December 23, 1933

Mr. Ray Bevan
Abford House, Victoria
London S.W. 1

Dear Ray:-

I hasten to write to you with regard to the opinions of Dr. Kohn-Abrest and point out to you the extent to which his questions have been answered in our experimental work. I have no illusions as to the effect which one may expect to achieve in making reply. According to his writings he is an opinionated person, and in this instance I suspect that he has an ax to grind.

The facts are these:

(1) The study of the distribution of lead in experimental animals after the absorption of tetraethyl lead (refer to Table 7 in article "The Behavior of Lead in the Animal Organism II Tetraethyl Lead) show that aside from the lead absorbed into the skin at the site of application, comparatively insignificant amounts of lead occur in the skin and hair.

(2) The distribution of lead in animals after the absorption of inorganic lead compounds does not favor the skin to any appreciable extent. (See Table I of the enclosed article in the Journal of Laboratory and Clinical Medicine, November 1933. This is just out. I'll send reprints as soon as I get them. )

(3) The examination of the hair in leaded animals. (See especially Table I in article "The Behavior of Lead in the Animal Organism I in American Journal of Public Health, May 1928) fails to show significant amounts of lead.

(4) The teeth of animals and human beings, on which we have considerable amounts of unpublished data, shoe the same sort of affinity for lead that is shown by other bony tissues - i.e. the skeleton.

(5) The excretion of lead from the skin, hair and teeth is obviously insignificant with the above facts in mind. In furry animals any loss of lead from the body by way of the hair is due to the shedding of hair. On the other hand examination of the hair is fraught with large

possibilities for error by reason of surface contamination through contact with faeces, urine, and other lead in the environment. Thus the data showing the presence of considerable amounts of lead in the hair are questionable excepting as the most minute attention has been given to cleansing before analysis. In human beings the hairy surfaces are small in area and are thus insignificant as a source of lead loss through shedding of hair. The teeth, obviously, do not give up their lead except by way of the circulation. They may, of course, be extracted, thereby removing small amounts of lead from the body.

(6) Observations on the fate of lead in the tissues, made very carefully and described in the articles cited above, show that the alimentary and urinary excretion account for practically the total lead interchange in the body.

(7) Observations on human lead metabolism described in our studies recently published in the Journal of Industrial Hygiene show, similarly, that the loss of lead from the body is chiefly by way of the alimentary tract, and to a lesser extent by way of the kidneys, both under conditions of normal absorption and also during lead intoxication.

The figures given by Kohn-Abrest sound strangely familiar. They closely resemble those of Melliere published in 1903, and one may suspect that that is their source. Unfortunately Melliere did not analyze the skeleton, or if he did failed to recognize the lead present there. Thus he missed an important point. It is true that the skin practically always contains lead, and sometimes in higher concentration than that in the liver, but never to the extent seen in the bones. Thus the chief source of lead for excretion, after exposure has been ended is found in the bones. It is ridiculous, therefore, to regard the skin as a relatively important tissue for lead storage and lead excretion. However, the question whether or not measureable amounts of lead are excreted by the skin - and an adequate study of the subject of lead excretion by the skin, by way of falling hair and perspiration presentx peculiarly difficult problems because of the factor of external contamination - becomes an academic problem, purely, when the significance of our study of the relationship between lead absorption and lead excretion in the faeces and urine, is appreciated. In studying the various avenues of lead excretion and their relationship to lead absorption, in the problem of leaded gasoline, we are interested primarily in one question, viz, - does lead absorption occur to a significant degree under the conditions of exposure to leaded gasoline? That question has been answered by showing (1) that faecal and urinary excretion are increased by even minute

increases in lead absorption; (2) that no such increase in lead excretion appears on exposure to leaded gasoline.

One wonders, in relation to the pronounced activity of the hair mentioned by Kohn-Abrest if he is not confusing lead with arsenic.

One wonders, still more, if he is not creating a fictitious problem in order to obtain funds for an equally fictitious investigation. However, be that as it may, the questions proposed are not worthy of being dignified by a too serious consideration.

You are at liberty to use the facts in the above discussion as you wish. I would suggest, though it is unnecessary to do so, in your case, that they should not be used to instigate or keep alive a futile controversy.

In concluding this long letter, I wish to mention a more important matter, and to wish you the happiest Christmas and New Year. It would be a pleasure to see you in person and to express my good wishes directly. However, I do express them and none the less heartily through this medium.

Sincerely,

RAK:IS

Robert A. Kehoe, M.D.