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The role of ZPP in lead poisoning¹

The Maine Childhood Lead Poisoning Prevention Program (MCLPPP) recommends a Zinc Protoporphyrin (ZPP) blood test for children with blood leads of 20ug/dl and above. The following is a brief explanation of ZPP and why we think it is a useful tool in the treatment of lead poisoning.

The ZPP is used as an indirect measure of the chronicity of lead exposure and the total body-burden of lead. Lead interferes in the mechanism of heme synthesis.

Lead inhibits the enzyme (heme synthetase) from converting protoporphyrin IX and iron into heme. In lead poisoning, there is decreased protoporphyrin conversion, causing erythrocyte protoporphyrin levels to rise and complex with zinc. This increases ZPP levels. An increase in ZPP usually lags behind the onset of an elevation of blood lead by 2-6 weeks.²

ZPP levels are normally <30ug/dl. Levels of 30-80ug/dl can be found in severe iron deficiency. A ZPP level of greater 100ug/dl is strongly confirmatory of lead exposure over a prolonged period and indicates a large total-body burden of lead. When the child is removed from the exposure to lead, and as the body's stores are released the ZPP will fall to normal, again lagging behind the drop of the serum blood lead level.

A low ZPP in a lead poisoned child indicates that the exposure has been relatively recent, and it reassures us that removing the child from the source of lead will result in a rapid decline of the lead level whether or not chelation is indicated. A highly elevated ZPP indicates long term exposure and body stores of lead, predominately in bone and fat. In this situation, if chelation therapy were indicated, we would expect a rapid rebound of the lead level and the need for multiple rounds of therapy, taking months to years for the lead level to fall to the non-poisoned range.

¹ Adapted from a handout "Lead Poisoning Treatment- the Role of ZPP", Kids Co-op, The Barbara Bush Children's Hospital, Maine Medical Center, Portland, Maine.

² Florin, Todd A., Brent, Robert L. and Weitzman Michael. **The** Need for Vigilance: The Persistence of Lead Poisoning in Children. Pediatrics, Jun 2005; 115: 1767 - 1768.