

April 28, 1969

Mr. Stanley Muniak
Scientific Assistant
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Dear Mr. Muniak:

I judge from your note of March 26 that you have seen certain of the published articles on The Fate of Inhaled Particulate Lead Compounds. The most "up to date" information has not been published because of the incomplete character of the experiments and will not be for some time. I shall undertake to bring you up to date, but if I fail to fulfill your wishes, it would be well if you were to let me know wherein I have failed. My difficulty lies in the fact that I have not had the time until very recently, to do more than skim the surface of the work by presenting the more obvious or more crucial findings. I am embarking on a systematic study of the extensive data in order to assemble the full information. This will occupy me for some time to come, but until it has been done, much of the product of the prolonged investigation will remain buried.

The sequence of the general investigations was interrupted about five years ago when it appeared to be necessary to solve (if possible) the problem of the tolerable level of the concentration of lead in the general atmosphere. Up to that time, we had been concerned with the effects of dosage, particulate dimensions of inhaled lead compounds, and variation in the effects of specific compounds upon the responses of human subjects to exposure to air-borne inorganic lead compounds. (We had first investigated, at some length, the response to the ingestion of lead and the patterns of intake and output of lead from the general environment.)

The results of the general experiments have been published from time to time in somewhat abbreviated form. The experiments concerned with the "tolerable" level, have been described briefly in articles which are not very readily accessible, and because the method of approach is indicated in them, I am sending reprints of them. (I assume that you have the earlier publications including their summarization in the "Harben Lectures of 1960." If you do not, let me know.)

These experiments are based, as to method, on the fact that the time element in the absorption of lead is as important as the dose (if the latter is sufficiently large to induce a definitive response). Since we cannot expose our subjects continuously to the inhalation of elevated levels of lead in air (for certain very practical reasons), we have tested the procedure of subjecting them to a carefully maintained constant level of respiratory exposure through a series of increasing periods of exposure, each of which was 16 to 20 weeks in duration. By this means, one can induce

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a series of regular increases, stepwise, in the response as demonstrated by lead in the urine and the blood. The peak of the response in each instance is a plateau, and if the incremental increases in time are regular, these peaks or points, connected by a line provide a definitive slope from which by extrapolation one can determine the response to continuous exposure. (The latter may be only an approximation, but it appears to be a very near approximation.) The object of the experiments, of course, is to obtain the maximum concentration of lead in the air, which when added to the background (normal?) of the existing environmental exposure to lead will just fail to induce a significant (i.e., measureable) response on the part of the intact (living) human organism. We have not found the precise point, but we are certainly fairly near to it. We have chosen to begin low and work up to the least concentration which will yield a response. This, I trust, will give you both the theoretical basis of the experiments and some of the evidence for its validity.

If you have questions, do not hesitate to direct them to me, but please do not expect an answer by return mail. I'll reply when I can find a convenient time to do so.

Sincerely yours,

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

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