

January 24, 1952

Dr. Conrad T. Rusin
The American Crucible Products Company
Lorain, Ohio

Dear Doctor Rusin:

I am pleased to answer your questions in terms of our experience, and on the basis of theoretical considerations which arise out of detailed study of the lead metabolism of exposed persons under controlled laboratory conditions.

There are sound reasons for believing that brief exposure to soluble lead compounds whether in the food or in the respired air can cause a prompt change in the lead levels in the blood and also in the urine. The speed of the response is greater in the case of airborne lead than in that of ingested lead, within the limits of comparable dosage, since lead absorbed from the lung enters the general circulation directly instead of by way of the portal circulation through the liver.

However, the differentiation of quantities of the order given is not possible except on the basis of the average of a number of analytical results on the blood. The analytical error in relation to values of this order of magnitude is commonly about 0.01 mg. for samples of the size we employ, and therefore 0.06 and 0.07 are indistinguishable when only one or two results are available. It is partly for this reason that we always carry out paired analyses, but even paired results are not sufficient to prove the case, and therefore I am always careful not to interpret such results with too much finality. When the average of the two results is 0.08 or more, I cannot fail to regard them with apprehension. When only one result is available at the level of 0.08 I regard it with suspicion but not too much concern (until the analysis can be repeated) since such a result might be in error on the high side. Here the urinary values are of great assistance in the interpretation of the situation, and therefore for diagnostic purposes I like to have the results on the urine.

The practical answer to your question is, therefore, that if the values are at this level, one analysis does not give you a certain and definite solution of your problem. If they are considerably higher, you know that there is danger, and if they are much lower, you can be sure that no danger exists, but if they are at or this close to the threshold value, you are left in doubt, and you can be sure that much additional exposure will push the individual over into a dangerous state, which may (or may not) result in symptoms of intoxication. That is to say that you are dealing here in proba-

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bilities, not in certainty.

The answer to your second question is a categoric negative. We have been looking carefully for such a situation for many years. We have never observed it, and we feel reasonably certain that, if it occurs at all, it is most rare. We have induced the abrupt release of lead from the erythrocytes by the administration of BAL, with a prompt and gross drop in the lead concentration in the blood and a roughly corresponding increase in the urinary lead concentration (up to 30 or 40 times the earlier level in the urine). This, however, is something beyond your question. There is no evidence in favor of the hypothesis that the lead in the skeleton is mobilized by this means, while there is indirect evidence that it is not, since, within a few hours, the effect of the dose of BAL wears off and the blood and urinary values return to their previous level.

I realize that you will be told that it is well known that such a situation as you have described does occur. It is "well known" only because Joe Aub and his associates so stated incorrectly and on inadequate evidence obtained before the development of the present precise and sensitive methods of analysis. The hypothesis is untrue, but it persists tenaciously, because it was put into the literature in the early twenties of this century, by a group whose scientific prestige was very great. They, at least Aub and Fairhall, who were responsible for the statement, know now that it is not true, but they have not taken pains to say so, and those who followed their work and ideas have not, in the main, learned better.

With best regards,

Cordially yours,

Robert A. Kehoe, M. D.

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