

INTRODUCTION TO TOXIC METALS

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TOXIC METALS: HOW ARE THEY MORE DAMAGING THAN OTHER TOXINS (1)?

- **Most organic substances are degradable by natural processes. However, no metal is degradable; they can only change form by attaching to or separating from other particles.**
- **Toxic metal inhibit absorption of nutrient minerals.**
- **Toxic metals (particularly cadmium, lead and mercury) replace these nutrient minerals (particularly zinc) at enzyme binding sites, causing alteration of thousands of enzymes. How many of the population are zinc-deficient?**
- **Toxic metals may also replace other minerals in tissue structures, particularly bones and joints, so weakening them.**
- **They may inhibit the replication of DNA and the biosynthesis process.**

TOXIC METALS: HOW ARE THEY MORE DAMAGING THAN OTHER TOXINS (2)?

- Toxic metals may facilitate development of fungal, bacterial and viral infections. Pathogens can adapt and thrive in a toxic metal environment, deactivating the immune system and outpacing the ability of our own cells to adapt in a similar way. Many become antibiotic-resistant.
- Metal toxicity increases the risk of electromagnetic radiation sensitivity. Toxic metals in the brain and teeth, pins in bone etc can act as micro-antennae, concentrating and increasing reception of EMF radiation.
- There is also a galvanic current produced wherever two metals are in close proximity.

TOXIC METALS: A SHORT-TERM THERAPEUTIC BENEFIT AS WELL!

- **The ability of toxic metals to replace a vital mineral means that toxic metals can extend life and keep the body functioning when vital minerals are deficient.**
- **Many toxic metals are fungicidal and bactericidal in the short term (despite their support for infections).**
- **But most metals have a very narrow therapeutic margin before their neurotoxic and carcinogenic effects outweigh the benefits. Other metals (arsenic, cadmium , lead, mercury) have no beneficial or safe level.**

TOXIC METAL DEPOSITION

- Toxic metals can deposit anywhere in the body but the deposition is not uniform i.e. equal amounts in all tissues.
- Some metals have a particular affinity for certain locations:
 - Mercury: brain, heart, bone, kidney
 - Nickel: breast, ovaries
 - Aluminium: brain
 - Lead: brain, bone.
- What else may determine the location?
 - Previous physical trauma
 - Locations of earlier disease or other weakness
 - Locations where a deficient nutrient mineral is needed, e.g. zinc and the prostate.
- Essentially, metals bioaccumulate in any tissue which is compromised.

WHO IS VULNERABLE TO METAL TOXICITY?

Everyone, but especially:

- Pregnant women and foetuses
- Children: developing organ systems, immature immune system, exposure behaviour (crawling on the floor, unwashed hands in mouths), greater scope for delayed reactions.
- The elderly
- Immigrants and those who have spent some time in developing countries. These countries tend to have much greater pollution, limited access to health care and potentially compromised baseline health status.

HANDOUTS

- Aluminium
- Arsenic
- Beryllium
- Cadmium
- Chromium (hexavalent)
- Copper
- Gadolinium
- Iron
- Lead
- Manganese
- Mercury

- Nickel
- Palladium
- Polonium
- Silver
- Thallium
- Titanium
- Uranium

Note that copper, iron and manganese are also essential nutrient minerals.

SOURCES OF TOXIC METALS

FOODS

- Don't assume that just because a toxin is banned in food in the EU that all imported food is similarly free of it (e.g. arsenic in US pesticides, animal feed, rice and fruit juice).
- Fish and seafood: arsenic, cadmium, iron, mercury, nickel. US study shows that all river fish contain mercury; fish is the principal source of US mercury toxicity. Omega 3 debate?
- Organ meats: Iron, copper, cadmium, lead
- Milk or milk products: aluminium, cadmium, lead, nickel, titanium
- Grains: cadmium, copper, mercury, nickel
- Tinned food: Aluminium, lead
- Food processing catalysts: cadmium in the hydrogenation process; mercury in the caustic soda used to make high fructose corn syrup.

IRON IN FOODS AND SUPPLEMENTS

- Beware foods fortified with iron (unless menstruating): a 2001 US study showed that 3% of elderly were iron-deficient but 13% had iron overload.
- Also these fortified foods contain inorganic iron (aka rust).
- Those on a gluten-free diet may be at risk of iron overload since the fibre and phytate content of grains can usefully inhibit non-haem iron absorption.
- Check iron content of multivitamin supplements; may be ferrous sulphate and/or too high.

COOKING AND EATING

- Pots and pans, especially with acidic foods: aluminium, copper, iron, nickel
- Foil and anything that is 'non-stick': aluminium
- Cutlery and cooking knives of stainless or carbon steel: iron, chromium and nickel
- Ceramic cookware: iron

DRINKING WATER

- **Water sources may be contaminated by a range of toxic metals from industrial and medical/dental waste and acid rain**
- **EU: stringent regulations on drinking water quality. But compliance is left to the discretion of the water companies. Only filtration can remove all metals from water and may be ineffective with small or nanoparticles of metal**
- **Water pipes: cadmium, copper, iron, lead**
- **One theory states that the Roman Empire fell when stone aqueducts carrying drinking water were replaced by lead piping.**
- **Some water companies may add:**
 - **A flocculating agent (to remove dirt particles): contain aluminium.**
 - **Fluorosilic acid to fluoridate the water: may contain arsenic or polonium.**

BABIES, TODDLERS AND CHILDREN

- Maternal exposure when *in utero*
- Breast milk from toxic mothers, particularly mercury
- Infant formula, particularly if made from soy: aluminium, cadmium, manganese
- Baby food: lead, arsenic (if imported from US)
- Toys: cadmium, lead (imported or old)
- Children's jewellery: cadmium, silver, thallium, lead (use of lead in plastics has not been banned!)
- Lead and mercury from peeling paint in old homes: attractive to infants

VACCINATION: MERCURY

- Thimerosal, a preservative (antimicrobial) is 49.6% mercury.
- In the UK, since 2004 only hepatitis B and influenza jabs are allowed to contain thimerosal, which must be phased out.
- BUT...Green Health Watch found that in US, manufacturers still made vaccines with thimerosal to reduce costs but filtered it out afterwards. So technically thimerosal-free. BUT.....
- This did not necessarily remove all the mercury, which continued to be present in vaccines, albeit in lower quantity.
- Also, US vaccines exported to 'less developed countries' could still contain thimerosal. Mercury's antimicrobial function was deemed more important than its neurotoxicity. The WHO raised no objection.

‘THEY TOOK OUT THE MERCURY AND PUT IN SOMETHING WORSE!’

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- **Aluminium is added to vaccines as an adjuvant: an agent that stimulates the immune system to increase its response to the vaccine. This reduces costs for the manufacturer.**
- **Aluminium in vaccines has never been tested for safety.**
- **Studies on the HPV vaccine found that the aluminium adjuvant had no beneficial effect on immune response.**
- **Risk of ‘accidental exposure’: a study found that some vaccines contained 5-6 times more aluminium than shown on the label.**
- **In contrast to ingested aluminium, the body absorbs 100% of injected aluminium.**

DENTISTRY

- Dental amalgams contain mercury and aluminium
- Amalgam releases mercury vapour continuously and is exacerbated by eating, drinking and brushing and grinding teeth.
- Several European countries (not the UK!) have required amalgam fillings to be phased out. In Sweden they were banned in 1994.
- Sweden also requires all amalgam fillings to be removed from corpses before cremation to prevent environmental contamination
- The UN Minamata Convention requires the phasing out of many mercury sources by 2020. But the treaty takes effect only after its ratification by 50 nations. EU Commission currently debating ratification.
- Alloys in appliances or implants: beryllium, cadmium, copper, nickel, titanium
- Toothpaste: mercury, aluminium, titanium (whitening agent)

PHARMACEUTICALS

- **Aluminium:** aspirin and other analgesics, antacids (including Gaviscon), anti-diarrhoea medication, nasal sprays
- **Copper:** birth control pills and IUDs
- **Mercury:** vaccines, thiazide diuretics, laxatives, suppositories, antiseptics, ointments
- **Palladium:** chemotherapy; antimicrobial agent
- **Titanium:** antimicrobial; in the 'safety' coating on low dose aspirin
- **Also note that imported traditional medicines may contain lead and other toxic metals.**

OTHER IMPORTANT SOURCES

- **Cosmetics:** aluminium, arsenic, beryllium, cadmium, lead, mercury, nickel, thallium, titanium
- **Cigarettes:** aluminium, arsenic, cadmium, lead, nickel, polonium, thallium (in counterfeit cigarettes). Cigarette use is reducing: Much of the developed world, China, Russia and Brazil have all banned smoking in (some) public places. BUT...
- ...the China smoking regulator is also CEO of the state tobacco firm!
- **E-cigarettes:** aluminium, iron, lead, nickel, silver. E-cigarettes emit a higher level of nickel than conventional cigarettes. Wales will ban e-cigarettes in enclosed locations from 2017 to prevent smoking becoming 'normalised' again.
- **Vehicle exhausts:** aluminium, nickel, palladium, lead (in developing countries)
- **Pesticides available at garden centres:** aluminium, arsenic, cadmium, hexavalent chromium, copper, lead, mercury, nickel, polonium
- **Frequent flying:** nickel, beryllium – Dr Jenny Goodman has more information

NANOPARTICLES

- Nanoparticles (ultrafine particles) are between 1-100nm in size. Nearly all metals can be found in nanoparticle form.
- They are generally much more reactive than the basic metal and can penetrate membranes more easily, including the BBB.
- Nanoparticle research is a new growth industry, with applications in the biomedical, optical and electronic fields, as well as e-cigarettes, vehicle exhausts and clothing.
- **'FDA classifies new washing machine as a pesticide'**
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TOXIC METALS: EFFECTS IN THE BODY

Caveat: There are many studies showing these metals have no effect in humans.

I am merely showing the results of some that do have an effect.

ALL METALS ARE NEUROTOXINS

and, particularly as nanoparticles, can cross the BBB

- Neurological problems: learning difficulties, reduced cognitive function, lower IQ, poor memory, disorientation, sensory impairment, confusion, disturbed neurotransmitters.
- Behavioural problems: hyperactivity, poor attention and responsiveness
- Mental health problems: depression, anxiety, paranoia, aggression, phobias, schizophrenia
- Possible association with autism: aluminium, mercury, copper
- Neurodegenerative disease: AD (aluminium, mercury, copper, iron); PD (iron, lead, manganese, mercury), ALS (mercury), MS (mercury)

ENDOCRINE DISRUPTORS

- Most metals are metalloestrogens, interacting with and distorting oestrogen receptors
- This disrupts sex hormones, delays or accelerates puberty, causes prostate and testicular dysfunction, reduces fertility, causes PMS and PCOS
- Pineal gland (reduced melatonin production): particularly aluminium
- Thyroid gland: arsenic, mercury and lead associated with hypothyroidism, probably through enzyme inhibition
- Adrenal insufficiency: copper

MATERNAL OR FOETAL EXPOSURE

- Increased miscarriages, stillbirths, premature birth, low birth weight, birth defects, cerebral palsy
- Increased infant mortality
- Increased neurological problems, deranged autonomic nervous system, learning disabilities, poor memory, reduced IQ.
- Increased childhood BP
- Increased cancer risk (DNA strand breaks in animals)

'ALL BABIES BORN TODAY, ANYWHERE IN THE WORLD, HAVE TOXIC METALS IN THEIR BODY'

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- **Studies using hair mineral analysis confirm that all newborns have toxic metals.**
- **A 2004 study by the US Environmental Working Group found that blood samples from newborns contained an average of 287 toxins, including mercury, fire retardants, pesticides and other chemicals.**
- **Toxic metals pass easily into the placenta and deposit in foetal tissues, or are contained in breast milk.**
- **Babies' immature immune and detoxification systems cannot cope with metabolizing and eliminating this level of toxins.**

CANCER

- Increased hormone cancers through the metalloestrogen properties of metals. Breast cancer particularly associated with aluminium antiperspirants.
- Increased non-hormone cancers as well, particularly:
 - Kidney/bladder, since urine is main route of excretion
 - Liver, probably due to inadequate detoxification
 - Respiratory system, due to inhaled metals
 - Gastric cancer, due to ingested metals
- Animal studies show single and double DNA strand breaks, poor DNA repair and micronuclei production

EFFECT ON IMMUNE SYSTEM

- **Suppression of immune function, increased infections**
- **Induction of allergies and sensitivities**
- **Induction of chronic systemic inflammation: elevated CRP, ESR, HSP, NF-kB and pro-inflammatory chemokines and cytokines**
- **Aluminium in vaccines linked to autoimmune conditions**

OTHER CONDITIONS

- Respiratory disease and asthma from inhaled metals
- Cardiovascular disease: hypo/hypertension, arrhythmia, MI, stroke
- Liver damage; elevated liver enzymes
- Kidney damage; reduced GFR
- Increased T2D, metabolic syndrome, insulin resistance
- Osteoporosis and fractures: metals displace Ca in bones
- Osteo/rheumatoid arthritis, fibromyalgia, cartilage destruction
- Skin reactions: dermatitis, eczema, lesions, particularly with nickel
- GIT: dysbiosis, candida, antibiotic-resistant bacteria, particularly mercury
- Chronic fatigue syndrome through reduced ATP production.

POTENTIAL MECHANISMS

All toxic metals are pro-oxidants, inducing increased ROS production, which damages DNA and protein production and oxidises lipids.

Other potential mechanisms include:

- Decreased metallothioneins (proteins which can bind metals)
- Displacement of nutrient metals by binding-site competition
- Increased cell membrane, GIT and BBB permeability
- Mitochondrial dysfunction reducing ATP production
- Reduced mitochondrial membrane potential and cell signalling ability
- Impaired production of endogenous antioxidant enzymes
- Inhibition of the MTHFR enzyme, inhibiting conversion of homocysteine.

**HOW CAN WE PROTECT OURSELVES AND OUR
PATIENTS/CLIENTS?**

PREVENTION IS SO MUCH EASIER THAN CURE!

- Avoid toxin exposure where possible: buy organic food, invest in a 'whole house' water filter, buy low chemical cosmetics, toothpaste, cleaning products, paints etc, find a 'mercury-free' dentist and don't accept any metal in the mouth. Avoid vaccination unless absolutely necessary and detox afterwards.
- Particularly ensure that foetuses and infants are protected.
- Ensure immune and detoxification systems are optimised.
- Ensure microbiota are optimised and the gut contains nothing pathogenic; supplementing prebiotics may be more effective than probiotics.
- Treat intestinal permeability.
- Ensure mineral intake is optimised but don't take a 'little is good so more must be better' approach with minerals.
- Take a high strength plant antioxidant supplement.

AND FINALLY...

- It's not just conventional doctors who adhere to the 'magic bullet' concept of treatment – most patients do too.
- And the public wants to believe they are only minimally exposed to toxins: 'Surely they wouldn't let us be poisoned?'
- So education of the public with some hard evidence comprising facts and figures is imperative.
- Policy change will only come about through 'people power', so become activists yourselves and encourage your clients to become activists as well.

