

November 17, 1942.

Dr. R. M. Andre,  
Supervisor, Medical Section,  
Industrial Commission of Ohio,  
Columbus, Ohio.

Dear Dr. Andre:

I am glad to reply as well as I can to your letter of November 6. Unfortunately the problem is not simple. In fact, it was with great dismay that I received word of the Resolution of the Commission, requiring quantitative analyses on urine in substantiation of the diagnosis of lead poisoning. There is no question of the usefulness of having accurate information on the blood or urine, or both. On the other hand, it is equally certain that the facilities for providing such accurate information throughout the state are not available and that they can not be made available merely by asking for this information. The result will certainly be that you will receive less useful information than you have been obtaining in the past, simply because you will probably confuse fairly good clinical information with hopelessly inaccurate analytical data. You will probably think I am painting an unnecessarily dark picture. Quite on the contrary, I can tell you that there are probably not a dozen places in the United States as a whole from which accurate analytical data of this type can be obtained. The analysis of blood and urine for lead content is probably the most difficult diagnostic laboratory procedure that could be mentioned. Special equipment is required, special laboratory facilities which are not contaminated with dusts and other materials from other chemical processes, must be available, and a degree of analytical skill well beyond that required of laboratory technicians in general, is imperative. Moreover, the samples must be obtained under specified and very carefully controlled conditions, since the contamination of samples will occur regularly under anything than the most rigid conditions of care. A 24-hour sample of urine, collected in a hospital by the usual methods should never be analysed, for the results obtained from its analysis are almost certain to be grossly misleading. Only the utmost precision and chemical cleanliness will provide samples worthy of analysis. This is not a routine analytical procedure, therefore, to be carried out in a clinical diagnostic laboratory, and only the greatest confusion can be expected to result from the attempt to introduce this measure into hospital and clinical laboratories. It simply cannot be done, since neither the personnel or the equipment will be available. Therefore, if

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the Commission intends to adhere to its Resolution, it will be necessary for it to see that certain places are set up which will be available for carrying out this type of work. We have already had a number of requests to do work of this sort. Unfortunately, this is not a diagnostic laboratory, and I can not permit it to degenerate into that type of laboratory. We shall be glad to give every possible assistance to persons interested in setting up good laboratory facilities. We shall be quite glad to give any such persons all the information we have as I am to send it to you. However, it must not be thought that this will solve the problem, for this is not just a question of a method of analysis.

Under separate cover I shall send you a complete and adequate description of the three methods which we employ in the laboratory. I should not wish you to refer to them in your instructions as the "Kehoe" method, since I think that would tend to make me rather ridiculous. Actually these methods have been worked out carefully over a period of years by my associates here in the Laboratory, and as you will see, all of them are available in published articles. There are other modifications of the so called dithizone method, which have given excellent results, and which in the hands of the well trained chemist will work satisfactorily. We believe that the dithizone method properly carried out, is the method of choice for clinical work. On the other hand, various persons are making use of the polarograph for lead determinations and when this is done properly, it gives excellent results. However, we do not believe that any laboratory can do sound work in this field irregularly and intermittently. Use of the method requires great precision, continual checking of reagents, and the greatest care in the maintenance of the utmost cleanliness in the immediate environment of the analysis. I am sure, therefore, that where only occasional analyses are to be made by a laboratory technician who is routinely engaged in a large number of laboratory procedure, the results obtained will be unsatisfactory and grossly misleading. From the point of view of the Commission, I feel certain that this will result badly, since I think there will be more cases to compensate than there would be under other conditions. The regular thing is for the results to turn out abnormally high as the result of contamination in the process of collection and analysis.

I regret very much that I have to take this position, since there is nothing I would like better than to see wide spread use of analytical procedures in persons suspected of lead poisoning. However, over a period of years in which I have been working in this field, I have consistently advised all the doctors I have come in contact with, not to resort to analytical procedures, unless they find it possible to obtain results with absolute certainty of high accuracy. It is infinitely better to rely upon

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MATERIAL SENT UNDER SEPARATE COVER

"Quantitative Spectrographic Determination of Lead in Biological Material" - Jacob Cholak

"Spectrographic Analysis of Biological Material III. Lead, Tin, Aluminum, Copper, and Silver" - Jacob Cholak and Robert V. Story

These articles are to be taken together for the spectrographic method, since the latter one refers to the former.

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"Determination of Lead in Biological Material" - Jacob Cholak and Karl Bambach

"Electrolytic Deposition of Lead from Biological Material" - Karl Bambach and Jacob Cholak

These articles to be taken together for the polarographic method.

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"Determination of Lead by Dithizone" - Karl Bambach

"Determination of Lead" - Donald M. Hubbard

These two articles to be taken together for the dithizone method. A complete version in one article will appear in the Industrial and Engineering Chemistry Journal - Analytical Edition - in a few weeks.

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pure clinical judgment than to have the misleading factor of inaccurate analytical data.

Despite all I have said above, you can count on my assistance in any way in which we can effectively help out.

Cordially yours,

Robert A. Kehoe, M. D.

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Enc.

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