

January 12, 1940

Dr. Donald E. Cummings
Director
School of Medicine and Hospitals
University of Colorado
2300 East 9th Street
Denver, Colorado

Dear Doctor Cummings:

I shall be very glad to give you my reactions to the usefulness of the basophilic aggregation test as an indicator of lead absorption. I judge from your comments that you are aware of the fact that we have been studying the problem of lead absorption and lead poisoning in a rather detailed fashion over a period of years. We have tried to be quite practical as well as scientific in a more or less fundamental sense in our experimental work, and accordingly we have made it a point to follow the blood changes quite carefully in relation to lead absorption, as revealed by lead excretion, as well as in relation to lead intoxication. Briefly to summarize our conclusions as to the significance of the blood findings, I may say that in our experience there is no necessary relationship between the degree of changes in the blood and the level of lead absorption in the body. By changes in the blood I mean such microscopic evidences as stippling, increase in the number of reticulocytes, etc. Changes in the basophilic elements of the blood tend to occur as a response to lead absorption, as everyone knows who has studied this question. On the other hand the response in the individual case is so variable that normal findings greatly overlap abnormal findings. In the case of stippled erythrocytes, we have found that the mean figure in a large series of normal individuals is approximately 300 per million erythrocytes. The variation in normal individuals, however, extends from 0 up to as high as 1500 or 2000 stippled erythrocytes per million. In persons exposed to lead compounds to a variable degree, we have found that groups of men show an increasing mean number as exposure increases, while even among groups showing fleeting evidences of intoxication, there will be slightly numbers of individuals who show only normal findings. Under abnormal conditions of hazardous exposure, I believe that a progressive increase in the number of stippled erythrocytes is an indication of dangerous lead absorption. The greater the danger the more abrupt the increase is likely to be. Nevertheless such increases do not always occur, and I should hate to be in

the position of having only this evidence to rely upon in the detection of impending lead intoxication. I do not trust it because my experience has shown me that it can not be trusted.

What I have said about stippling is equally true, in my opinion, of the basophilic aggregation test. In fact, so far as I can see, the enumeration of any one of the basophilic levels in the blood will give as good information as the enumeration of all of them in the basophilic aggregation test. In general the basophilic materials of a variety of kinds tend to run in parallel. This is not specifically true but it is as near true as most correlations. In any case it is quite true that the normal range of values overlaps the abnormal, and that the factor of human variability is so large as to make the interpretation of results doubtful in individual cases.

In our experience striking increases occur in most cases of active intoxication, but here one makes the diagnosis from the clinical picture, and not from the blood findings. In such a case, therefore, the blood findings are not primarily diagnostic evidence but only corroborative.

If it is not possible to keep close check on the lead exposure of workmen by frequent study of the particulate lead in the atmosphere, and more especially if it is not possible to determine the degree of lead absorption of workmen by following their urinary lead excretion, then one will have to depend on microscopic blood findings. I do not mean to deny the usefulness of these microscopic findings in experienced hands. On the other hand I feel quite sure that if the conditions in the plant are actually dangerous, reliance upon blood changes as evidence of impending lead intoxication will fail in some instances. For myself, I should hate to be without the advantage of laboratory facilities for the collection of the excreta of workmen, for not only is such information vitally necessary for the recognition of certain unanticipated dangers, but it is often of the greatest importance in a prompt diagnosis of doubtful clinical conditions.

I hope I have answered your questions. I have, at least, given you my best opinion.

I am complying with your request by sending you some reprints which I hope will be of interest and use to you. If I can be of any further service, please do not hesitate to let me know.

Very truly yours,