. Consequently I

believe some additional factor of lead exposure must be present if unusually large quantities of lead are to be deposited in the tissues.

I am very much interested in your point of view about the lead content of the hair and the relation of the hair to the storage and excretion of lead. I may say, however, that I am very skeptical of the significance of your results on the hair. We have had occasion to study the lead content of the hair of a rather large number of experimental animals with known lead content in their tissues. In general we have found negligible quantities of lead in the hair even when the tissues were high in lead. In some instances, however, in which the contamination of the hair with the excreta was unavoidable, we found quite high results on the analysis of the hair. These, believe, were the result of contamination of the hair. As a matter of fact, we found it exceedingly difficult, if not impossible, to so cleanse the hair that we could regard it as free of surface contamination. This, I believe, is a practically unsurmountable obstacle in practical work and I doubt very much, therefore, the significance of the determination of lead in the hair. Our observations have shown us too that lead analyses on the skin give highly variable results. The lead content of the skin, as determined by analyses of the skin, has failed to have any relation to the lead content of the tissues. We have come to the conclusion that the examination of the hair is almost a useless procedure since it is virtually impossible to assure ourselves that the skin is free of external contamination.

I can not but wonder in connection with the analytical results, whether your Indians may not use some hair oil which is relatively high in its lead content. In any case I should be very much interested in seeing some results obtained before and after the very careful shampooing of the hair and scalp of these individuals. In our experience, particulate lead compounds are so nearly ubiquitous that it is practically impossible to avoid gross contamination with lead in the case of any and all materials which can not be cleaned in the chemical sense. I have recently attempted some observations on the lead content of the perspiration. I think we shall be able to solve this question by a satisfactory technique, but up to the present time I have been defeated by our inability to completely cleanse the skin in advance of the collection of the samples. Single samples of the perspiration of the same normal healthy individual have varied all the way from .07 to .03 milligrams of lead. Under the conditions of our experiment

I feel sure that this variation is the result of contamination of the skin rather than the result of variation in the excretion of lead in the perspiration. Accordingly I should be very loathe to accept the significance of analytical results obtained on skin or hair, or other appendages of the skin.

With the exception of the above criticism, I have regarded your work with a great deal of interest and admiration. I hope you will supply me with further reprints as your investigations progress.

Very truly yours,

RAK:is

Robert A. Kehoe, M.D.