

July 2, 1940

Dr. Max Kummel  
Thirty-one Lincoln Park  
Newark, New Jersey

Dear Doctor Kummel:

The question raised in your letter of June 29th requires some discussion since, in my opinion, it is not possible to give an arbitrary judgment on the point which will be based on generally acceptable facts.

Presumably milk is advised as a part of the necessary diet of workers in the hazardous lead trades because it has some specific advantageous effect upon either lead absorption, lead excretion or the behavior of lead in the human body after absorption. No one has demonstrated that any of these effects actually occur. It is believed on wholly unsound evidence that milk is advantageous in relation to lead absorption, and it is pure assumption. This is not to say that milk is not an advantageous article in the general diet for we all know that it is, and if workers are undernourished or if they are going along on a deficient diet with respect to calcium, phosphorus, specific proteins or caloric intake, milk is obviously advantageous. It has been demonstrated by animal experiments that a diet deficient in calcium causes an increase in the toxicity of lead compounds. No doubt this could be demonstrated in relation to a number of other deficiencies. On the other hand there is no evidence, so far as I know, that a diet which is abnormally high in calcium over a long period of time is advantageous in relation to lead exposure and absorption. Calvery's experiments have tended to show that a high calcium diet in the case of animals fed on diets high in lead, resulted in diminution in the average quantities of lead found in the bodies of the animals when sacrificed for analysis. Whether this is the result of failure to absorb lead from the alimentary tract in the presence of excessive quantities of calcium has not been certainly established, but this is the probable

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explanation of these observations if one considers the recent experimental work of Thompson in this connection. In any case Calvery's results were concerned with ingested lead and not with inhaled lead and, therefore, the facts are not necessarily related to occupational lead exposure to any very important degree.

From the latter part of the preceding paragraph, it might be assumed that any beneficial effects of the use of milk could be attributed to its high calcium content. This, of course, is not necessarily true. I have referred specifically to the calcium only to show how little we definitely know about even this phase of the matter. We have recently carried out some experiments in an effort to determine just what is the effect of milk in large quantities on the absorption of ingested lead, and on the excretion of lead from the body. An experimental subject who had been on an experimentally induced lead intake of a milligram a day, plus that which was in his food, took large quantities of milk over a period of a month. We were unable to find that the milk had any effect on the intake and output of lead. The quantities of lead which passed through the alimentary tract were essentially unchanged and the quantities excreted in the urine were likewise subject to very little modification. These results, as yet unpublished, serve to demonstrate the unpredictability of the effects of large quantities of milk in the diet in relation to lead absorption and lead excretion.

The only reason I can see for the addition of milk to the diet of lead workers is that it is likely to improve the diet. Many industrial workers, and especially those in the lower wage group, eat very bad food. Their choice of food is often bad and their opportunities for choice are often very limited. As a consequence the addition of any article of food which covers most of the requirements for a good food, is likely to be advantageous in terms of general nutrition. Therefore if the workmen are under-nourished in either a general or a specific sense, the addition of milk to their diet will be helpful. If, in order to correct their diet, it is necessary to see that milk is provided, it probably should be done, and often the only way it can be done is by providing it at low cost or at no cost. In my opinion this should not be an economic problem but rather an educational one, for I should feel that if the workmen are so poorly paid that they can not afford a good diet, then their diet should be improved by correcting their wage scale.

In answer to your final question, I can see no reason for supplying any kind of medicated beverages to industrial workers with the single

exception that it is necessary to add salt in hot weather or in the case of jobs which must be carried out at definitely high temperatures. The latter procedure is fully justified by adequate clinical evidence. On the contrary there is no valid evidence to justify specific diets or specific beverages in the case of lead workers, and if the conditions of exposure are such that lead poisoning will occur, the conditions should be corrected. If they are such as to be safe from the point of view of lead hazards, then no special dietary provisions are necessary. Even if these latter two statements were not wholly true, there is still no sound body of information which will enable us to provide protection for dangerously exposed workers through dietary means, except to the extent that diets which are recognized to be deficient can be modified so as to make them adequate.

Despite what I have said above, there might be some justification for introducing certain dietary modifications among workers in the hazardous lead trades, if one had the means of determining precisely what occurred. In other words our present information is good enough to justify carefully controlled experimental observations. However we should not deceive ourselves into the belief that the effects of dietary changes upon lead absorption and lead excretion are predictable over any considerable period of time.

I trust I have made myself clear. If not, I shall be glad to try to reply to any further questions which may occur to you.

Sincerely yours,

RAK:is

Robert A. Kehoe, M.D.