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بالرسالة صفحات

لم ترد بالأصل

HOSSAM MAGHRABY

STUDY OF THE NEUROMUSCULAR DISORDERS AMONG WORKERS EXPOSED TO LEAD

Thesis

Submitted to the Faculty of Medicine,

Alexandria University

In partial fulfillment of the requirements of the

degree of

DOCTOR OF

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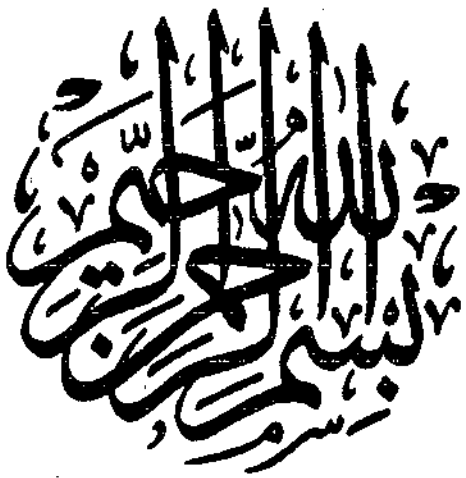
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CONTENTS

LIST OF ABBREVIATIONS

-AHC:	anterior horn cells
-ANS:	autonomic nervous system
-BAEP:	brainstem auditory evoked potential
-BBB:	Blood brain barrier
-BLL:	blood lead level
-CMAP:	compound muscle action potential
-CNS:	central nervous systema
-CV:	conduction velocity
-DL:	distal latency
-EPs:	evoked potentials
-Gp:	Group
-Hb:	Hemoglobin
-IPLDs	Interpeak latency differences
-MND:	motor neuron disease
-PD:	Parkinson's disease
-PNS:	peripheral nervous systemt
-SEP:	Somatosensory evoked potential
-SNAP:	sensory nerve action potential
-ULL:	Urine lead level
-VEP:	visual evoked potential

INTRODUCTION

INTRODUCTION

Lead intoxication is an environmental disorder that is the result of human activities.[1] The manifestations of lead poisoning were first described by Hippo crates (a Greek poet physician) around 370 B.C.[2] The Romans made extensive use of lead in their daily life. It includes cosmetics and paints. Roman wine was contaminated with lead due to the practice of simmering grape syrup in lead vessels to enhance the flavor. This may explain the infertility and mental infirmity between the Roman and English aristocracy. [2,3]

Lead use with the subsequent interest in its adverse effects on health with special emphasis on the neuromuscular disorders have increased dramatically over the last 50 years.[3]

**** Physical characters of lead:***

Lead (Pb) is found naturally in earth and in almost all parts of the environment.[4] Lead is a soft malleable, blue gray metal, characterized by high density and corrosion resistance.[5] Its melting temperature is 327.4 C. The boiling point is 1740C. It is freely soluble in nitric acid and slightly soluble in soft water particularly in the presence of oxygen and carbon dioxide. When heated, it joins oxygen, halogen and sulfur.[6]

**** Lead forms:***

Lead exists naturally in four stable isotopic forms that do not decay on a human lifetime scale. [7,8] The body appears not to distinguish between isotopes; all are potentially toxic.[9] Once lead is processed for use and disseminated, it persists in soil, dust, and drinking water.[10]

Sources of lead toxicity:

The release of lead into the environment occurs from many sources. The use of leaded gasoline has caused the main lead pollution for years in almost every big city. The exposure from the general environment is now very rare in the developed world due to regulations limiting lead content with the development of cost-effective alternatives; unfortunately, this is not the case in the developing countries.[11]

Occupational exposure to lead is encountered **among persons employed in many works** as battery workers, artificial silk manufacturers, painters, persons removing the paints of the old houses, printing, manufacturers of plastics, ceramics, automobile radiator repair shops and garage workers.

Moreover, lead can be **transported** via worker's clothes, shoes, skin and hair to worker's houses. Lead poisoning can occur following ingestion of lead in food or beverages.[12]

Lead has been used for hundreds of products because of its malleability and low melting point. Industries as plumbing, and plastics have found lead to be efficacious. Products that may contain lead include pipes, solderS, brass fixtures, ceramics, crystal, electric cable, paints, radiation shielding, gasoline, batteries, alternative medications ("alternative" medicines for gastrointestinal or urologic disorders) and cosmetics (as kohl).[13] Lead may be found in unexpected household items, such as window blinds, zippers, painted furniture, and mineral supplements. Another important source of lead exposure is the lead contaminated plants through air and soil.[6] Soil's lead is taken up by root vegetables and atmospheric lead may fall onto leafy vegetables specially those exposed to smelter emission. Seafood can be also contaminated with lead, thus providing an important source of the element for human.[6,13]

Drinking water is among the recorded sources of lead toxicity.[14] The water becomes contaminated as it moves through the water distribution

system. Cairo Water Authority in 1992 found that the drinking water lead concentration was 5.9 μg/liter.[15]

Lead effects on the human body are not only limited to the involved workers but all the community members are at risk. It is estimated in the USA that:

- 3 to 4 million American children (non exposed to lead) have unsafe blood lead levels (BLLs) 30 μg/dl or more. [16]
- It has been found that the mean concentration of 15 μg/dl bone ash in typical Americans today is 1000 times greater than the level of lead in human bones hundred years ago.[17]
- Unrecognized dysfunctions caused by lead are probably widespread among Americans.[17]
- Each year, the United States consumes 1.3 million tons of lead and releases an estimated 100,000 tons of lead into air and water.[18]

Although the toxicity of lead was recognized centuries ago, concern was restricted to the overt symptoms of lead toxicity as colic, encephalopathy, anemia, or renal disease.[17] This is because of lack of awareness of the specific biochemical or metabolic effects. Recently, and after the development of the sensitive measures of diagnosis; identification of the subclinical effects has been possible. This new awareness prompted the lowering of acceptable occupational exposures, as measured by blood lead from 80 to 40 μg/dl range,[17] lowering the lead content in gasoline has been also accomplished according to the new methods of diagnosis and analysis. Inspite of the late international efforts to limit the use of lead, the recent researches proved that the detrimental effect of lead will continue in the following years. Lead deposited in the bones acts as stores with slow releases of lead into the circulation.[7] Also, lead isotopes are very stable; they do not decay for millions of years.[6,18] The widespread uses of lead with the subsequent increase of the body lead burden among all the community individuals, the reported toxic effects of lead on all body