ENVIRONMENTAL EXPOSURE AND THE TOXICITY OF METALS

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International Board of Clinical Metal Toxicology

South African sludge- Courtesy Carin Smit
So. African share of World Reserves & Production

Platinum: 90%
Manganese: 80%
Chromium: 73%
Vanadium: 45%
Gold: 41%
BUDAPEST, Hungary, October 15, 2010 (ENS) - The October 4 spill of toxic red sludge from an aluminum plant in western Hungary that killed at least eight people and injured more than 150 others.
All Metals are toxic in excess
careful environmental and medical monitoring is essential
Knowledge is Power
(supporting Health)

Detoxification Treatment Success is based on:

- Understanding how metals affect human biochemistry is the first step towards reducing the rising problem of environmental exposure problems.

- Early and correct monitoring of metal exposure acute exposure requires a more aggressive approach than a chronic burden.

- Treatment based on diagnosis and type of metal exposure (i.e. mercury intoxication requires a different approach than a manganese burden).
Manganese (Mn) –

nutritionally essential and potentially toxic (neurotoxin)

Pseudo Parkinson-

• known toxicity symptom
• can be reversed through detoxification
Parkinson Disease (PD) in SA

- Estimated and extrapolated prevalence in SA: 1,079,615
  Including "PseudoParkinson"

- **Onset**: generally 50+

- **General Treatment**: lifelong medication, physiotherapy, psychotherapy

- Detoxification (Chelation): effective for Pseudo Parkinson (=manganese-induced PD)
Chelation in metal intoxication. XII. Antidotal efficacy of chelating agents on acute toxicity of manganese.

Tandon SK, Khandelwal S.
Archives of Toxicology, 1982. Vol 50, Nr 1, 19-25

“......a few common drugs which could be used in high dosage or for longer duration in manganese intoxication without serious side effects, appear promising.”
A University of Toronto study is the first in North America to draw a link between Parkinson's and manganese air pollution, and suggests industry-generated pollutants poses a greater health risk than traffic-generated manganese.

Murray Finkelstein, assistant professor in the department of family and community medicine, worked with Berkeley professor Michael Jerrett to compare the incidence of diagnosis and treatment of Parkinson's with markers of exposure to vehicle exhaust and industrial emissions in the cities of Toronto and Hamilton. The study, which examined a cohort of 110,000 subjects over three years, appears in this month's issue of *Environmental Research*. 
Early manifestations of manganese neurotoxicity in humans: an update.
Mergler D, Baldwin M.
Centre pour l'Etude des Interactions Biologiques entre la Santé et l'Environnement (CINBIOSE), Université du Québec à Montréal, Montréal, Québec, H3C 3P8, Canada.

• It is possible to detect early signs of neurotoxic dysfunction associated with environmental or occupational exposure to manganese.

• Although outcomes from individual studies vary, they collectively show a pattern of slowing motor functions, increased tremor, reduced response speed, enhanced olfactory sense, possible memory and intellectual deficits, and mood changes.
Iron bacteria occur naturally in the soil and thrive when there is adequate food (i.e., iron and/or manganese). Iron bacteria are small, approximately 12 microns wide and 315 microns long. (A micron is one millionth of a meter.)

New Hampshire Dep. Of Environm Services, Fact Sheet 2010
Water Safety
The Governmental Dichotomy

**Germany:**
Iron: < 200mcg/L
Manganese: <50mcg/l

**South Africa (2005):**
Iron: < 200mcg/l
Secondary value (MAL for limited duration): 200-2000 mcg/L
Manganese: <100mcg/l
Secondary value (MAL for limited duration): 100-1000 mcg/L
Gold Mining, the Mercury & Uranium Connection

South Africa—Largest Gold producer until 2007 (now China)
The Mercury-Uranium Connection

many open questions..

In 1952, the West Rand Consolidated Mine was the first in the world to extract uranium as a byproduct of the gold refining process.
Uranium exposure

- Simple (not totally satisfying) treatment approach
  
  Sodium bicarbonate
Abstract
In widespread informal gold mining in the Amazon Basin, mercury is used to capture the gold particles as amalgam. Releases of mercury to the environment have resulted in the contamination of freshwater fish with methylmercury. In four comparable Amazonian communities, we examined 351 of 420 eligible children between 7 and 12 years of age. In three Tapajós villages with the highest exposures, more than 80% of 246 children had hair-mercury concentrations above 10 microg/g, a limit above which adverse effects on brain development are likely to occur.
Methylmercury neurotoxicity in Amazonian children downstream from gold mining.

Grandjean P, White RF, Nielsen A, Cleary D, de Oliveira Santos EC.
Department of Environmental Medicine, Odense University, Odense, Denmark.
p.grandjean@winsloew.ou.dk

Neuropsychological tests of motor function, attention, and visuospatial performance showed decrements associated with the hair-mercury concentrations.

Especially on the Santa Ana form board and the Stanford-Binet copying tests, similar associations were also apparent in the 105 children from the village with the lowest exposures, where all but two children had hair-mercury concentrations below 10 microg/g.

..., the current mercury pollution seems sufficiently severe to cause adverse effects on brain development.
Symptoms of Mercury exposure

Central Nervous disorders
Skin problems

Immune disorders, including autoimmune diseases such as

- Hashimoto/Thyroiditis in **South Africa**: approx. 243,546 cases
- Rheumatic disease
Body burden of mercury is associated with acute atopic eczema and total IgE in children from southern Germany.
Koh C., Kwong KL, Wong SN: A Case Report

Mercury Poisoning: a rare but treatable cause of failure to thrive and developmental regression in an infant.

Hong Kong Med. J. Feb 2009

Examination showed a thin and irritable infant ... with non-specific maculopapular rash... pink and swollen extremities with skin desquamation and disfigured fingernails

**Diagnosis:** Mercury intoxication (Blood/Urine)

**Cause:** Hg-containing Chinese Remedy given to child for 4-months
The Buyat Bay Tragedy
Scientist's appeal to help Buyat Bay people

A clinical medical toxicologist, Dr E. Blaurock-Busch, is appealing for funds to help the people of Buyat Bay recover from their health problems.

Dr Blaurock-Busch spoke at a seminar on mining, environment and sustainable development, part-funded by Newmont, which was held in North Sulawesi's Sam Ratulangi University in May this year.

The scientist, who is on the International Board of Clinical Medical Toxicology, calculates that a 6 month treatment course would cost 760 Euros per person. Dr Blaurock-Busch makes it clear that the objective is not to accuse anybody, but simply to help the Buyat Bay people.

(Source: We can help the Buyat Bay people, via email list serve, 24/Sep/05)
Single Metal Exposure: extremely rare in the chronically exposed
Atopic Excema female / 3-month old
Patient: Dr. Ko, Hongkong
**Laboratory diagnostic of Hong Kong mother and child**

<table>
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<th>Mercury Hair value Ref.Range &lt;0.4mcg/g</th>
<th>Mercury-Blood value Ref.Range &lt;45 nmol/L</th>
<th>Nickel-Hair value Ref.Range &lt; 0.4mcg/g</th>
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<td>65</td>
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Atopic Excema - after Treatment

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We have answers!

„Chelation Therapy is the preferred treatment for reducing the toxic effects of metals.

Research Facts
We can utilize existing knowledge..

By monitoring exposure in people living near mining areas, or working in mining!

- Hair metal analysis for longterm exposure
- Blood metals for immediate exposure
- Urine metals for monitoring detoxification progress

Cost is considerably less than life-long care of chronic disease
Health Care Economy 2005

- South Africa spent 8.7% of GDP (gross domestic product) on health care, or US$437 per capita. Of that, approximately 42% was government expenditure.

- Germany spent 10.7% of GDP on health care, or US$3,628 per capita. Of that, approximately 77% was government expenditure.

"The conference was prompted by emerging evidence that low-level exposures to metals may result in toxic effects not previously recognized."

Poison Centers are not involved in the evaluation and treatment of cases of chronic exposure.

Chronic metal exposure is considered one cause of many chronic diseases.
Each Chelating Agents has a specific metal binding ability

EDTA - good for Manganese

DMPS/DMSA good for Mercury
Orthomolecular alternative

Detoxifying nutrients

- Antioxidants
- B-vitamins to support Metal binding
- Cysteine etc

- Biochemical replacement therapy i.e. Se vs Hg
- Or Zn vs Pb

Vit.E + Se increases Se efficacy
Metal intoxication vs detoxification (chelation)
= Good vs Bad Chemistry
We can panic, or we can act!

Modern diagnosis and proper detoxification

Effectively reduce
- metal burden,
- patient symptoms
- health care cost

Thank you!

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