

Sears, Roebuck and Co.

November 18, 1946

Dr. R.A. Kehoe
University of Cincinnati
Kettering Laboratory of
Applied Physiology
Cincinnati 19, Ohio

Dear Dr. Kehoe:

I wish to thank you for your very helpful and informative letter of October 25, written in response to our recent inquiry concerning the absorption of lead through the intact skin. Contrary to your opinion the information you furnished will be very useful.

However, we do have two problems holding at the present time that I can use as illustrations of the kinds of questions we must attempt to answer from time to time. The first concerns the use of an aqueous solution of lead acetate as a hair dye. We are interested in the possibility of chronic poisoning due to absorption. The second involves a nose-ring for a bull made of lead-bearing metals. In this case if there is absorption due to close contact with open tissues, is the rate of absorption apt to be great enough to cause trouble?

In view of the above, if you care to add anything to the information which you sent us, we will be very happy to receive it.

Very truly yours,

Virginia Pearson

(Miss) Virginia Pearson
Librarian
Merchandise Testing &
Development Laboratory

October 25, 1946

Miss Virginia Pearson,
Librarian, Merchandise Testing and
Development Laboratory,
Sears, Roebuck and Company, Department 817
Chicago 7, Illinois.

Dear Miss Pearson:

I am afraid it will not be very easy for me to give you any useful information in connection with the request in your letter of October 10, without having a somewhat clearer idea of your problem. However, I shall do my best to reply.

In general the inorganic compounds of lead are not absorbed through the intact skin to any significant degree. Speaking from the purely theoretical point of view it seems almost certain that very minute quantities of lead can be absorbed through the skin as the result of contact with any appreciably soluble material. For practical purposes, however, the penetration of the skin by lead compounds dissolved in water is negligible and is of no hygienic consequence. The total quantities that could be absorbed in this fashion within any unit of time are so insignificant in relation to the daily normal and unavoidable lead absorption from the alimentary tract as to be quite without any importance.

The only lead compounds that are absorbed to an important degree through the skin, so far as my knowledge and experience goes, are the liquid alkyl lead compounds, of which the only one in commercial use is tetraethyl lead. This compound, as well as its other alkyl analogs, penetrates the skin with ease, and will cause fatal lead intoxication in suitable dosage. It will be of interest to you in this connection to realize that the quantity of tetraethyl lead found in commercial gasolines is so small as to give rise to no significant risk of the absorption of this compound through the skin of persons who come in contact with gasoline. You will see statements to the contrary made by uninformed persons in the medical literature. The facts, however, have been clearly established by experimental work on both animals and man.

It has been said here and there that the lead salts of the fatty acids, specifically the oleate and stearate, can be absorbed through the skin in significant quantities. There is some slight suggestion in clinical experience that such absorption may be significant when ointments of this type are

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applied on the seriously abraded or denuded skin. However, the evidence even here is unconvincing. It is theoretically possible that such absorption can occur to a significant degree. I have seen no evidence that has clearly demonstrated the facts in this matter. In general, therefore, I am quite prepared to take a viewpoint that the only hazard in connection with percutaneous absorption arises from the alkyl lead compounds of the type indicated above. Even the triethyl compounds as differentiated from the tetraethyl lead being crystalline in character as well as water-soluble, are not appreciably absorbed through the intact skin.

I trust that this will be helpful, but if you have any practical problem in mind, I should be in much better position to advise you concerning it, if I knew the nature of the problem.

Very truly yours,

Robert A. Kehoe, M. D.

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