Diagnosis of Inorganic Lead Poisoning: A Statement*

Because of varying opinions on the diagnosis of inorganic lead poisoning which appear in the international literature the signatories hope that the following statement may be of value. The statement is intended to provide guidance for hospital medical staff, industrial medical officers, and other medical practitioners in the examination of cases of suspected lead poisoning in adults.

A diagnosis of lead poisoning should be based on clinical findings and supported by biochemical evidence of excessive lead absorption, and if possible by evidence of unusual exposure.

There are varying degrees of lead absorption. The accompanying Table, which is based on personal experience and published data, lists biochemical tests for estimating the degree of lead absorption and the values likely to be found in four arbitrary categories of this absorption. The values apply to estimations made *concurrently* with exposure and *concurrently* with the onset of symptoms. The values may be significantly lower a few weeks after cessation of exposure.

Categories of Lead Absorption. (The Values Given Below Will Not Necessarily Apply in Cases Where There is a Lowered Haemoglobin Concentration, or Where Chelating Agents, for Example EDTA, Have Been Used)

Test	A Normal	B Acceptable	C Excessive	D Dangerous
Blood lead ..	< 40 μg./ 100 ml.	40–80 μg./ 100 ml.	80–120 μg./ 100 ml.	> 120 μg./ 100 ml.
Urinary lead	< 80 μg./l.	80–150 μg./l.	150–250 μg./l.	> 250 μg./l.
Urinary copro-porphyrin	< 150 μg./l.	150–500 μg./l.	500–1,500 μg./l.	> 1,500 μg./l.
Urinary δ-aminolae-vulinic acid	< 0·6 mg./ 100 ml.	0·6–2 mg./ 100 ml.	2–4 mg./ 100 ml.	> 4 mg./ 100 ml.

Blood and urinary lead determinations can be relied on only when carried out in laboratories experienced in the techniques. Even so, errors of ±10% may be expected.

Urinary samples of specific gravity less than 1010 are unreliable and should be rejected; 24-hour samples or repeated spot samples are desirable.

A measurement of haemoglobin is important additional evidence; a lowered haemoglobin concentration is commonly found in lead poisoning and may be associated with category C or D.

Punctate basophil counts, though still used, are less reliable than the tests shown in the Table, and are not advised.

The four arbitrary categories are:

(A) Absorption found in the "normal" population when there has been no occupational or abnormal exposure.

(B) Increased absorption resulting from occupational or abnormal exposure which is occupationally acceptable. At these levels of lead absorption the mild symptoms listed below, which are common to a number of minor complaints, are not attributable to lead.

(C) Increased absorption from excessive occupational or other exposure which may be associated with mild symptoms or signs (see below), or, rarely, with severe symptoms or signs. Even in the absence of symptoms and signs these levels of absorption are unacceptable because of the possibility of toxic episodes and long-term sequelae.

(D) Dangerous absorption from occupational or other exposure in which mild, and severe, symptoms and also long-term sequelae are increasingly probable.

Clinical Findings

Mild symptoms and signs of lead poisoning include: tiredness; lassitude; constipation; slight abdominal discomfort or pain; anorexia; altered sleep; irritability; anaemia; pallor; and, less frequently, diarrhoea and nausea. Many of these are symptoms of other, sometimes trivial, complaints, and it is therefore essential for a correct diagnosis of lead poisoning that the symptoms and signs be associated with laboratory evidence of excessive absorption and that other causes be excluded.

The presence of a blue line in the gums and of a metallic taste are useful indicators of increased lead absorption.

Severe symptoms and signs include severe intermittent abdominal pain (colic); reduction of muscle power—for example, wrist-drop; muscle tenderness; paraesthesiae; and other symptoms or signs of neuropathy, or encephalopathy. In a lead worker these are strong evidence of poisoning, but supporting laboratory evidence of high lead absorption should be obtained.

Comments

The incidence of sequelae increases not only with an increase in absorption, when the latter is excessive, but also with the length of time that this absorption is allowed to continue. Therefore biochemical indications of excessive absorption, with or without clinical manifestation of poisoning, should be followed by appropriate industrial and/or medical action.

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