Lead Industries Association

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January 19, 1944

Dr. Robert A. Kehoe
College of Medicine
University of Cincinnati
Cincinnati, Ohio

Dear Dr. Kehoe:

If you read TIME no doubt you saw the item which appeared in the December 20 issue entitled, "Paint Eaters" derived from an article by Byers and Lord, published in the November, 1943 issue of the American Journal of Diseases of Children, entitled, "Late Effects of Lead Poisoning on Mental Development." It drew some amazing conclusions alleging that lead poisoning in early childhood had left effects showing up years later. It was a most alarming revelation. Naturally, I immediately instituted an investigation because, if what this article describes is correct, then we have indeed a most serious public health hazard.

However, on examining the article from which the TIME condensation was made, I am really surprised that a reputable journal of the American Medical Association would publish such a dissertation. Superficially it is a long paper, well illustrated, and must seem impressive to the profession at large. Many case histories are described, but to any one who has studied lead poisoning intensively and who is familiar with the vast amount of work that has been done in recent years on the metal, and who wishes to sift fact from fancy, the assertions made appear to be far from proven.

Although 20 cases of alleged lead poisoning in children are individually described in not a single case have I found the authors making the slightest attempt to ascertain whether or not the paint used on the cribs contained any lead. They apparently proceed on the assumption that any paint chewed from any crib must be lead bearing and build up their contentions on medical diagnoses that do not sound convincing to me.

For example, take the very first case. There was no stippling of the blood, the urine was normal, there was no analysis made of the paint, but the X-ray showed

"dense bands of metallic deposit at the growing ends of the shafts, characteristic of lead poisoning." For that reason alone the case was alleged to be lead poisoning.

Take Case No. 3, the youngster had scarlet fever and other infections. Again the X-ray is relied upon as the only evidence. There was no analysis of the paint.

Or Case 4, in which it was stated, "results of the physical examination and laboratory investigation were not remarkable," but again the X-ray comes along with a "positive" determination of lead! No paint analysis.

All the cases are more or less alike, but one of the prizes is Case No. 6 because here there is alleged to be a high lead content of the blood but the X-ray was negative! Nevertheless it was diagnosed as lead poisoning.

Or better yet, look at Case 11 in which an infant's blood at 2-5/12 years showed "a mild secondary anemia and her urine a moderate amount of pus." When she was 4¼ years old she showed a "history of chewing wood.." and "her blood was examined for stippled cells, without success." At 5½ years her family stated definitely that "in chewing wood she had chewed painted articles of furniture." On this occasion "her blood showed 1.8 per cent stippled cells and a mild secondary anemia." The X-ray examination suggested "recurrent lead poisoning." Two years later the X-rays showed "faint bands of density some distance behind the growing ends of the long bones, thought to be due to the old deposits of lead." But, here comes the most interesting point of all; four years later, when she was 11, and still growing, "her blood, urine and spinal fluid showed about one hundred times the concentration of lead found in normal persons. In spite of these results, roentgenograms of the long bones showed no evidence of lead deposits." Rather confusing, isn't it?

All the cases are more or less similar and there is no need of going into any more of them here.

I note, too, that most of the work involved in this article was prepared by Elizabeth E. Lord, Ph.D., who died recently.

As you know, it is our belief here, based on careful investigation, that no crib manufacturer in the United States today is using any lead paint on cribs, nor has he used any for years, for two reasons:

(1) other paints, such as zinc oxide, lithophone and titanium base enamels are cheaper than white lead, and

(2) they make a harder and more satisfactory enamel than white lead.

Wouldn't you think, therefore, that rather than jump to conclusions, conclusions based chiefly upon only one premise, and X-ray diagnosis of the bones, the authors would at least have tried to ascertain whether or not the cribs had been painted with lead? This would have been so easy to determine. Window sills might be painted with lead but here, too, leadless paints are more apt to be employed which is the current vogue on interiors.

In the second place I am struck with the fact that the examinations made of the children in almost all cases showed no stippling of the blood and in most cases where an effort was made to find out whether the children were excreting any lead, the urine was normal, or no analysis was made. On the other hand, the authors place great weight upon the X-ray and their article is replete with X-ray photographs of the bones calling attention to well marked deposits of "lead" on the margins of the shafts of long bones.

Now it may very well be that the authors did not see or don't agree with the careful work of Dr. L. T. Fairhall, reported in Public Health Report Vol. 58, No. 6, dated February 5, 1943, entitled, "Identification of Lead in Bone Tissue" where he states:

> "It is apparent that the small amounts of lead deposited in bone are insufficient to register by means of X-rays and that darkened areas which have heretofore been accepted as lead deposits are likely to be due to calcium. From what is now known concerning the distribution of lead in bone, it would be surprising indeed if such small amounts of lead so evenly distributed would be revealed by X-rays in the presence of such large amounts of calcium. The lead content of human bones with known exposure to lead is also insufficient in amount to impart any marked opacity to X-rays."

If lead was so prominent in the X-ray photographs shown by Byers and Lord in their paper there must have been perfectly enormous amounts of lead in the bones to do so. This seems incredible to me. Why didn't it show up in the urine?

Another point which I can not understand is that years after these youngsters were alleged to have contracted lead poisoning and were removed from the exposure and subsequently re-examined, this so-called lead line was still found in the bones. How do the authors account for that?

I hesitate, of course, to bother you in wartime with this topic but I think you will agree with me that this is an episode which, because of your deep interest in lead and your high standing in the profession, can not be ignored. Is is unfortunately true, and I know from bitter experience, that other doctors will accept as authoritative this paper of Byers and Lord and probably build upon it still more fantastic assertions. I would, therefore, like to know from you what, in your judgment, is the best thing to do. Do you think, for example, that it is something which might be brought to the attention of your distinguished committee on lead poisoning which has just published such an able report for the American Public Health Association?

With kindest regards,

Sincerely yours,

E. Vorhees

Secretary.

P.S. In the event you do not have a copy of the paper mentioned at your disposal, I am enclosing a photostatic copy.

February 7, 1944

19

Mr. F. E. Wormser,
Lead Industries Association,
420 Lexington Avenue,
New York City 17.

Dear Mr. Wormser:

I have had time only recently to consider your letter of January 19, and the article by Byers and Boyd in the American Journal of Diseases of Children. Having been out of the country for several months, I could not get around to answering it sooner.

I fear that you will be disappointed by my answer, for I am disposed to agree with the conclusions arrived at by the authors, and to believe that their evidence, if not entirely adequate, is worthy of very serious consideration. Perhaps my own experience prejudices me in favor of the acceptance of their findings, for I have seen cases of serious mental retardation in children that have recovered from lead poisoning of the encephalopathic type, and among my records is one case of permanent feeble mindedness which I attribute to a well defined episode of lead encephalopathy in an infant. The child is now fourteen or fifteen years of age.

The article must be considered on two bases, - (1) evidence of the occurrence of lead poisoning, and (2) evidence of mental impairment. For my part I am willing, - perhaps too willing - to accept the conclusions of the authors as to the second point. It must be pointed out that the contribution of Elizabeth E. Lord, Ph.D. was made on this aspect of the problem, and not on the question of lead exposure or lead poisoning. I should not take issue with the propriety or competence of her work in this field, although I am frank to say that I have no knowledge of her abilities. It is true that the authors do some rather amateurish theorizing on the subject of the behavior of lead in the human organism in the first part of their article, and that they discuss the criteria of the diagnosis of lead poisoning in a somewhat less than well-informed manner. On the other hand, it appears that they did not make the diagnoses in these cases but rather accepted the diagnoses made as a matter of record in the Childrens Hospital, and carried out their follow-up studies on cases that would ordinarily be accepted as lead poisoning in children. I agree that the diagnoses may have

been in error in some instances, perhaps even in many, for I know how difficult this problem is in the case of children. In the final analysis it is frequently impossible to be sure on ordinary clinical grounds, and often a series of analyses of the blood and urine are required to prove or disprove the significance of the lead exposure. On the other hand, the criteria used here, as indicated in the Summary of the Data, are orthodox.

You quarrel with the statement about chewing paint and say that the manufacturers don't use it on cribs and toys. That may well be true. My experience leads me to accept it as such. However, the householder repaints these articles, and often with lead-containing paints. Please note that the article makes point of the fact that the children chewed paint "off cribs, window sills or furniture," and also refers to the statement of parents that they had repainted cribs. I'm afraid it will do you no good to try to combat the significance of the history of chewing articles in relation to the problem of lead poisoning in children. The most significant feature of the history of exposure in an overwhelming proportion of the cases of lead poisoning in children is just that fact. "Pica" is at the bottom of most of these cases, and unfortunately the environment of small children is not sufficiently free of lead for their safety. Have you seen the data on lead poisoning in children in Queensland? These cases were largely due to chewing the paint off the railings of the porches on which the children played.

You also object to the significance of the X-Ray evidence of lead absorption. I'm afraid you are not on good ground. The work of Park and Vogt on this point is much too extensive and good to be dismissed so easily. This sign does not exist in adults, for there is no line to be photographed in the case of the adult, unless perhaps he absorbs much lead while a broken bone is mending. However, in the case of the child it is a very useful presumptive sign. Although the dense line at the epiphyseal edge of the rapidly growing and calcifying long bone of the child is not specific for lead, (this should always be checked by blood or urinary lead analysis) it is associated with the absorption of abnormal quantities of lead in many instances, and therefore it may not be ignored. Fairhall's work (he is not a physician, either) was mainly on the bones of dogs, which may or may not have been young and growing. He does not mention this point, and I am not sure he was even aware of its significance. However, he did not say that no line was visible in the bones of children exposed to lead. He only said that there is considerable doubt that any line seen in human or other bones is due to the shadow cast by lead itself at that point. I am not prepared to argue the matter of the lead concentration in the region of most rapid growth in the bones of childred, for I have no analytical data on that aspect of the problem. I am prepared to say that the occurrence of a dense

narrow band at the epiphyseal line in the long bones of a child is a warning that had better be carefully investigated, for although it is by no means certain, the likelihood is that this child has been swallowing or inhaling considerable quantities of lead in the very recent past. I advise you to examine the articles of Park and of Vogt with considerable care before you make too broad an interpretation and application of Lawrence Fairhall's observations.

The statements in the case records that "the urine was normal," do not refer to normal lead concentrations, but rather to the lack of ordinary abnormalities such as albuminuria, hematuria, and the like. You must remember that the use of the urinary and blood lead concentrations as evidence of the extent of the recent lead absorption of an individual was not popular in Boston even after these procedures had come to be accepted as diagnostic measures elsewhere. It is not surprising therefore, that lead analyses on the blood or urine were not carried out. In this connection it is enlightening to note (page 475) that the authors refer to the recently published method of analysis of Fairhall and Keenan as offering some hope that the lead in urine may eventually be found to have some clinical significance.

You must not take too seriously the reported absence of stippling and lead lines in many of these cases. The blood findings on children are somewhat more erratic than they are in adults, and then the large proportion of doctors do not know how to examine a blood smear to find out if stippling is present. I speak here from long experience with the results of this examination in hospitals. We never take them seriously unless we know who made the examination. As for lead lines, they are rarely seen even in the most severely poisoned children, for the reason that children seldom have chronic gingivitis.

Finally, from the purely clinical viewpoint, the symptomatology of most of these cases was such as to justify the strong suspicion that lead poisoning existed. Any attempt to discredit the diagnoses in most instances would not be worth the effort, since only detailed evidence could be used to do this. No such evidence is available. I quite agree that the reasoning in some instances was "confusing."

From all this you may gather that I think that the only thing that can be done about this paper and this concept, is to investigate the problem further, so as to settle the facts. What has been said is suggestive, and I think there is more than a grain of truth in it. The sitatuion may not be as black, however, as it has been painted.

I apologize for the length of this letter, but I could not explain

my point of view without considerable discussion.

I'm glad you liked the report of the A.P.H.A. Committee. I, also, think it is good.

Cordially yours,

Robert A. Kehoe, M. D.

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