

PLUMBUM ! - KARACHI, QUO VADIS?

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LEAD - Element 82 in the Periodic Table of the Elements - Group IVa : at the top: carbon, the giver and sustainer of life; at the bottom, lead, the destroyer.

Lead has been known to have neurotoxic effects for a long time¹, with encephalopathy having been first noted in 1910². Blood lead levels above 120 ug/dl cause neurological symptoms ranging from peripheral nerve dysfunction to acute encephalopathy, memory loss and death but it is the more subtle effect on the CNS, less easily linked to lead exposure, that are now the focus of research. It is now known to cause a whole variety of neurological and psychological problems, genetic disturbances, suicidal and criminal tendencies, birth defects and on I.Q. and the learning abilities of children; children being particularly prone to the effects of lead.³

There is no evidence that lead is involved in any of the physiological functions of the organism. Therefore,, normal values of lead in blood cannot be established, although jt has become customary to accept the usual blood lead levels observed in industrialised soèiety as “normal”. The main aim among scientists has been to establish “safe values”, “safety limits” or “maximum allowable concentrations” in blood.

The one-time safety limit of 40 ug/dl for blood lead levels⁴ has given was” to 20 ug/dl as a mean acceptable value with 35 ug/di as an “action value” as recommended by a commission of the European Community in 1978⁵. In U.S.A. in 1982 the National Clearing House for Poison Control Centers recommended 30 ug/dl as a safety limit⁶ and the Centers for Disease Control in 1985 stated that a blood lead level of 25 ug/dl should be regarded as being elevated⁷.

But is this good enough? Recently it has been shown that blood lead levels as low as 7 ug/dl can cause irreversible neurotoxic effects, 8 ug/dl can cause blood pressure increases, 10 ug/dl can cause shortened red blood cell life and 25 ug/dl irreversible chronic nephropathy and an irreversible loss of I.Q. in children⁸. It has been estimated that if mean levels in U.S.A. were lowered from 17 to 10 ug/dl, 5,000 myocardial infarctions and 7,000 strokes per year would be prevented⁹. Blood levels as low as 11 ug/dl were shown in 1987 to influence the age at which children first sat up, walked and spoke and levels even as low as 4 ug/dl were shown to raise hearing thresholds in children and adolescents¹⁰

Placental transfer of lead from the maternal system to the fetus occurs. In 1987, it was reported that the mental development of infants over the first two years of life, whose cord blood lead levels had been between 10 and 25 ug/dl, was slower than those whose levels had been lower¹¹ However, over the two years postnatal period, periodic sampling had shown that the blood levels between, the two groups had not been significantly different. It should be remembered that the half life of lead in blood is only about 18 days. Ninety percent of the lead load is stored in thebones and release from the brain is very slow. Hence blood lead levels are a measure of recent exposure to lead only, whereas brain levels remain elevated considerably longer after even a short term exposure.

Pollution of the environment in Karachi should be a matter of grave concern, (but isn't !). Traffic exhaust fumes are clearly the major source of aerial lead pollution. Most of the drinking water comes from the River Indus, which is heavily contaminated with metal ions and chemicals from the industrialised north and with pesticides and their dangerous degradation products from agricultural mn-off. Two hundred and five million gallons per day of untreated effluents and sewage are pouring into the harbour area and coastal waters, mostly of industrial origin, together with 200,000 gallons per day of untreated effluents from the steel works. Coastal contamination includes huge quantities of metal

ions, antibiotics, fats, proteins, pesticides etc.¹² The first two enter the food chain via bacteria. In this way, offshore fish and shellfish become heavily contaminated. From personal observations, I suspect that the deeper sea fish catch also is heavily contaminated.

With the help of a grant from The Aga Khan University Medical College, several projects are under way to investigate the effects of environmental pollution on the levels of metals in body fluids, and on health. The work is in its infancy but already many interesting results have been obtained. Our "normals" (academic staff and laboratory technologists living in "good" areas) had blood lead levels 16.4-49.5 (mean 34.4 ug/dl), patients at a clinic in the city centre: 25.8-72.9 (mean 42.1), in a survey of the traffic police, at the Cantt Traffic Section, for example: 35.4-67.6 (mean 46.6), even soldiers at the relatively pollution free Malir Cantonment: 15.4-39.8 (mean 29.9 ug/dl).

Among neurop sychiatric patients from poor and polluted areas, e.g. those suffering from disturbed behaviour had 11.0-76.4 (mean 40.3 ug/di) and in mentally retarded children: 20.3-74.3 (mean 46.0 ug/dl). We must remember that blood levels reflect present levels of lead exposure. In many cases there were also other metal abnormalities, which are connected with mental disease and the effects of these and the effects of lead can enhance each other. Of course, we donot yet know which is the cause and which the effect; the metal abnormality causing the disease, vice versa, a little of both, or neither.

However, it is known that the effects of lead are worse among those in low income groups¹³.

A selection of children from a school in K.D.A. from "good" areas, but who travel a long distance to school had blood lead levels of 21.3-52.2 (mean 38.2 ug/dl). In U.S.A. concern was expressed over the fact that 40% of children under 5 years of age including 60% of black children in some cities had blood lead levels above 20 ug/dl¹⁴. Admittedly our children were not under 5 years of age, but not oiie had a level below 20 ug/di!

In view of the facts discussed above, these results are truly horrific

But are Pakistanis affected by lead as much as Westerners ? We do not know. Race often plays a part in differences in body chemistry: there is a high degree of immunity among W. Africans towards cyanides and aflotoxins; although black American children have higher lead levels than white, their hearing is more acute, the hearing threshold is less affected by the effects of lead and they develop more rapidly during the first year of 10 In clinical biochemistry, normal ranges for many tests for Pakistanis are very much different from Western values.

However, something must be done / At least, the initial action to be taken is all too obvious. Remember ! Mighty Rome, in existence for 1,200 years, whose empire once stretched from Scotland to the Sudan and from the Atlantic to the Tigris, in one generation came crashing down plunging Europe into the Dark Ages for nearly 1,000 years: due to LEAD

Plumbum ! Karachi, quo vadis?

Lead! Karachi, where are you going?

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