

September 23, 1971

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Dear Doctor Hammond:

I do remember, with pleasure, our meetings of the past, and I am glad to have this opportunity to communicate with you further. It was good of you to write to me as you have done, and I appreciate your comments. You and your colleagues on the Panel had a difficult job to perform, and I was pleased with the result. The rash of publications on many and varied aspects of the entire problem of lead in the general environment of man on this planet, and specifically on man in North America, posed a serious problem of study and interpretation. Moreover, the prevalent point of view in the community, based upon little information and ^{much} misinformation, and among a number of non-medical and non-biologically oriented scientists, could have been a profoundly difficult situation to deal with.

I had only one criticism to offer, as to the interpretation of our own work on the behavior of lead, and I did not think it necessary to make any reference to it in my letter to Dr. Marshall, for the reason that it entered very little into the matters with which you, and your Panel, had to deal. I think it is worthy of mentioning to you, however, because of your interest in the general problem.

The experiments concerned with the oral administration of lead demonstrated that there was no tendency toward reaching the endpoint of accumulation of lead, but that (with certain seasonal and other types of variability) the rate of accumulation of lead in the bodies of the subjects remained essentially constant during the entire period of such administration and for aught one knows would have continued indefinitely to accumulate at a rate dependent upon the magnitude of the dose. This is a continuous type of absorption of lead, which, in my view, would correspond in type (if not in degree, because of the smallness of the daily dose of lead day by day) to human exposure to lead in the ambient air.

The reverse is true of the type of absorption which occurred when the subjects inhaled lead in the respiratory chamber in simulation of the respiratory exposure of workmen in the lead trades. Here, as we have observed in industry and confirmed in our controlled experiments in the Laboratory, the subjects, presumably, absorbed lead at the same rate on every day of observed exposure, but they soon (8 to 10 weeks) reached a plateau in the concentration of the daily output of lead in the urine, and in the concentration of lead in their blood beyond which they did not progress with the lapse of time, during the exposure of the same type and quantity. Presumably, the accumulation of lead in the bodies of the subjects failed also to occur at the initial rate, but rather it tapered off to a very low rate. (At least this is how experimental animals seem to behave, although this has not been proved beyond peradventure, because of the smallness of the amounts at low levels of absorption, after equilibrium has been reached.) It appears, however, that some degree of accumulation in the skeleton occurs, whenever lead is being absorbed, and that the lead which reaches the avascular part of the

skeleton increases at a rate which varies with the amount absorbed, and is very little, indeed, under ordinary environmental conditions.

At any rate, the discontinuous absorption of lead, as it occurs in industry and in experiments in the laboratory which simulate (in time) industrial exposure, result in the development of an equilibrium, after which there is no further increase in the concentration or output of the lead in the urine, or in the concentration of lead in the blood.

This phenomenon is one of great importance, since it furnished the basis for arriving at a safe (utterly safe) level of absorption of lead in industry. When the exposure of individuals to lead reaches its peak (under a given set of conditions in an industrial plant) at some figure ^{indicated by the blood} slightly, but significantly, short of 0.08 mg. per 100 grams of whole blood (as determined repeatedly in the individual person by sensitive methods of analysis), we have yet to observe the occurrence of a single case (among thousands of individuals) of lead poisoning. I regard this as the most important piece of information which we have been able to demonstrate, and since this has been the major achievement of almost half a century of experimental work, in the attempt to eliminate lead poisoning in industry, I am, perhaps, unduly vehement about it. By this means, however, we can put a stop to the occurrence of lead poisoning in industry, if we can gain acceptance of the application of the method. It is now fairly widespread in big industry, but small units of the lead industry have largely failed (allegedly because of the expense, but actually because of failure to be interested in - or acquainted with - hygienic principles). The new Occupational Health Act, however, may provide the compulsion required to achieve the desired result.

I hope you will bear with my insistence upon this point of information, and perhaps I can be forgiven for such insistence, by reason of the importance of the application of the method. I have always believed that the people who do the work of the world, deserve every protection that is feasible, and I abhor the point of view that we can afford to pay the price in human life and health, for the production of things we want. There are various attributes of barbarism, and this is one of them.

Sincerely yours,

Robert A. Kehoe, M.D.
Professor Emeritus of
Occupational Medicine

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