

PEASE LABORATORIES, INC.

BIOLOGICAL, CHEMICAL AND SANITARY INVESTIGATIONS

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Dr. Robert A. Kehoe
Kettering Laboratory of
Applied Physiology
College of Medicine
Cincinnati, Ohio

Dear Doctor Kehoe:

Thanks very much indeed for your letter of the 18th and for your kindness in loaning me the copy of your very excellent presentation of such a fundamental series of investigations on the effects of ingestion of lead, and the relation of the same to other avenues of access of lead to the body tissues.

I have taken the liberty of having the text and bibliography of your paper copied and will, of course, observe carefully the suggestion that it be considered confidential until such time as the paper actually appears in published form. The data, however, will be of very considerable assistance to us if, in the meantime, Dr. Calvery should take up for active discussion the results of our researches upon the penetration of the skin by lead compounds which undergo chemical alterations in contact with the hair colorations very probably associated with reactions between the lead and certain constituent factors of the hairs. As yet we have found no evidence that the lead penetrates beyond the surface layers of the epidermis, or if it does gain access to the actual layers of the skin the lead is not taken up by the lymphatics, for our analysis of the lymph glands tends to show no increase in the amounts of lead in those that drain the areas treated.

In your article you refer to the outward passage of the lead with the perspiration, which is indeed very interesting. In the case of the rabbits which we have been using as experimental animals, we are dealing with skins in which there is at least the minimum of perspiration. Rabbit skin is substantially devoid of sweat glands, or, at least, they are very few in number. On the other hand, we know they have very large numbers of sebaceous glands, and it is true that the rabbits subjected to treatment with a lead compound on the skin appear to have very substantial

amounts of lead in the non-treated areas of the skin, in both the skin itself and in the fur. It has been shown in researches that even when lead was ingested, the very substantial amounts of lead found in the fur and in the skin were due to external contamination rather than to outward penetration from the tissues to which the lead was undoubtedly carried by the blood circulation. On the other hand, from your investigations the lead would certainly be present in the feces in very substantial amounts, and under ordinary conditions of housing the fur and skin of the rabbits might very readily become contaminated by contact with the fecal material. Also, your results on the amounts of lead present in the urine indicate that there would be an opportunity for rabbit fur and skin to become contaminated with lead from that source. In any case, there appears to be no doubt that the fur and the external surfaces of the skin of the rabbit become laden with considerable lead whenever the animals are fed lead compounds, or the same are applied to restricted surfaces of the body. In our rabbits we found restricted amounts of lead in the internal organs and in the lymph glands, notwithstanding substantially greater amounts in the untreated skin and untreated fur.

In the case of our animals they all put on weight, so that whatever absorption of lead took place failed to affect their growth tendencies in any material manner.

We did not do blood work on the animals, largely on the grounds that blood investigations of animals give results that are not very uniform even under the best of metabolic and environmental states. Your blood work on the human being, where conditions could be considered reasonably standardized, tends to confirm our feelings with respect to this line of investigation on such a variable animal as the rabbit.

It is indeed very interesting that the results of so many of these tests tend to show the harmlessness of fairly substantial amounts of lead gaining access systemically. Of interest is the idea that up to certain concentrations the animal body can absorb, excrete and perhaps store in reasonably harmless locations considerable amounts of metals, and that no undue or pathological reactions take place until amounts of the metals either gain access to the circulatory system by entrance or by reason of excessive release for exit, in concentrations well above those following this earlier apparently more or less normal course.

In investigations we made years ago on canned foods with respect to the storage of tin, we found this fundamental feature to be true; namely, the various tissues of the bodies of

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the monkeys appeared to be capable of holding approximately the same amounts of tin, no matter how much was present in the food which they consumed. In those investigations the skin of the animals retained very substantially more than any other body organ. As most of the tin was ultimately determined to be present in one of the food ingredients with which the canned, glass packed, and fresh vegetables were mixed, the generally uniform final results in all the tests, regardless of either the source or the amount of the food eaten, indicated that the animals have this capacity to take care of approximately the same amount of the metal tin.

Somewhat the same results have been obtained by us and by Coulson working with oysters, and the copper commonly found in oysters. Coulson's work particularly indicates that up to a certain point the individual tissues of the body will store approximately the same maximum amounts of copper quite unaffected by anything but very extraordinary amounts fed of certain types of copper, such as, copper sulphate.

Again thanking you for your kindness in making available to me the results of your very interesting work, and with very best wishes,

Yours sincerely,



Director

HDPease VK
Enclosure