



WEST ALLIS MEMORIAL HOSPITAL

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November 11, 1975

G. E. Wright
Chief, Laboratory Division
Navy Environmental Health Center
3333 Vine Street
Cincinnati, Ohio 45220

Dear Mr. Wright:

This is a reply to your letter of November 5-th;
NAVENVIRHLHCEN, 5/GEW:Z11, 6260.10.

Inclosed are copies of our blood and urine lead procedures. The procedures involve a simple chelation and extraction process followed by aspiration into the atomic absorption system, in our case the Varian AA 5.

We recommend that blood specimens for lead analysis be collected in the special Orange Top Vacutainer Tube prepared by Becton, Dickinson & Co.. This tube #3200 X F582 contains sodium heparin and 0.1 ml of Triton X-100. Blood collected in this tube is completely hemolyzed if shaken immediately after drawing and, as a result, clotting is kept to a minimum. The tubes are certified as lead free.

Although the literature indicates that the pH of the blood be adjusted to 3.0 before chelation with ammonium pyrrolidine dithiocarbamate (APDC), we have found no appreciable difference in the values determined if this adjustment is omitted. Literature also recommends use of the 2170 A resonance line as the most sensitive. Studies show, however, that measurements made with this resonance line are not linear. We use only the 2833 A resonance line.

As indicated in the procedure we use only certified AA standards. Because we were not able to find acceptable commercial controls, we prepare our own controls for our quality control program. Spiked specimens are not acceptable nor are specimens using animal blood. After analysis we pool the blood from industrial workers exposed to lead according to arbitrary concentration levels, i.e.,

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0 - 20, 21 - 40, 41 - 60, 61 - 80, and 81 - 100 mcg/dl. The pools are kept frozen during collection. When a liter, or better two liters, of a given level has been collected, the blood is thawed, filtered through gauze and cloth with suction to remove all clots and fibrin, poured into plastic tubes or vials in 7 to 10 ml aliquots, and the aliquots frozen. The mean and standard deviation of each pool lot is determined from the aliquots. Vials of the frozen control are thawed as needed for our quality control program. At least one control aliquot is run with each set of lead determinations. If kept frozen the pool controls maintain the mean value indefinitely. Our studies have shown that a refrigerated pool decreases in value after about two weeks. It is this pool control that we use in our round robin program. We have also made these controls available to other laboratories at cost for their quality control programs.

✓ We discourage the determination of lead on urine specimens unless the patient is being treated and the doctor is interested in an evaluation of the lead excretion. Our experience shows very little correlation between blood and urine lead levels in patients exposed to lead. Urine lead is a poor indicator of lead exposure.

✓ In our program the hemoglobin value is determined on all blood specimens analyzed for lead in order to determine the ratio of lead concentration to the grams percent hemoglobin. The ratio, which we call the lead index, is far more indicative of lead toxicity than the lead level alone. An individual with a lead level of 80 mcg/dl and a hemoglobin of 16 gm% will have an index of 5; a second patient with a lead level of 60 mcg/dl and a hemoglobin of 10 gms% has an index of 6. The second patient has a greater lead toxicity than the first and there is need for greater concern for the condition of this patient. Toxic levels are often present when the index approaches 6.0. We routinely report the lead level, hemoglobin, and index for each analysis.

We are in the process of evaluating our Reference Program of October in which 16 laboratories participated. We will be happy to send you a copy of the tabulated data from this study and will be glad to include your laboratory in any

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future programs. Some consideration is being given to a round robin program on a monthly basis but this would have to involve some financial contribution from the participants.

I hope I have provided the information you seek. If there are any further questions concerning our program or our analysis procedures, please feel free to contact us. We are happy to be of service.

Sincerely,

H J Conlon

H. J. Conlon, M.D.
Director of Laboratories

SC/dr

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