

July 1st, 1936

Mr. R. G. Phillips
1108 Mercantile Building
Rochester, New York

Dear Mr. Phillips:

I am very glad indeed to be able to send you by separate cover a series of articles which give the major results of our experimental work in the field of lead absorption and excretion. (I wish to make sure that I did not previously send you a copy of the thick booklet "On the Normal Absorption and Excretion of Lead" etc. My supply of these books is exhausted with the one that I am sending you. As a matter of fact I have had to dig this copy up in the laboratory and take it away from one of my associates, on my promise to supply him with another from some source.) The two articles which have to do with the hazards associated with the use of leaded gasoline will be of interest to you chiefly because they give most of the charts in full in our study of normal subjects. I think you will find these of some interest, therefore, in that they supplement very materially our other work on normal lead.

You are quite right in assuming that I have an opinion as to the maximal levels of lead intoxication. For lead in the air in a finely divided form, I should regard a concentration somewhere between 1.5 and 2 mgs. per 10 cubic millimeters as about the threshold of dangerous lead absorption. Below this level I should not expect to find cases of lead intoxication. This concentration is approximately equivalent to a lead inhalation of .75 to 1 mgs. per working day. Under these conditions there would be a heightened lead excretion.

As to lead ingestion, the figure would be somewhat greater but I should regard it as only doubtfully safe to take in lead by ingestion in quantities greater than a milligram per day. This statement requires a word of explanation. I do not feel that we can safely adapt the facts obtained from studies of actual exposure to the entire community. One pre-supposes that there are certain risks in industry of which the workman is aware, and which he accepts as a part of his occupation. It is not to be supposed that the casual citizen can be expected to take any corresponding risk in relation to the basic conditions of his life. (Incidentally any gross increase in the basic level of lead ingestion would alter the situation in industry.) As I pointed out in my discussion the other day, the present level of lead

N9739

Mr. R. G. Phillips

ingestion is, on the average, a quarter of a milligram per day. This does not result in progressive lead accumulation. On the other hand it is associated with the presence in the tissues of the normal adult of something more than a hundred mgs. of lead. I should gravely question the safety of multiplying this figure by 4. No one knows how much lead would be found in the tissues of persons who ingest a milligram of lead per day over a long period. Undoubtedly the quantity in the tissues would be increased, and it is probable that the increase would be considerably less than proportional to the increased ingestion. On the other hand, no one could contemplate such a wholesale experiment on a community and be able to sleep well at night. This is a question which one does not dare push too much on the basis of opinion. We must face the facts. I feel certain enough of the facts that I should be willing myself (I being a reasonably healthy, well behaved individual), to ingest a milligram of lead per day over a period of months. I should not expect to be injured by it in any way, and I should expect by the end of three or 4 months to have developed an equilibrium after which I would excrete an amount equivalent to that taken in. Under these conditions I would expect my gross lead absorption to be considerably less than what it is at present when I am taking in about a quarter of a milligram per day. In fact, I am quite confident that the major portion of this ingested lead would go through the alimentary tract unabsorbed. I think this on the basis of experimental observations. On the other hand, it must be recognized that there are a large number of infants, children and sick people whose behavior can not be predicted with sufficient accuracy to justify any type of experimentation with their health. This is the problem which the apple industry has to face. I repeat what I have tried to put over to them, that the situation in industry is a totally different one in principle.

In reply to your last question, I have administered lead to only two experimental subjects over a short period of time for the purpose of seeing how much was absorbed in that short time and how quickly and how extensively the urinary excretion responded. This lead was administered in solution (as lead chloride) on an empty stomach in the hope of getting the maximal alimentary absorption. Most of the lead under these conditions runs through the alimentary tract unabsorbed in spite of the most favorable conditions for absorption. (It is possible, of course, that the lead compound would have remained longer with the alimentary tract if it had been mixed with food, but on the other hand, there would probably have been a greater interference with the absorption.)

I hope you will find the article which I am sending you to be of some interest, and if I can answer any further questions, do not hesitate to raise them.

KE 0008519

Mr. R. G. Phillips

With kindest personal regards,

Cordially yours,

RAK:is

Robert A. Kehoe, M.D.

RE 0008520