

Iron Deficiency Anaemia and Zinc Protoporphyrin Levels

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Commentary

Zinc protoporphyrin (ZPP) is found in erythrocytes when haem is inhibited by lead and/or lack of iron.

Instead of incorporating a ferrous ion, to form haem, protoporphyrin IX, the immediate precursor of haem, incorporates a zinc ion to form ZPP (Zinc protoporphyrin!)

The reaction to insert a ferrous ion into protoporphyrin IX is catalyzed by ferrochelatase.

Ferrochelatase is an enzyme.

Measurement of ZPP can be used as a screening test for lead poisoning or iron deficiency.

In this article we are more

Interested in iron deficiency than lead poisoning.

There are a number of clinical situations in which ZPP values may be useful.

These include;

Lead poisoning

Iron deficiency

Sickle cell anaemia

Anaemia of chronic disorders

Vanadium (a heavy metal) exposure

ZPP as a screening test is of value in all these disorders.

But our focus is on iron deficiency per se.

The fluorescent properties of ZPP in intact erythrocytes allows the ZPP/haem ratio to be measured effectively, efficiently and at a low cost. Cost is of major concern as we cannot incur major expenses.

Only a small sample is needed.

One can use a micropipette to aliquot the sample.

Protoporphyrin compounds containing zinc have been known since the 1930s.

They became of major academic interest with the discovery in 1974 that ZPP was the major non-haem porphyrin formed in red cells as the result of iron deficiency or lead poisoning.

It was already known at this time that non-haem iron Protoporphyrin IX levels were elevated in these conditions, but prior investigators had used extraction methods that converted ZPP to unbound Protoporphyrin IX.

The early literature is a bit confusing and results are difficult to compare.

Results may refer to Free Erythrocyte Protoporphyrin (FEP) or Erythrocyte Protoporphyrin (EP or EPP.)

ZPP is also abbreviated ZP and ZnPP.

The current trend is to report the molar fraction of ZPP to haem as Micromole/mole!

Zinc protoporphyrin may be a unique and cost effective way of determining iron deficiency anaemia!