Reproduction Study

AU - ALFANO DP
AU - PETIT TL
TI - Behavioral effects of postnatal lead exposure: Possible relationship to hippocampal dysfunction.
SI - HEEP/82/06522
SO - BEHAV NEURAL BIOL; 32 (3), 1981, 319-333.
AB - HEEP COPYRIGHT: BIOL ABS. A review of previous evidence sussested the possibility of hippocampal involvement in the behavioral changes observed following postnatal Pb exposure. To further assess this possibility, Long-Evans hooded rat pups were exposed to inorganic Pb from postnatal days 1-25 via maternal milk. Mothers were fed diets containing 4.0% PbCO3, 0.45% PbCO3 or a 2.2% Na2CO3 control diet. Animals were tested at maturity in 4 situations considered sensitive to hippocampal dysfunction. Exposure to Pb resulted in delayed acquisition of the radial 8 arm spatial maze but produced no changes in the susceptibility to audiogenic seizures or the acquisition and performance of a 2-way active avoidance response. Pb-exposed animals also performed deficiently on a DRL-20 schedule of operant reinforcement, although significant variation was observed between litters in the control group on this task. Results were discussed in terms of a relationship between postnatal Pb exposure and hippocampal dysfunction. Other forms of CNS alterations resulted from early Pb exposure and alternative explanations for these behavioral changes were also sussested.

DWS: 1031400

DUP040011199

Human Exposure

AU - LURAKIS MF
AU - FITONE JM
TI - Occupational lead exposure, acute intoxication and chronic nephropathy: A case and review of the literature.
SI - HEEP/84/08321
SO - J AM OSTEOPATH ASSOC; 83 (5), 1984, 361-366.
AB - HEEP COPYRIGHT: BIOL ABS. The longest known case of toxic Pb nephropathy resulting from chronic, symptomatic occupational Pb exposure was reported. The patient had been exposed continuously to Pb from the age of 19-29 yr, with probable absorption through lungs, gastrointestinal tract and skin. Clinical evaluation at age 62 yr revealed symmetrically small kidneys and a markedly diminished glomerular filtration rate. Subsequently, a renal biopsy demonstrated interstitial fibrosis and few glomeruli. A discussion of the signs and symptoms of Pb intoxication and the development of chronic Pb nephropathy in the USA and other countries ensued. The paper emphasized the probable pathogenesis, diagnosis and treatment of this rare and potentially reversible cause of chronic renal failure.

DWS 1031402
DUP040011201

Epidemiology

2#2
AU - Deritito T
TI - Lead neuropathy.
SI - TOXBIB/84/157841
SO - CRC Crit Rev Toxicol; VOL 12, ISS 2, 1984, P149-213 (REF: 214)
AB - The still unexplained nature of the neurotropic action of lead has prompted this chronological survey of the course of development of the medical attitude towards the problems of lead neuropathy all along the centuries--from ancient times up to the present. Once a conspicuous, severe, and even frequent clinical type of plumbism, peripheral lead neuropathy has received due attention in the early classics (Tanquerel des Planches, Duchenne, Aran, Remak, Rombers, Erb, etc.) and of the pioneers in industrial medicine (Legge, Aub, Teleky, Hamilton). Even the modern era, however, has not come further than to state that lead produces different neurological effects in different animal species and even in humans--different patterns of neuromuscular involvement. With the advent of electrophysiology, conflicting and inconsistent findings have also appeared, particularly in regard to overt and latent lead neuropathies. Theories regarding the mode and site of the neurotoxic action of lead are reviewed and data which might be used as arguments both in favor and against are presented.

DWS. 1031403

DUP040011202

Epidemiology

AU - Janin Y
AU - Couinaud C
AU - Stone A
AU - Wise L
TI - The "lead-induced colic" syndrome in lead intoxication.
SI - TOXBIB/85/142702
SO - Surg Annu; VOL 17, 1985, P287-307 (REF: 169)
AB - Lead has a multiplicity of biologic effects. The universal occurrence of lead accounts for the continuous appearance of new instances of human lead poisoning. The most common and one of the earliest manifestations of lead intoxication in the adult is so-called lead-induced colic, which is a syndrome with a multiplicity of clinical patterns and at least three possible different pathogenic mechanisms. It may be caused by changes in the visceral smooth muscle tone secondary to the action of lead on the visceral autonomic nervous system, lead-induced alterations in sodium transport in the small-intestinal mucosa, and lead-induced interstitial pancreatitis. It should be considered in the differential diagnosis of abdominal pain of obscure etiology and whenever a disparity is observed between the symptoms and the abdominal findings in a patient with abdominal pain, especially in the presence of a history of occupational exposure to lead.

DWS 1031404
DUP040011203

Epidemiology

31
AU - PARKINSON DK
TI - Exposure to lead--Psychological and behavioral sequelae (human)
GI - CRISP/85/MH36221-04
SA - U.S. DEPT. OF HEALTH AND HUMAN SERVICES; PUBLIC HEALTH SERVICE; NATIONAL INST. OF HEALTH; NATIONAL INSTITUTE OF MENTAL HEALTH
SO - Crisp Data Base National Institutes Of Health
AB - RPROJ/CRISP The purpose of this renewal application is to extend our comprehensive assessment of the mental health, social functioning and neuropsychological performance of workers occupationally exposed to lead. In the fall of 1981 we initiated an epidemiologic study into the effects of cumulative and current lead exposure using a cross-sectional design in which lead workers and non-exposed controls were assessed with a neuropsychological test battery, sections of the Diagnostic Interview Schedule, a detailed social functioning inventory, and an occupational history questionnaire. Biological measures of past and current lead exposure and recent alcohol and drug use are also obtained. A major goal of the renewal application is to complete the analysis of these data. The ultimate aim of our research is to provide data that may be useful in the prevention of mental health problems resulting from lead exposure. In the course of conducting our pilot study, a striking association was observed between elevated current blood lead levels and deficits in performance on the neuropsychological tests. In this application, we propose to systematically ascertain the acute effects of high lead exposure and the recovery of functioning following the decline in blood lead levels associated with removal from exposure. Development of a comprehensive prevention program also requires knowledge of the natural history of a disorder. The time course for the development of neuropsychological deficits and deterioration in psychosocial functioning in relation to duration and intensity of lead exposure is not known. Therefore, we wish to initiate a prospective study of the natural history of neuropsychological and psychosocial changes in lead workers. We also propose to verify psychosocial information by interviewing a significant other adult.

DWS 1031405

DUP040011204

Epidemiology

AU - Shukla GS
AU - Singhal RL
TI - The present status of biological effects of toxic metals in the environment: lead, cadmium, and manganese.
SI - TOXBIB/85/024374
SO - Can J Physiol Pharmacol; VOL 62, ISS 8, 1984, P1015-31 (REF: 187)
AB - The number of reports concerning the chemical toxicology of metals which are released in the environment by natural as well as anthropogenic sources, have been increasing constantly. Lead, cadmium, and manganese have found a variety of uses in industry, craft, and agriculture owing to their physical and chemical properties. The environmental burden of heavy metals has been rising substantially by smelter emission in air and waste sewage in water. Further, organic compounds of lead and manganese used as antiknock substances in gasoline are emitted into the atmosphere by automobile exhaustion. Such environmental contamination of air, water, soil, and food is a serious threat to all living kinds. Although these metals are known to produce their toxic effects on a variety of body systems, much emphasis has been placed on their effects on the nervous system owing to apparent association of relatively low or 'subclinical' levels of metallic exposure with behavioral and psychological disorders. Clinical and animal data on environmental exposure show that while lead and manganese are most toxic to the nervous system, cadmium exerts profound adverse effects on kidney and the male reproductive system. It appears that the consequences of exposure to lead in adults are less severe than the types of exposure associated with hyperactivity in neonates. Except for a few reports, hyperactivity has indeed been observed in animals exposed to either of these three metals. Experimental work has also shown that these metals produce behavioral changes by altering the metabolism of brain neurotransmitters, especially catecholamines. Recently, it is hypothesized that these metals exert their toxic effect by damaging biological defences which exist in the body to serve as protective mechanisms against exogenous toxins. A voluminous publication list with diverse opinions on the biological effects of metals is available and there is an urgent need to compile assessment of the existing literature to identify the future theme of research work. The problem of metal toxicity becomes even more complex owing to simultaneous or successive exposure of the general population to different physical, chemical, biological, and psychological factors in the environment. The net toxic manifestations produced by multiple exposure should, therefore, be different from those produced by a single factor as the result of their additive, synergistic or antagonistic action. Even though a metal may not exist in sufficient amounts to cause any disability, the toxicity could result when a second factor is also present.(ABSTRACT TRUNCATED AT 400 WORDS)

JWS1031406
DUP040011205

Metabolism

3
AU - NEATHERY MW
AU - MILLER WJ
TI - Metabolism and toxicity of cadmium, mercury, and lead in animals: A review.
BI - HEEP/76/06903
SO - J DAIRY SCI; 58 (12), 1975 (RECD 1976) 1767-1781
AB - HEEP COPYRIGHT: BIOL ABS. Cd, Hg and Pb are toxic to humans and animals. Although Cd and inorganic Hg toxicities occur in humans, they have not been observed in domestic livestock under practical conditions. Cattle, especially young calves, are extremely susceptible to Pb toxicity. Apparently, cattle are more tolerant of Cd than are other animal species. Due partially to higher absorption and longer retention times in the body, the alkyl mercuries, especially methyl mercury, are more toxic than inorganic Hg compounds. Inorganic forms of Cd, Hg and Pb are poorly absorbed from the intestine. However, due to lack of effective homeostasis, after absorption retention time is long. Injected Cd, Hg and Pb are metabolized differently from that naturally absorbed. Most Cd and Hg are in kidney and liver (50 and 23% of total body in goats); but highest total load of methyl mercury is in muscle (72% in cows). With low to moderate body burden, most Pb is retained in the skeleton. However, beyond a certain point, the kidney accumulates large quantities. Only minute amounts of Cd and Hg are secreted into milk, but milk is only moderately well protected from dietary Pb. Likewise, little Cd and inorganic Hg pass the placental barrier; Pb and methyl mercury pass more readily.

DWS1031407
DUP040011206

(Related Reference)

74
AU - Pounds JG
TI - Effect of lead intoxication on calcium homeostasis and calcium-mediated cell function: a review.
SI - TOXBIB/85/111752
SO - Neurotoxicology (Park Forest Il); VOL 5, ISS 3, 1984, P295-331 (REF: 118)
AB - The interaction between lead and essential metals is a complex, well recognized, but poorly understood phenomenon. Dietary deficiencies or excesses of certain essential metals may alter the absorption, elimination, or dose response of lead. Lead, in turn, may alter the homeostasis and function of essential metals. This review will be limited to the effect of lead on calcium, an essential metal with elaborate systemic and cellular homeostatic mechanisms and innumerable second messenger and coupling-factor functions. Lead may ultimately perturb calcium-regulated or calcium-mediated functions (a) directly by interfering with calcium transport or storage processes, e.g., Ca2+ transport proteins, calcium gates, etc.; (b) indirectly by altering cell functions required for calcium homeostasis, e.g., energy production, plasma membrane permeability, etc.; (c) by substitution of Pb2+ for Ca2+ at functionally important calcium binding sites, e.g., calmodulin. While any individual study may not provide adequate experimental verification of the causal role of perturbations of calcium metabolism and function as the primary toxic lesion of lead intoxication, the collective observations of many studies do strongly support lead-calcium interactions as an important functional lesion in lead intoxicated organelles, cells, tissues, and organ systems.

DWS1031408

DUP040011207

(Related Reference)

79
AU - Shellenberger MK
TI - Effects of early lead exposure on neurotransmitter systems in the brain. A review with commentary.
SI - TOXBIR/85/111744
SO - Neurotoxicology (Park Forest II); VOL 5, ISS 3, 1984, P177-212
AB - The mechanism by which early lead exposure alters the functional development of the brain remains an open question. One primary avenue of approach has been to study the effects of neonatal lead exposure on neurotransmitter systems. This paper reviews the published data related to the interaction of lead with each of those systems. Further, each dosing paradigm has been evaluated with a view to experimental error and

interactive variables. It was concluded that factors such as the time at which pregnant animals were shipped and mode of dosing may have been uncontrolled variables causing variability in reported results between and within laboratories. The majority of publications deal with the interaction of lead with catecholamine systems and with dopamine in particular. Reports of effects are highly variable and many observations lack confirmation by other laboratories or have not been replicated. However, the bulk of observations leads to the tentative conclusion that lead does result in an altered functional state of the catecholamine systems. This is true for cholinergic function as well. Some perturbation of acetylcholine metabolism probably exists but the specificity and significance of the effect are suspect. Reports that lead alters the functional state of GABA pathways are interesting but require confirmation. The generality and variability of effects on neurotransmitter systems questions the degree of specificity that may be expected. It is suggested that lead may effect a variable change in the functional state of all these systems by limiting glucose metabolism during periods of vulnerability.

DWS1031409

DUP040011208

(Related Reference)

AU - Triebig G
AU - Bluttner J
TI - [Neurotoxic occupational substances: I. Metals and their compounds./A literature review of the years 1970 to 1982]
SI - TOXBIB/84/149317
SO - Zentralbl Bakteriol Mikrobiol Hyg [B]; VOL 177, ISS 1-2, 1983, P11-36 (REF: 129)
AB - The knowledge of the neurotoxicity to the peripheral nervous system of arsenic, lead, thallium and mercury as well as their compounds is reviewed according to the literature of the period 1970-1982. - First

acute and chronic intoxications are described with special reference of the neurological symptoms. Then we review the results of electromyographic, neurophysiological and histological investigations. Field studies in occupationally exposed groups and evaluation of dose-response-relationships are specified in detail. Further the presented results are discussed according to aspects in occupational medicine. The following conclusions can be drawn: Neuropathies after arsenic intoxications are characterized by symmetric sensory symptoms as usually numbness and paresthesiae of the distal extremities, but the neurophysiological and histological studies showed a great variety of results. In a former study a significant dose-response-relationship between arsenic load and evidence of neuropathy in workers was demonstrated. The onset of impairments of the peripheral nervous system caused by chronic lead exposure is discussed controversially. Some reports showed a dose-response-relationship between a slowering of nerve conduction velocities and an increase of the lead body burden. Proposals of threshold values ranged between 50 to 80 micrograms lead/dl blood. Other authors did not confirm these results. Longitudinal studies are, with one exception, not available at present. Thus a relevant evaluation, particularly regarding relevance and prognosis of a mild slowering of nerve conduction velocity, can not be given now. The neurotoxicity of mercury and its compounds is well demonstrated. In case of the metal and the inorganic compounds a direct damage of the peripheral nerve is possible, whereas for organic compounds the pathophysiological mechanism is unclear. Studies concerning dose-response-relationships as well as evaluation of threshold values in chronically exposed workers are limited. It seems at present not possible to define a threshold value for the neurotoxic effects of mercury according to peripheral nervous system. Thallium caused peripheral neuropathy is described in many casuistics But to our knowledge there are no reports of neurophysiological studies in occupationally exposed groups.

DWS 1031410

DUP040011209