

Environmental Toxins: It's impact on our health

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INTRODUCTION

Definition Naturopathic Medicine – medicine that truly balance science, tradition, respect for nature and looks at the whole person versus just at the disease. Encourages the body to heal itself.

Today's epidemic

- Male and female reproductive problems, especially infertility and pre-term births
- ADHD and Autism in kids
- Degenerative diseases
- Obesity and diabetes
- Asthma
- Cancers
- Neurological disease (Parkinson's – 94 chemicals damages the nervous tissue)

SOURCES

Types of Toxins (general)

- Pesticides
- Solvents
- Heavy Metals
- Geopathic stress

Types of Toxins (specific)

- Body care products, toys
- Cleaning products
- Yard and gardening products (herbicides and pesticides)
- Systematic spraying of parks and recreational areas.
- Foods – hormones, antibiotics, additives, preservatives, coloring
- Plastic

- Air, soil, water, Found even in the most remote places of the planet
- Drinking water
- Mold/dust
- Amalgam fillings in teeth
- Fluorescent lights (contains mercury)
- Fire-retardants
- Cigarette smoke
- Biological toxins (mold, bacteria)
- Noise

Cosmetics and Fragrances

- Are they really safe?
- Poor regulation by FDA
- Deodorants and parabens and breast cancer – what is the link?
- Up to 3000 ingredients, predominantly synthetic, some 900 of which were identified as toxic used in fragrances Do they have to be reported? NO, due to trade secrecy. FDA supports this trade secrecy.

Ubiquitous in the air (actually found higher levels indoor than in outdoor environment!)

- Chloroform*
- Carbon tetrachloride*
- Styrene*
- P-dichlorobenzene*
- P-xylene
- Tetrachloroethylene
- Ethylbenzene
- Benzene
- 1,1,1-trichloroethane
- O-xylene

*more commonly found

Strong link between increase in asthma and air pollution.

Homes / Indoors

- According to NIH study, people spend as much as 90% time indoors vs outdoors.
- In 1970's, was popular to build tighter houses to conserve on heat, A/C Was this a good thing? No!
- Modern building materials, furnishings, and paint and other coatings made with volatile organic compounds (VOCs). They outgas into the home, causing respiratory problems.
- Carpeting and pesticides, dust mites, bacteria and mold...
- Hot showers and radon gas exposure or chlorinated by-products
- Startling discovery:

- a) Concentrations of pesticides 10-100 times higher in carpet dust than in yard soils
- b) These compounds last far longer indoors than they do out of doors

Common Sources of Exposure to Heavy Metals

- Power Plants (Hg, Sb, As, Tl)
- Automobiles (Mn, Cd)
- Diesel (Ni, S)
- Agricultural (Cu, As, Al, Zn, U, etc.)
- Sewage sludge/incineration (Hg, Cd, Pb, As, etc.)
- Paint (Pb, Hg, Cd, Sb)
- Insecticides / rodenticides / fungicides (MeHg, As, Sb, Cd, Tl)
- Cooking utensils (Al, Cu)
- Wood preservatives (As, Cu)
- Disinfectants (Cu, Hg, Ag)
- Vaccines (Hg, Al)
- Dental materials (Hg, Au, Ag, Pd, Ni, Sn)

Methyl Mercury in Fish

- Mercury is found in the meat of the fish, not the fat. Fish consumption advisories in 41 states.
- Unsafe for pregnant women and children to eat fish containing high amounts mercury. FDA Threshold Limit for commercial fish 1 ppm
- Eating fish is the main way most people are exposed to methylmercury,
- Methylmercury is a neurotoxicant that in appropriate doses causes mental retardation, seizures, cerebral palsy, and death.

Mercury in seafood

| <u>Species</u> | <u>Mercury(in micrograms)</u> |
|--------------------------|-------------------------------|
| • Shark | 143ug |
| • Swordfish | 105 |
| • Mackerel | 88-121 |
| • Bass, striped | 77 |
| • Bluefish | 38 |
| • Tuna, white(canned) | 34 |
| • Tuna, fresh, albacore | 29 |
| • Snapper | 27 |
| • Tuna, fresh, yellowfin | 24 |
| • Tuna, light (canned) | 18 |
| • Catfish, freshwater | 11 |
| • Crab | 11 |
| • Flounder | 11 |

- Scallops 5
- Anchovies 4
- Salmon 4
- Shrimp 4
- Oysters 2

Source: EPA, FDA, Consumer report

Chemical approval (Public Health Report, 2002-Jane Houlihan,MS)

- Approximately 80,000 synthetic chemicals developed since 1940s'
- 2300 new chemicals introduced annually
- 8 of 10 new chemicals win approval in less than 3 weeks. Government approves 805 of these with no restriction and no requests of tests
- Less than half of the 15,000 chemicals registered for commercial use have been tested for toxicity.
- Tests for developmental neurotoxicity submitted to EPA for only 12 chemicals as of December 1998. This test is not required.
- Toxics release Inventory for 1997 revealed 2.58 billion pounds toxic chemicals released in the US by facilities required to report. This does not include 4.5 billion pounds of toxic chemicals released into products or pesticides.
- In 1999 – 2000 found 95 compounds in treated water (steroids, insect repellent, antibiotics, detergents).

Routes of Entry

- Inhalation
- Ingestion
- Absorption
- Vertical transmission – mother to fetus (esp PCB's).
- Horizontal transmission – through mother's breast milk
- These toxins "leapfrog" from one are of the globe to another, which has been very alarming.

Body Burden

- Defined as "quantity of an exogenous substance or its metabolites that accumulate in an individual or population
- Body burden not distributed evenly homogeneously within an individual - depends on substance's affinity for water, fat, mineral matrices.
- Example: PCB's and many other pollutants have an affinity for adipose tissue. Calcium mimicking lead concentrates in the bones.
- It is estimated that adipose tissue of humans contains 700 contaminants that have not been chemically identified.
- Difficult to establish good reference range (baseline) for many of the chemicals and pesticides due to few nationally representative populations being studied.
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- Average of 91 chemicals in each person
- In each person, many chemicals linked to common health harms

Carpeting

- One household item that can cause a lot of problems is carpeting.
- One suspect chemical is 4-phenylcyclohexene (4-PC), a byproduct of the production of styrene-butadiene. This substance is used for the backing of many carpets.
- Shampooing carpeting can be particularly bad for your health.

Atrazine safety levels

- Found in pesticides
- Recommended application level for Atrazine is 1,000,000 PPB.
- Safe short term exposure at 100 PPB
- Safety level for drinking is 1 PPB
- Hermaphroditic frogs found when exposed to 0.1 PPB!

Dutch study of PCB's/Dioxins

- PCB's and dioxins found in plastics, chemicals, pesticides.
- Dioxins – used to produce PVC (plastic or chlorinated pesticides, herbicides).
- Dioxin – powerful hormone disrupting chemical. Its toxicity is 2nd only to radioactive waste.
- Decreased immune function in toddlers
- Impaired cognitive function in toddlers
- Altered play behavior of children
- Boys engaging in less masculine behavior and girls more feminine.

Phthalates

- Phthalates, chemicals that are added to polyvinyl chloride (PVC) polymers to create flexible plastics, are receiving most of the attention. Phthalates are used in products such as shower curtains, raincoats, balls, squeeze toys, and medical devices such as tubing and IV bags.
- Found in baby's milk bottles – they are often warmed in the microwave.
- High levels chemicals linked to birth defects in women of childbearing age. Babies exposed to a common phthalate in utero are born a week earlier on average than babies without exposure.
- E.U. ban of these chemicals in cosmetics, phase outs in the U.S.
- Chronic intake and accumulation to a deleterious level may require 30-40 years

Bisphenol Exposure

- Bisphenol-A, the main ingredient in hard polycarbonate plastics for baby bottles, drinking water bottles, and food containers, has been detected in pregnant women in Germany and Japan. It is one of the top 50 production-volume chemicals in the U.S., and exposure likely is widespread.
- Found in building blocks and polycarbonate plastics. Leaches with age, heat, exposed to chemicals.
- Causes aneuploidy (error in cell division – single largest cause miscarriage in people)
- Examples: linked to increased incidence of prostate cancer, low sperm count, obesity.

Flame retardants (Polybrominated diphenyl ethers (PBDE's))

- Flame retardants, added to foams, plastics, and electronics, have been found at exponentially increasing levels in women in California; levels in U.S. women have reached up to 75 times the levels found in Europe and Japan.
- Banned by EU Union.
- Slowly released over life of plastics, foams and fabrics (carpeting, upholstered furniture, polyester blankets, mattresses, kid's pajamas, wallpaper, etc.).
- Can travel 1000's of miles away – found even in Antarctic!
- Found PBDE levels in bodies of humans and wildlife far higher than that found 10 years ago.
- Linked to neurodevelopmental and behavioral deficits, thyroid hormone disruption and possibly cancers.
- The highest levels are found within 6 months of new purchase, but the PBDEs stay in the tissues of a mother and child forever.

Radon

- Radon is a naturally occurring radioactive gas that can seep into buildings from the surrounding soil. It is most prevalent in certain areas of the country and is present in greater concentrations in newer, well-insulated homes. Exposure to radon is believed to be the number two cause of lung cancer in the United States
- Home radon test kits are available in most hardware stores. If your home is found to have radon, you can probably correct the problem by sealing cracks and improving ventilation in the basement. Regional offices of the Environmental Protection Agency (EPA) can provide more information.

Rapid half-life

- Formaldehyde
- Benzene
- Pesticides
- These are rapidly excreted or metabolized, producing a negligible long-term body burden

Longer Half-life

- These accumulate progressively in a person's tissues as exposures continue.
- Tetrachlorodibenzo-p-dioxin, has half life in humans of seven years.
- In a study published in the Archives of Environmental Health, people who were exposed to chlordane, used to control termites, had immune system defects that were detectable up to ten years after the exposure.

CONSEQUENCES

Possible signs/symptoms of environmental toxicity

- | | | |
|------------------|------------------------|--------------|
| • Diarrhea. | • Ringing in the ears. | • Arthritis. |
| • Watery eyes. | • Asthma. | • Fatigue. |
| • Nausea. | • Bronchitis. | • Headache. |
| • Upset stomach. | • Stuffy nose. | • Eczema. |

- Depression.
- Chronic flu-like symptoms
- ADHD and Autism
- Premature births
- Stillbirths and birth defects
- Chronic fatigue
- Muscle/joint pain
- Allergies
- Skin conditions
- Chemical sensitivities)
- Autoimmune disease
- Hypertension
- Neurological diseases
- Cancers

Host Susceptibility – Chemical toxins affect individuals in vastly different ways

- Nutritional status
- Total toxic
- Genetics
- Age
- State of health
- Stress
- Immune system status.

Conceptual Shift #1

OLD: Toxins work by overwhelming the body's defenses...by brute force

NEW: Toxins work by hijacking control of gene expression.

Conceptual shift #2

OLD: High levels needed to cause an impact (True to an extent in which high levels can be devastating)...

NEW:

- At low levels can cause long-lasting effects on a person's health and cause a wide range of diseases.
- At very low levels, interferes with hormone signals.
- Not just the dose but timing is crucial as well as person's susceptibility.

Conceptual shift #3

OLD: Immediate cause and effect

NEW: Long latencies following developmental exposure.

Conceptual shift #4

OLD: It is not just one toxin acting alone

NEW: It is the synergistic effect of toxins and infections that potentiates and perpetuates the disease.

Systems affected by heavy metals

- Neurotoxic (Hg, Pb, As, Al)
- Nephrotoxic (Cd, Pb, Hg)
- Cardiovascular Disease
(Hg, Cd, Pb, Sb)

Metals and and Organochlorine compounds (OCC) has devastating effects on the immune system

- Heavy metals disrupts enzyme function, which affects virtually every system of the body
- As, Hg, Cd, Pb, Ni and Sn
 - a) ↓ Numbers *and* activities of macrophages and Natural killer cells
 - b) ↓ Resistance to bacterial, protozoa and fungus
 - c) ↓ Antiviral and tumoricidal activity
- OCC
 - a) ↓ killing capacity of PMNs
 - b) ↓ number plasma responder cells
 - c) ↑ degranulation of mast cells
 - d) Leucopenia
 - e) ↓ phagocytic ability
 - f) Changes in spleen, thymus, lymph glands
 - g) Variation in complement
 - h) Disturbances in fetal and perinatal immune regulation

Organophosphate Pesticides (major class – Dioxins, DDT, PCB's)

- Not biologically persistent as the OCC's, but are toxic to immune system.
- Decreased % of CD4, CD5 cells
- Increased number and % of CD26 cells
- High rates of autoimmunity. Similar autoimmunity found in heavy metals.

Solvents and Pesticides

- Disrupts neurological function.
- Immunotoxic and toxic to the endocrine system.
- Disrupts dermatological, gastrointestinal, genitourinary, respiratory, musculoskeletal, cardiological problems.

Cancer

- Rates of cancer on the rise. According to Nation Cancer Institute, 1:2 will develop cancer.
- The American Cancer Society has estimated that 75% of all cancers are caused by environmental factors, including smoking, diet, infectious agents, radiation and chemicals.
- Breast Cancer - One cancer that has very clear association with environmental chemicals is breast cancer.

Fatigue

- Increased fatigue may be due to chemicals acting on the thyroid gland. Chlorinated compounds are well known for their effects on thyroid function. Many of these compete directly with thyroid hormones or proteins that carry thyroid hormones.
 - a) Thiocynates
 - b) Perchlorates
 - c) Pertechnetates
 - d) Pentachlorophenol
- Other chemical exposures contributing to fatigue include:
 - a) Formaldehyde (found in carpeting)

- b) Trichloroethylene (found in floor polish, copy machines, carpet cleaner, etc.)
- c) Toluene (very common indoor pollutant)
- d) Methylene chloride (found in paint thinner, hair spray, adhesives, solvents, paint, flame retardants, hair sprays, anti-perspirants, air fresheners, spray paint). Once inhaled, methylene chloride goes directly to the brain, fat cells, and liver.
- Toxic mineral exposure
 - a) Lead, mercury, cadmium, arsenic, aluminum, nickel, silver, beryllium, and tin.
 - b) Aluminum blocks the major energy molecule in the body, ATP.
 - c) Lead and mercury impair immune function, block enzyme function, inflammatory substances, and alter certain metabolic pathways.

Insomnia

- In Environmental Neurotoxicology, it is reported that any of 119 different chemicals can cause sleep disturbance.
- In 112 individuals evaluated for exposure to organic solvents (house paints, spray finishers, printing), there was a significantly higher prevalence of insomnia.

Multiple chemical sensitivity

- Often become ill from being in the presence of only minute amounts of a chemical.
- Even a faint smell of formaldehyde can cause devastating symptoms of fatigue.
- Often these people are labeled as hypochondriacs, told, "If I can't smell it you must be imagining it."

Epidemiology – What is the trend in health and disease due to environmental toxins? www.iceh.org

- Research suggests that some 30% of disease in the European Union may be triggered by environmental agents

Who is at greatest risk? The Children!!!

- Pound for pound, they eat, drink, and breathe more than the adult
- Children live closer to the ground where toxic chemicals often collect (especially carpets).
- Their brains and bodies still growing and changing
- Neurodevelopmental and mental health disabilities are rapidly rising in California.
- In the last four decades:
 - a) The number of obese adolescents in the U.S. has quadrupled
 - b) Girls in the U.S. appear to be reaching puberty six months to one year earlier than in the past,
 - c) Both trends could be tied to endocrine-disrupting chemical exposures in utero.
- Incidence of cancer in children increased to 26% between 1975 to 1998.
- Incidence of testicular cancer in young men has increased by 60%
- Percentage of US children with asthma doubled from 3.6% to 7.5% between 1980 and 1997.
- Autism in the U.S. has doubled between 1966 to 1997. In 1997 to 2000, 6.7% children between ages 5-19 reported too have been diagnosed with ADHD.
- One million children in the US exceed 10ug/dL blood lead level exposure. 36% of those children are African-American and live in inner cities.

- **GOOD NEWS:** Blood levels lead in the US has dropped from 16mg/dL in 1974 to less than 2mg/dL in 1998 because of public health intervention.

DIAGNOSIS

New Medical Diagnosis

- Sick Building Syndrome
- Multiple Chemical Sensitivities
- Chronic Fatigue Syndrome
- Fibromyalgia

Diagnosis

- Clinical symptoms
- Patient history – occupational exposure, diet, dental amalgams, etc.
- Blood tests
- Hair analysis
- Urinalysis
- Stool analysis
- DMPS challenge
- DMSA challenge

Detection of Toxic Metal Burden

- Test for metal toxicity as an underlying root cause of chronic disease and learning / behavioral disorders
- Hair Elements – pre and post detox
- Urine Elements
 - a) Pre- and post-provocation agent
 - b) Monitor progress of detoxification
- Fecal Heavy Metals – Primary natural route of excretion (bile)

Fecal Toxic Metals

- > 90% of Hg is naturally excreted via the biliary (fecal) route
- Fecal Hg correlated with amalgams (exposure)
- No pharmaceutical provocation agent required
- Special applications test

Why Use Hair?

- Hair is an excretory tissue that binds toxic elements irreversibly in proportion to levels in the body
- Detects chronic, low level exposure and accumulation
- Recommended as initial screening tool by
U.S. Environmental Protection Agency

*International Atomic Energy Commission
World Health Organization*

- Comprehensive, *non-invasive* and very cost effective

Andrew Jackson's Exposure to Lead and Mercury

- Hair Pb (131ppm), Hg (6 ppm); 1815 [normally, see 3-9ppm mercury in hair analysis after amalgam extraction and chelation]. Andrew Jackson's level was 10x that level!
Armed Forces Institute of Pathology, DC
- Symptoms he displayed were colic, diarrhea, rapid tooth loss, sialism, tremor, irritability, paranoia, violent mood swings, headaches, renal failure
- Calomel, "sugar of lead", bullet wounds

Hair Mercury : Amalgams

- Highest (3-9 ppm)
After extraction
During mobilization/chelation
- Lowest (< detection limit) (<0.1ppm)

TREATMENTS

Types of Detoxification Treatments

- REMOVE the CAUSE!
- Nutrients: L-glutathione, vitamin E, vitamin C, N-acetylcysteine, selenium, beta-carotene, coenzyme Q10, taurine, zinc, copper, magnesium, molybdenum, bioflavonoids, MSM,
- Herbs: chlorella, cilantro
- Homeopathy
- Gastrointestinal support – probiotics, heal the gut
- Lymphatic drainage
- Infrared hydrotherapy - most effective way of opening sebaceous glands
- Aqua Qi foot bath.
- Colonic hydrotherapy/enemas - once toxins have been mobilized, this helps to reduce the transit time).
- Diet (dietary protein)
- Support the endocrine, immune, and hepatic (liver) system.
- Begin a program of behavioral therapy and stress management.

Nutritional requirements

- Need lots of minerals and vitamins!
- Glutathione, Alpha-lipoic acid, essential fatty acids, etc.

PREVENTION

Practice Prevention

- Keep indoor environments healthy
- Buy non-toxic products for your home
- Learn more about alternatives to pesticides
- Buy organic if you can
- Eat foods low on the food chain. (top predators like sharks and bass can have Hg levels 1000 of times higher than the water which they swim) – Harvard Heart Letter, June 2003 Likewise, toxins found in infants probably will be much higher than found in mothers. (Klinghardt)
- Eat fish low in mercury (salmon, herring, cod, haddock, pollock).
- Eat foods with less animal fat
- Don't reheat or microwave foods in plastic containers
- Dispose of household toxic products properly
- If living in home/apartment older than 1978, probably has lead pain. Run water for >1 minute and never run hot water for cooking.
- If dry clean clothes, find place that uses non-toxic solvents. If not possible, should wait 2 weeks before wearing dry cleaned clothing.
- Try to remove carpeting in home. Remove shoes before entering in home.
- Work up a sweat!
- Educate yourself about the issues

Thank you for coming and let's make this world a better place to live! -Peace, Kim

Websites to check out

- <http://1800recycle.ca.gov>
- <http://1800recycle.wa.gov> – Dispose of household toxic products properly
- http://dmoz.org/Health/Alternative/Non-Toxic_Living/ - great website for things we can do and more info on environmental toxicity
- <http://householdproducts.nlm.nih.gov/> - Health & Safety Information on Household Products
- <http://www.foodnews.org> - Buy organic and local
- <http://www.beyondpesticides.org> – List of least toxic pest control companies
- http://www.bioimmune.com/toxic_quiz/answers.asp - test to see how toxic you are
- <http://www.ecologycenter.org/ptf/toxins.html> - Don't reheat or microwave foods in plastic containers
- <http://www.ecologycenter.org/ptf/toxins.html> - plastics
- <http://www.environmentalhealthnews.org> – Educate yourself about the issues
- <http://www.epa.gov/nheerl/> - Environmental Protection Agency (EPA) website
- <http://www.pesticide.org/faactsheets.html#alternatives> – Learn more about alternatives to pesticides:
- <http://www.protectingourhealth.org/corethemes/links/2004-0203spreadsheet.htm> - summarizes information on chemical contaminants and about 200 adverse health outcomes.
- <http://www.sis.nlm.nih.gov/Tox/ToxMain.html> - Toxicology and Environmental Health
- <http://www.watoxics.org/pages/root.aspx?fromMenu=0&pos=3|0> - Buy non-toxic products for your home

Indoor Air Quality links

<http://www.epa.gov/iaq/>

<http://www.stl-inc.com/>

<http://www.envirovillage.com/>

Benzene Links

http://www.iet.msu.edu/Tox_for_Journ/Chemicals/benzene.htm

Toluene Links

http://www.iet.msu.edu/Tox_for_Journ/Chemicals/toluene.htm

http://www.epa.gov./opptintr/chemfact/f_toluen.txt

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- http://tuberose.com/Environmental_Toxicity.html
- <http://www.cqs.com/edioxin.htm>
- <http://www.environmentalhealthnews.org>
- <http://www.environmentalcalifornia.org/envirocaliftoxics.asp?id2=13673>
- <http://www.iceh.org>
- http://www.immunesupport.com/library/showarticle.cfm/ID/3404/e/1/T/CFIDS_FM/
- <http://www.neuraltherapy.com>
- <http://www.OurStolenFuture.org>
- <http://www.preventcancer.com/consumers/cosmetics/fragrances.htm>. **Fragrances and Perfumes Can Be Toxic, Beware of Calvin Klein's "Eternity eau de parfume"**
- <http://www.ProtectingOurHealth.org>
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- <http://www.yourpurelife.co.uk/articles/toxins.html>.
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