**Lead and Metabolic And Personality Dysfunctions**

**Introduction**

Lead is considered to be a toxic heavy metal. It has no known function in the body and with excess accumulation, either acute or chronic, will cause a wide array of metabolic dysfunctions by interfering with normal metabolic functions.

**The Effects of Lead Upon Mineral Balance**

Many of the effects of lead toxicity result because of a preexisting mineral deficiency or because of mineral deficiencies caused by the presence of lead in living tissue.

Lead affects the vital balance of every mineral in the body, principally copper, zinc, calcium and manganese.

**Sources of Lead**

Lead naturally occurs in the earth's crust and increases with time due to the disintegration of radioactive elements such as uranium and others to lead.(1)

Major contributors to environmental lead occur from the burning of leaded gasoline and from industry, such as the manufacturing of batteries and smelters. Lead is found in ink and paper, and may be ingested by children when chewing paper. Cans, which are sealed with lead solder, are a contributor to ingested lead, especially if acidic foods such as orange, apple, tomato and lemon juice are stored in them. Canned baby foods, such as evaporated milk, may contain as much as 200 micrograms of lead per liter. Canned juices may contain up to 100 micrograms lead per liter. The total intake of dietary lead in an adult may be as high as 300 micrograms per day.(2)

**Prevalence of Lead Contamination**

Lead contamination is so prevalent that concentrations of lead have been found in the Arctic ice caps and have increased with the passing of each decade.

**Metabolism And Uptake Of Lead Is Dependent Upon Many Factors**

Normally, approximately 1 to 10% of lead ingested is absorbed, depending upon the form. The uptake of lead has been found to be greater in children than in adults. A child may retain up to 50% of ingested lead.(3) Elimination of lead, however, decreases with age, due principally to a reduced metabolic rate and thus becomes cumulative.

**Metabolic Disturbances and Lead Toxicity**

Lead is believed to be related to causing stillbirths, spontaneous abortions and sterility.(4) Lead toxicity is also associated with anemia, insomnia, headaches and in extreme cases, plumbism. Plumbism is characterized by a bluish line around the gums. A very common symptom of lead accumulation is colic or abdominal inflammation. Neurological disturbances occur most frequently in children and may produce a decrease in mental activity. Hyperactivity is also quite common in young children suffering from elevated tissue lead levels.

**Metabolic Dysfunctions Associated With Elevated Lead Levels**

|  |  |  |
| --- | --- | --- |
|  | Blindness | Infertility |
|  | Cancer | Insomnia |
|  | Constipation | Libido, Depressed |
|  | Convulsions | Liver Dysfunction |
|  | Deafness | Menstrual Problems |
|  | Diabetes | Multiple Sclerosis |
|  | Digestive Upsets | Nephritis |
|  | Dyslexia | Neuromuscular |
|  | Encephalitis | Dysfunctions |
|  | Epilepsy | Osteo arthritis |
|  | Gout | Osteoporosis |
|  | Hallucinations | Pyorrhea |
|  | Hyperactivity | Rheumatoid Arthritis |
|  | Hyperkinesis | Tooth Decay |
|  | Impotency | Vertigo or Dizziness |

**Psychological Manifestations**

|  |  |  |
| --- | --- | --- |
|  | Abnormal Brain Function | Mental Retardation |
|  | Anxiety | Mood Swings |
|  | Depression | Nightmares |
|  | Excitement | Psychotic Behavior |
|  | Loss Of Mental | Restlessness |
|  | Memory, Impairment Of | Schizophrenia |

**Manifestations of Lead Toxicity**

|  |  |  |
| --- | --- | --- |
|  | Adrenal Insufficiency | Gonadotrophins |
|  | Diminished Pituitary | Hypothyroidism |

It is important to realize that some of these symptoms may manifest, not only with lead accumulation, but also when it is being removed from the body.

**Change in General Metabolism May Precipitate An Attack of Lead Poisoning**

"Lead may be held harmlessly within the body until some change in the general metabolism may precipitate an attack of poisoning..."

**Appearance of Symptoms of Lead Poisoning Even After Exposure has Ceased**

"Lead poisoning often appears after prolonged exposure, but occasionally even after exposure has ceased. This tardy development of symptoms is probably caused by liberation of the lead deposit in the bones, which occurs during severe illness or alcoholic debauches." Acute stress may also precipitate numerous symptoms associated with lead toxicity.

"As long as the body...contains excessive amounts of lead fixed in the tissues (notably bone), symptomatic recurrences are an ever-present threat. Whether insidious or sudden in onset, a recurrence may occur without an exciting incident, or may be precipitated by any stressful situations such as fever, acidosis, alkalosis, or deleading therapy..."

**Toxicity of Lead Varies With Individuals**

"The toxicity of lead varies so much with individuals that no definite prediction may be made as to the amount which will cause symptoms of poisoning to appear, although Legge stated that a continued absorption of more than 2 mg. per day may produce intoxication."

**Mineral Deficiencies Which Result in Enhanced Lead Absorption**

Many people may be exposed to the same amount of lead, yet some will accumulate more lead than others.1 There are protective minerals in adequate or inadequate amounts that account for this apparent enigma.

**Calcium: The Importance in Preventing Accumulation of Lead and in Increasing the Excretion of Lead**

Calcium, if present in sufficient quantity, will reduce the absorption of lead. Adequate tissue calcium protects against the accumulation of lead in the body or enables the body to excrete ingested lead. A tissue calcium deficiency is a major cause of increased absorption of lead and an inability to excrete it. The lower an individual's calcium reserves, the more toxic effect lead has on the system. Relatively small concentrations of lead may produce symptoms of lead toxicity in one person, whereas a greater concentration of lead in another individual may produce very minimal symptoms. Again, this is due in part to individual calcium reserves.(5)

**Lead Detoxification: Acute**

Lead behaves much like calcium from the point of view of storage in the body, that is, lead is stored in the bone when a calcium deficiency exists.

Often during specific nutritional therapy, lead which has been stored in the bones will be released. The release of lead from the bones, especially if occurring at a rapid rate, will often result in symptoms related to acute lead poisoning. Symptoms such as the following may occur:

|  |  |  |
| --- | --- | --- |
|  | abdominal pain | inflammation |
|  | arthritis | insomnia |
|  | constipation | irritability |
|  | depression, mental | metallic taste in mouth |
|  | digestive upsets | sore joints |
|  | fatigue | vague aches and pains |
|  | hyperactivity |  |

**Lead And Other Minerals**

Lead also has an adverse effect on iron and copper metabolism. Increased lead borders have been found in children with iron deficiency. Iron deficiency is related to increased absorption of lead from the GI tract. Hyperactivity in children with increased lead levels may actually be secondary to an iron deficiency.

**Copper Protects Against Lead Toxicity**

Decreased dietary copper has been found to be related to increased concentration of lead in the red blood cells. This is probably due to the inability of the body to use iron properly in face of a copper deficiency.(6)

**Zinc Protects Against Lead Toxicity**

Increased dietary zinc intake has been shown to decrease lead absorption in some animals.

**Iron: Copper, Zinc and Calcium: An Insurance Policy to Protect us From the Detrimental Effects of Lead**

Inasmuch as lead is so prevalent in our environment, our best effort should have its main thrust toward protection. This can be done by ensuring that we have an adequate mineral balance, together with adequate levels of the protective minerals, iron, copper and zinc. This serves two purposes, removing the accumulation of lead that is already present, and protecting from further exposure to lead, which is, in our day and time, inescapable.

**The First Step: Elimination of the Sources of Contamination**

Our first goal should be the avoidance of all sources of contamination that we have control over, such as avoiding canned foods and, of course, refined foods. Also, we must eliminate any factors which may cause a loss of the protective minerals, iron, copper, zinc and magnesium, from our body.

**Sources of Lead Contamination**

Environmental

* Leaded gasoline

Household Sources

* Ceramic glazes
* Lead plumbing
* Paints

Beverages

* Beer
* Fruit juices from cans
* Teas wrapped in lead foil
* Wine

Food Sources

* Anchovy filets
* Apple cider (non-organic)
* Baking powder
* Corn, frozen
* Gelatin, dried
* Lobster (claw meat)
* Puffed rice
* Sardines (canned)
* Whole wheat flour

Organ Meats

* Liverwurst
* Sandwich spread
* Sausage, all types

Personal

* Cigarettes
* Hair coloring

**The Protective Minerals**

Calcium - Avoidance of Factors Which Contribute to a Calcium Deficiency Calcium deficiencies may occur as a result of:

* prolonged stress
* excess consumption of foods high in phytates
* excessive alcohol consumption.

**Lead Uptake by Bone is Lessened by Increased Calcium Intake**

"When lead is deposited in bones, these deposits take exactly the same pattern as calcium deposits. If both lead and calcium are present, the bone is more likely to take up the lead, because the lead compounds occurring here are less soluble than the corresponding calcium phosphates. But if extra calcium is given before lead administration, less lead is taken up by the bones..."

**Lead Must be Eliminated Gradually From Tissue Storage**

"After the subsidence of acute symptoms, the purpose of the treatment is to eliminate lead from the body gradually."

**The Importance of Calcium in Lead Detoxification**

"An effective method of treatment has been developed, which is dependent upon the parallel metabolism of lead and calcium... Storage of lead may be reduced by keeping bones filled with calcium."

"In acute cases, a diet containing much calcium should be given. This consists of 1 to 2 quarts of milk and 6 to 8 grams of calcium lactate daily."

Avoid those factors which increase copper burdens.(7)

**References**

* The Trace Elements and Man, Henry Schroeder, M.D.
* Mitchell and Aldors, 1974. Lead Content of Foodstuffs, Environmental Health Prospectus.
* Alexander 1974, The uptake of lead by children in differing environments. Environmental Health Prospectus.
* Smith 1976, Metabolism and Toxicity of Lead. Trace Elements in Human Health and Disease, Vol. II.
* Eck, ARL.
* *Healthscope #1,* "Simple Tests that Determine Biochemical Imbalances."
* *Healthscope #2,* for more detailed information on iron and copper related to anemia, "Anemia."

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