Exogenous Toxins: Intervention and Case Histories

Dr. Joseph Pizzorno, ND
President Emeritus, Bastyr University
Editor, *Integrative Medicine: A Clinician’s Journal*
Chair, Scientific Advisory Board, Bioclinic Naturals
President, SaluGenecists, Inc.

mail2@DrPizzorno.com

Copyright © 2015
Interventions

- Avoidance!
- Non-specific
- Specific
- Glutathione Support
- Systemic
Avoidance

• Decrease Exposure!!
• Organic, mostly plant-based diet
• Choose low mercury fish
• Low POP health and beauty aids
• Remove amalgams
  ▪ Must be done by ecological dentist
Worst/Best Foods
(www.ewg.org 9/14)

<table>
<thead>
<tr>
<th>Dirty Dozen™</th>
<th>Clean 15™</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apples</td>
<td>1. Avocado</td>
</tr>
<tr>
<td>2. Strawberries</td>
<td>2. Sweet Corn</td>
</tr>
<tr>
<td>3. Grapes</td>
<td>3. Pineapples</td>
</tr>
<tr>
<td>5. Peaches</td>
<td>5. Sweet Peas</td>
</tr>
<tr>
<td>6. Spinach</td>
<td>6. Onions</td>
</tr>
<tr>
<td>7. Sweet Bell Peppers</td>
<td>7. Asparagus</td>
</tr>
<tr>
<td>8. Nectarines (imported)</td>
<td>8. Mangoes</td>
</tr>
<tr>
<td>10. Tomatoes</td>
<td>10. Kiwi Fruit</td>
</tr>
<tr>
<td>11. Snap peas (imported)</td>
<td>11. Eggplant</td>
</tr>
<tr>
<td>• Hot peppers</td>
<td>13. Cantaloupe (domestic)</td>
</tr>
<tr>
<td>• Kale</td>
<td>14. Cauliflower</td>
</tr>
<tr>
<td></td>
<td>15. Sweet potatoes</td>
</tr>
</tbody>
</table>
Eating Organically Grown Foods Decreases POP Load

• Levels drop measurably within 3 days
• 10-fold increase in POPs doubles ADHD

Mercury In Fish

- 10-fold variation from lowest to highest
- All fish contain some mercury
- Pick those with highest omega-3 and lowest Hg:
  - Sardines
  - Anchovies
  - Small salmon

Source: http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115644.htm
HABAs Can Be Significant Source of POPs

Non-Specific Detoxification Agents

- Fiber
- Antioxidants
- Alpha lipoic acid
- Curcumin
Fiber

- Decreases enterohepatic recirculation
- Limited research available
- Pectin—Russian research
- PGX
  - Strong research support for improving insulin sensitivity and weight loss
  - 2.25 g tid
Pectin Increases Excretion and Protects Against Metals

- Helps protect neurons from mercury (rats)
- Russian research shows efficacy against Pb, Hg
- 5g g bid for 1 month decreased $^{137}$Cs 62% in children exposed to Chernobyl compared to 21% in controls

Chlorella Decreases HCA Metabolites

• Dramatically decreases HCA (heterocyclic amines from frying meat and fish) metabolites in urine
  ⇒ Binds in gut to prevent absorption of toxins and enter-hepatic recirculation of metabolites

• Chlorella will absorb toxic metals from environment
  ▪ Must ensure clean source

Chlorella Decreases Toxic Metals

- Oral administration (rats):
- Increases stool and urinary excretion of mercury
- Decreases mercury in kidneys and brain, but not liver
- No apparent benefit with removing cadmium
- Benefit preventing cadmium absorption

- Binds metals so well, being used to clean up toxic waste sites

⇒ Must ensure clean source

<table>
<thead>
<tr>
<th>Groups</th>
<th>Small Intestine (μg/g wet wt)</th>
<th>Blood (μg/100 ml)</th>
<th>Liver (μg/g wet wt)</th>
<th>Kidney (μg/g wet wt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC0</td>
<td>0.17 ± 0.04&lt;sup&gt;2,3,5&lt;/sup&gt;</td>
<td>0.28 ± 0.03&lt;sup&gt;6&lt;/sup&gt;</td>
<td>3.83 ± 0.44&lt;sup&gt;6&lt;/sup&gt;</td>
<td>4.80 ± 0.46&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>NC3</td>
<td>0.07 ± 0.01&lt;sup&gt;5&lt;/sup&gt;</td>
<td>0.33 ± 0.03&lt;sup&gt;6&lt;/sup&gt;</td>
<td>2.93 ± 0.38&lt;sup&gt;6&lt;/sup&gt;</td>
<td>4.78 ± 0.70&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>NC5</td>
<td>0.08 ± 0.05&lt;sup&gt;5&lt;/sup&gt;</td>
<td>0.44 ± 0.05&lt;sup&gt;6&lt;/sup&gt;</td>
<td>3.30 ± 0.49&lt;sup&gt;6&lt;/sup&gt;</td>
<td>2.94 ± 0.40&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>CCO</td>
<td>8.24 ± 1.13&lt;sup&gt;4&lt;/sup&gt;</td>
<td>36.46 ± 3.45&lt;sup&gt;5&lt;/sup&gt;</td>
<td>48.51 ± 6.11&lt;sup&gt;6&lt;/sup&gt;</td>
<td>52.35 ± 6.06&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>CC3</td>
<td>4.05 ± 0.10&lt;sup&gt;5&lt;/sup&gt;</td>
<td>18.08 ± 3.19&lt;sup&gt;6&lt;/sup&gt;</td>
<td>31.41 ± 1.18&lt;sup&gt;5&lt;/sup&gt;</td>
<td>20.50 ± 0.78&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>CC5</td>
<td>3.64 ± 0.76&lt;sup&gt;5&lt;/sup&gt;</td>
<td>11.74 ± 1.31&lt;sup&gt;6&lt;/sup&gt;</td>
<td>25.37 ± 4.04&lt;sup&gt;5&lt;/sup&gt;</td>
<td>13.99 ± 2.17&lt;sup&gt;7&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Alpha Lipoic Acid

- Protects brain neurons from oxidative damage from mercury (rats)
- Pre-treatment (injected) at 35 μmol/kg (5.5 mg/kg)
- Increases glutathione (decreases depletion)

Curcumin to the Rescue

- Many of the mechanisms of damage from toxins are mitigated by curcumin
- Emerging research showing direct protection from specific toxins
- Protects DNA from perfluorooctane sulfonate

POP Elimination

• Little research for elimination/removal
• Fiber
• Bile sequestrants (eg., colestimide, cholestyramine)
• Glutathione support
• Antioxidant support, increased sweating, and reducing intake all likely to benefit
  ▪ Vegan diet associated with lower PCB serum content, but vegetarian diet associated with higher pesticide intake
  ▪ Organic diet eliminated OP pesticide metabolites in children
• Detoxification support – cruciferous vegetables
• Systemic (sauna, fasting, hydrotherapy)

DMSA

• 2,3-Dimercaptosuccinic acid
• SH-containing, water-soluble, low-toxicity, oral (IV toxic)
• Developed in 1950s as alternative to more toxic chelating agents
• 10-20% of oral dose absorbed
• Chelates all forms of mercury (more effective for Pb)
• ½ through urine, ½ through bile
• Amount of Hg bound: ~7.5 ug/g of oral DMSA
• Increases glutathione production
• ½ life in blood 2-3 hours

DMSA

• Nutrients to improve efficacy
  ▪ Alpha lipoic acid
  ▪ NAC
  ▪ Probiotics
  ▪ Fiber

• Research studies use 30 mg/kg/day
  ▪ 7 days on, 7 off
  ▪ Not recommended

• Protocol we used:
  ▪ 50 mg trial dose; if no reaction within 2 hours:
    • 250 mg qd for 3 days then off for 11 days, or
    • 250 mg every 3rd day before bed

NAC

- Most research animal and human cell lines
- Multiple benefits:
  - Increases production of glutathione
  - Protects human neurological cells from Hg toxicity
  - Reverses damage to human pancreatic cells from Hg
  - Directly binds to Hg, esp. MeHg, and excrete through kidneys

NAC

• IV
  ▪ Treatment of acute acetaminophen poisoning
  ▪ 150 mg/kg body weight given over 15-60 minutes
  ▪ Effective but high incidence of adverse events—ER only!!

• Oral
  ▪ Safe: No serious adverse events in review of 4,000 patients
  ▪ 500 mg: 1-2 times a day

Watch for Sulfur Sensitive Patients

- Clinical indications:
  - Allergies  Onion and/or garlic intolerance
  - GURD  Sulfite sensitivity
  - IBS

- Laboratory:
  - Increased sulfite/sulfate ratio in urine
  - Decreased Phase II sulfation

- Intervention:
  - Molybdenum 300 ug/d
  - Manganese 20 mg/d
  - DMSA and possibly NAC contraindicated until S metabolism improved
Lead Detoxification

- **Chelators:** DMPS, DMSA, EDTA, d-penicillamine (DPA)
  - Long history of EDTA use, most often used IV
  - EDTA also depletes Zn, Cu, Fe, Co, and Mn
  - **Oral DMSA as effective as IV EDTA**
    - Pt example decreased from 3.7 to 2.4
  - Not clear if DMSA removes lead from bone, but does reduce hippocampal lead
  - Combination of EDTA and DMSA increase amount excreted

Bradberry, S et al. A comparison of sodium calcium edetate (edetate calcium disodium) and succimer (DMSA) in the treatment of inorganic lead poisoning. Clinical Toxicology 2009
Bradberry Use of oral DMSA in adult patients with inorganic lead poisoning. QJM. 2009
Lee BK, Provocative chelation with DMSA and EDTA: evidence for differential access to lead storage sites. Occup Environ Med. 1995
Cadmium Detoxification

- Little data for chelation, but EDTA primarily used
- **Chelators may redistribute cadmium and increase its toxicity**
- Extreme care as easily concentrates in kidneys
- In workers with high exposure, a 14 year study found if urinary levels were initially > 10 microg/g Cr, renal damage was irreversible with EDTA
- DMSA will chelate small amount
- In a case study, glutathione was used with EDTA, and appeared to increase both blood cadmium and renal excretion of cadmium

Cadmium – Sweat it Out!

- Cadmium eliminated efficiently through sweat
- 20 individuals sweat via exercise, steam or infrared sauna
- Cadmium found in sweat in those with undetectable serum levels, suggesting it could be used for assessment of burden
- Elimination of other minerals (Cu, Mn) suggests need replenishment during induced sweat

Arсенотоксинизация

- Поддержание путей метилирования кажется логичным.
- Увеличение мочевого MMAV в арсенотоксичных субъектах свидетельствует о недостаточной метилировании и повышает вероятность повышения концентрации MMAIII внутриклеточных.
- Диетическое потребление и концентрация в сыворотке цистеина, метионина, холина, селена, цинка, фолиевой кислоты, нiacиная, витамина B12, ферритина, может все модифицировать метаболизм, сохранность и токсичность арсеника.
- Арсенотоксические кожные заболевания более распространены в тех, кто имеет низкий уровень фолиевой кислоты.
- 400 мкг фолиевой кислоты в день у тех, кто имеет низкий уровень плазменного фолиата, увеличивает мочевой DMA, и понижает мочевой MMA, что, вероятно, снизит риск болезни.

Glutathione: Critical

• Difficult to overstate its importance
• Most important intracellular and intra-mitochondrial antioxidant
• Binds and transports mercury out of cells and brain
• Irreversibly(?) binds to mercury in the brain
• Neutralizes oxidative damage from mercury and POPs
• Facilitates detoxification of POPs
• Depleted by oxidative stress, metals, alcohol
• Even predictor of healthy aging!

Glutathione

- Tripeptide (cysteine, glycine and glutamic acid)
- Relatively high (5 millimolar) concentrations in most cells
- Exists in reduced state (GSH) and oxidized state (GSSG)
- Ratio determines cell redox status
  - Healthy cells at rest have a GSH/GSSG ratio >100
  - Ratio drops to 1-10 in cells exposed to oxidant stress
- Produced exclusively in the cytosol and actively pumped into mitochondria
Synthesis, Regeneration & Recycling

• GSH is made available in 3 ways:
  ▪ Synthesis via a 2 step process catalyzed by the enzymes GCL and glutathione synthetase—requires ATP
  ▪ Regeneration of oxidized GSSG to reduced GSH by glutathione reductase—requires NADPH
  ▪ Recycling of cysteine from conjugated glutathione—requires NADPH

• Regulation of synthesis, regeneration & recycling
  ▪ Glutathione synthesis is primarily controlled by GCL because the rate-limiting step is the cellular level of the amino acid cysteine
  ▪ GCL is in part regulated by GSH feedback inhibition

• If GSH is depleted due to oxidative stress, inflammation, or exposure to xenobiotics, de novo synthesis of GSH is up regulated, as is cysteine synthesis.

Creative Commons Attribution License
Depleted GSH Has Been Implicated In:

- **Neurodegenerative disorders** (Alzheimer's, Parkinson's and Huntington's diseases, amyotrophic lateral sclerosis, Friedreich's ataxia)
- **Pulmonary disease** (COPD, asthma, and acute respiratory distress syndrome)
- **Immune diseases** (HIV, autoimmune disease)
- **Cardiovascular diseases** (hypertension, myocardial infarction, cholesterol oxidation)
- **Liver disease**
- **Cystic fibrosis**
- **Chronic age-related diseases** (cataracts, macular degeneration, hearing impairment, and glaucoma)
- **Aging process itself**

Factors that Affect GGT

**Increase**
- Excessive alcohol
  - Acetaminophen worsens
- Meat intake
- Fried food intake
- Smoking
- Elevated blood sugar
- Obesity
- Anticonvulsants, OCAs

**Decrease**
- Dietary vitamins C & E, carotenoids and fiber
- Fruit and vegetable intake
- Bean and lentil intake
- Whole grain intake
- Nut intake
- Physical activity
- Coffee!

Dixon JB, et al. Weight loss and non-alcoholic fatty liver disease: falls in gamma-glutamyl transferase concentrations are associated with histologic improvement. Obes Surg. 2006;16(10):1278-86
Seifert CF, Anderson DC. Acetaminophen usage patterns and concentrations of glutathione and gamma-glutamyl transferase in alcoholic subjects. Pharmacotherapy. 2007;27(11):1473-82
Glutathione Strategies

- Decrease depletion
- Directly administer
- Promote production
- Lifestyle
Glutathione: Decrease Depletion

• Decrease utilization
  ▪ Decrease toxic exposure, esp alcohol
• Decrease oxidative stress
  ▪ Decrease oxidative markers, increase GSH
  ▪ Alpha-lipoic acid for mitochondria
    • Increases GSH in skeletal muscle cells with CoQ10
  ▪ Vitamin D for brain
  ▪ Melatonin for brain

Garcion E, et al. New clues about vitamin D functions in the nervous system. Trends Endocrinol Metab. 2002 Apr;13(3):100-5
Glutathione: Direct Administration

- IV glutathione
- Nebulized glutathione
- Oral glutathione
- Oral liposomal glutathione
- Topical glutathione
- Intranasal glutathione

Glutathione – IV

- Extremely short half-life in the plasma
- High blood levels may carry mercury from blood into brain (animal research)
- Parkinson’s disease (symptomatic improvement)
- Peripheral artery disease (improved pain-free walking distance and several markers of circulation)
- Study comparing IV glutathione to IV N-acetylcysteine found the former to be more effective in preventing contrast-induced nephropathy

Glutathione - Nebulized

- Elevates local and systemic levels
- In cystic fibrosis found to improve several clinical indicators, such as peak flow.
- Case reports of success in emphysema

Glutathione – Oral

- 3g oral showed no change in plasma glutathione
- Recent trial @ Bastyr:
  - 500mg bid to 40 healthy volunteers, randomized & double-blinded, placebo-controlled – 4 weeks long
  - Measured RBC GSH & GSSG (and ratio), as well as urinary markers of oxidative stress (F2-isoprostanes and 8-hydroxy-2′-deoxyguanosine)
  - Analyzed and contained >98% reduced glutathione, <1.4% oxidized glutathione, and was free of microbial contamination and heavy metals.
  - **No significant changes in any parameter measured**
- Recent trial @ Penn State:
  - 6 months long, using 250-1000mg GSH
  - GSH levels were increased 30–35% in RBC, plasma, and lymphocytes, and 260% in buccal cells at higher dosage NK cytotoxicity up 2x
  - Was benefit due to much longer time of dosage? i.e., expensive cysteine.

Lipoceutical & Transdermal - Glutathione

- A small study of children with autism spectrum disorders found that both oral lipoceutical and transdermal glutathione had some efficacy in improving plasma reduced glutathione levels.

Glutathione - Intranasal

- Intriguing as does not transport Hg from blood
- Lung absorption documented (very effective)
- Children with chronic otitis media with effusion given glutathione as a nasal aerosol had improvement in 67% versus 8% of controls
- Uncontrolled survey found 78.8% success for multiple chemical sensitivity, allergies/sinusitis, Parkinson disease, Lyme disease, fatigue and “other.” 12.1% reported ADRs.
- MRI showed 53% increase in brain after 20 mg intranasal
  - 200 mg/ml

Glutathione: Increase Production

- Silymarin
  - Standardized extract, 100 mg tid
- NAC (also directly binds methyl-Hg)
  - 300-1000 mg bid
- Whey powder
  - 15 g bid
- SAMe
  - Not methionine as it also increases homocysteine

Soltan-Sharifi MS, et al. Improvement by N-acetylcysteine of acute respiratory distress syndrome through increasing intracellular glutathione. Hum Exp Toxicol. 2007;26(9):697-703


NAC Elevates Glutathione

- N-acetylcysteine
- Amino acid cysteine is a rate-limiting factor for GSH synthesis
- Variety of both clinical trials and in-vitro/in-vivo data suggest that supplying cysteine as NAC is an effective strategy for enhancing GSH production and intracellular cysteine.
- Increases intracellular glutathione
- Dosage dependent increase

NAC Decreases GGT

- 600mg/day for 4 weeks reduced GGT from 62.7 to 46.3 U/L.
- Expected result as decreases need for recycling glutathione

How About Beer (Alcohol-Free)?

- 29 nuns, 58 to 73 y old, live in a convent with a disciplined, regular, and homogeneous lifestyle
- 500 mL/d of alcohol-free beer (0.0%) divided into two doses over 45-days
- 29% increase in RBC glutathione!

Glutathione: Stimulate Production

- **Resveratrol**
  - 1 g/d (human study)
- **Milk thistle/Silymarin**
  - 166 mg bid in hepatitis C patients treated with antiviral drugs

Cruciferous Vegetables

- Cruciferous vegetables with intact glucosinolates boost glutathione levels and detoxifying enzyme activity
- Cooking the cabbage before enzyme activation from damaged cells eliminates most of benefit

Glutathione & Meditation

- Forty-two Sudarshan Kriya practitioners (practiced at least 1 year) and 42 normal healthy controls – cross sectional study
- Controls and practitioners had the same socioeconomic status, comparable BMI, were vegetarians, and were nonsmokers
- **Practitioners had higher glutathione levels** – 76.7 ± 4.06 nmol/ml in controls, and 96.5 ± 4.41 in practitioners
- Also had higher antioxidant enzyme activities, and transcriptional level for glutathione peroxidase, catalase, and higher GST-P1 levels

Glutathione & Exercise

- Hours/week of moderate exercise positively associated with blood glutathione levels (not excessive exercise!)
- **Aerobic and weight training combined more effective than either alone**


Abdull Razis AF, et al. Intact glucosinolates modulate hepatic cytochrome P450 and phase II conjugation activities and may contribute directly to the chemopreventive activity of cruciferous vegetables. Toxicology. 2010 Nov 9;277(1-3):74-85.
IV Glutathione Protects Neurons

- 50% less glutathione (GSH) in the substantia nigra of Parkinson's patients
- But not in other parts of brain => used up in neutralization of local toxins
- GSH 600 mg IV bid x 30 days
  - 42% decline in disability
  - Lasted 2-4 months after stopped
- Protects both telomeres and mtDNA

Systemic Detoxification

- Sauna
- Fasting
- Hydrotherapy
- Spa Program
Sauna
(Heat Chamber Depuration)

• Extended time: 1-2 hours
• Modest temperature: 150-170°F
• Increases excretion of:
  ▪ Heavy metals: arsenic, cadmium, lead, mercury
  ▪ Chemicals: phthalates, PCBs, PBBs, and HCBs
  ▪ Essential trace minerals

Schnare DW, et al: Body burden reductions of PCBs, PBBs, and chlorinated pesticides in human subjects. Ambio, 1984
Hydrotherapy

- Bath General Hospital
  - Lead poisoning (colica pictonum)
  - 120 years of records analyzed
  - 3,377 patients with lead poisoning
  - 45.4% cured; 93% improved

- Treatment
  - 1+ hour full body (standing) immersion at 35°C
  - 3 times per week; average stay 150 days

- Physiological research
  - Standing full immersion:
    - Increases cardiac output 50%
    - Increases excretion of lead 250%
    - Peak lead excretion at 2.5 hours

Spa Program

- Juice fast, caloric restriction (800), meditation
-Colonics (4)
-1 week residential

<table>
<thead>
<tr>
<th>Measure</th>
<th>WEIGHT (lbs)</th>
<th>BMI</th>
<th>BP_SYS (mm Hg)</th>
<th>BP_DIA (mm Hg)</th>
<th>ALT U/l</th>
<th>AST U/l</th>
<th>GGT U/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Mean</td>
<td>162.2</td>
<td>25.1</td>
<td>111.4</td>
<td>73.7</td>
<td>24.5</td>
<td>27.3</td>
<td>23.0</td>
</tr>
<tr>
<td>Pre SD</td>
<td>27.1</td>
<td>4.0</td>
<td>11.3</td>
<td>7.3</td>
<td>13.5</td>
<td>13.4</td>
<td>13.2</td>
</tr>
<tr>
<td>Post Mean</td>
<td>155.4</td>
<td>23.8</td>
<td>108.6</td>
<td>68.0</td>
<td>26.8</td>
<td>26.6</td>
<td>20.0</td>
</tr>
<tr>
<td>Post SD</td>
<td>26.0</td>
<td>3.7</td>
<td>9.4</td>
<td>7.9</td>
<td>16.0</td>
<td>13.2</td>
<td>9.2</td>
</tr>
</tbody>
</table>

$P$ value $0.0001^a$ $0.0001^a$ .16 $0.012^a$ .24 .41 $.012^a$

Wintering, N, et al. A pilot study to evaluate the physiological effects of a spa retreat that uses caloric restriction and colonic hydrotherapy. IMCJ 2011, 11:26-32
Silybum Marianum for Diabetes?

- Increases antioxidant activity
- Increases reduced glutathione
- Decreases inflammation
- Decreases fasting blood sugar and HbA1c!
- Decreases LDL, triglyceride, SGOT and SGPT – all indicative of improved blood sugar control and decreased toxicity
- Curative use of a botanical medicine as addresses cause


Summary Intervention

• Find and eliminate source of toxins
• Eat organically grown foods, esp. dirty dozen
• Use low POP HABAs (Health and Beauty Aids)
• Facilitate detoxification:
  ▪ High fibre diet
  ▪ Multivitamin and mineral
  ▪ Long saunas
• Protect from damage by promoting glutathione
  ▪ NAC: 500 mg/d
• DMSA if high mercury or lead
Interventions We Used In Canada

- Removal of amalgams—must use ecological dentist!!
- IV DMPS
  - Stopped because of excessive adverse events “Brain fog”
- DMSA
  - 250 mg x 3 days, 11 days off
- NAC
  - 600 mg bid
- Fibre
  - PGX: 2.25 g tid
- Supportive nutrients
  - Multivitamin designed to promote glutathione production
  - Ca/Mg/Zn until custom multivitamin available
Results of Oral Chelation Intervention

- DMPS challenge test, ~ 1 year apart

### Urinary Challenge Hg After 1 Year

<table>
<thead>
<tr>
<th></th>
<th>Start</th>
<th>Repeat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Hg</td>
<td>10.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Amalgams</td>
<td>4.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

40% reduction!
It All Started After Amalgams (MB)

48 yo male, employee, Calgary

Relevant medical history

- Symptoms began 2 mo after amalgams and gold crowns
  - Chest pain followed by weakness, dizziness and shortness of breath.
  - Multiple trips to emergency room with no answers.
  - Neck pain, gastrointestinal problems and insomnia. Extreme fatigue, chronic sinusitis.
- 8 amalgams, 2 gold crowns
- Challenge urinary Hg : 5.8 ug/g creat

Intervention

- All amalgams removed
- B-complex
- Vitamin C
- Infrared sauna
- IV DMPS

Results

- “Feel better now both physically and mentally than I have in 15 years.”
- Virtually all symptoms alleviated
- All prescription drugs discontinued
- Improvement within 2 weeks of removal of amalgams but full relief took ~ 2 years

Bertsch M. A patient’s report of mercury poisoning. IMCJ 2010;9:14-15
MB Symptoms That Went Away

- Chest pains
- Completely exhausted all the time
- Amalgam tattooing on the gums
- Muscle twitching and muscle tremors
- Burning in the mouth and tongue
- Numbness in the feet and hands—feeling of something crawling under the skin
- Insomnia
- Night Sweats
- Tingling on the face
- Tingling and prickly feeling on the scalp and legs
- Severe lower back pain
- Sore muscles and joint pain
- Double vision
- Blurred vision

- Jabbing pain in the eyes
- Dizziness
- Depression
- Anxiety – panic attacks
- Memory loss
- Brain fog – impaired cognitive thinking
- Sour and metallic taste
- Increased saliva production
- Intestinal problems
- Elevated liver enzymes
- Itchy hands
- High pitch whining in the ears
- Persistent cough and sore throat
- Cold hands and feet
- No appetite to eat
Am I Losing my Mind? April 2012

- 67 yo white woman
- I had the odd feeling that I was living in a fog, that things were very fuzzy and that my memory was very sporadic. I was having trouble sleeping and had a lot of muscle aches during the night. I always had a metal taste in my mouth and felt that my breath lacked freshness other than the first few minutes after brushing my teeth. My skin and scalp were always sore and especially dry.

2 years IV chelation discontinued due to side effects & no benefit

Hg = 50!
I do know that things really improved once I started your protocol and I was happy to see the light at the end of the Mercury tunnel.

### Toxic Metals; Urine

<table>
<thead>
<tr>
<th>TOXIC METALS</th>
<th>RESULT µg/g creat</th>
<th>REFERENCE INTERVAL</th>
<th>WITHIN REFERENCE</th>
<th>OUTSIDE REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (Al)</td>
<td>1.9</td>
<td>&lt; 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimony (Sb)</td>
<td>0.3</td>
<td>&lt; 0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>27</td>
<td>&lt; 1.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium (Ba)</td>
<td>10</td>
<td>&lt; 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beryllium (Be)</td>
<td>&lt; dl</td>
<td>&lt; 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bismuth (Bi)</td>
<td>&lt; dl</td>
<td>&lt; 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>0.6</td>
<td>&lt; 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cesium (Cs)</td>
<td>8.9</td>
<td>&lt; 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gadolinium (Gd)</td>
<td>&lt; dl</td>
<td>&lt; 0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>4.3</td>
<td>&lt; 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>12</td>
<td>&lt; 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>7.2</td>
<td>&lt; 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palladium (Pd)</td>
<td>&lt; dl</td>
<td>&lt; 0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platinum (Pt)</td>
<td>&lt; dl</td>
<td>&lt; 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tellurium (Te)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thallium (Tl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thorium (Th)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tin (Sn)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tungsten (W)</td>
<td>&lt; dl</td>
<td>&lt; 0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uranium (U)</td>
<td>&lt; dl</td>
<td>&lt; 0.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### URINE CREATININE

<table>
<thead>
<tr>
<th>RESULT mg/dL</th>
<th>REFERENCE INTERVAL</th>
<th>-2SD</th>
<th>-1SD</th>
<th>MEAN</th>
<th>+1SD</th>
<th>+2SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine</td>
<td>23.6</td>
<td>35-225</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SPECIMEN DATA

- **Date Collected:** 10/23/2012
- **Date Received:** 10/30/2012
- **Date Completed:** 10/31/2012
- **pH upon receipt:** Acceptable
- **<dl> less than detection limit**
- **Provoking Agent:** DMPS
- **Method:** ICP-MS
- **Creatinine by Jaffe Method**
- **Collection Period:** timed: 6 hours
- **Volume:** 2100 mL
- **Provocation:** POST PROVOCATIVE

**Results are creatinine corrected to account for urine dilution variations. Reference intervals and corresponding graphs are representative of a healthy population under non-provoked conditions. Chelation (provocation) agents can increase urinary excretion of metals/elements.**
June 2013

- With each successive test the symptoms were lessening and I was feeling more normal.

Hg = 7.3
December 2013

- It was a day of celebration when I received the last test results.
- I would caution people to remember that clearing mercury out of one’s system is a long process but it is worth the effort even if it takes many years. Being healthy is a good reward for all the patience required to do the heavy mercury lifting.
- Good luck with your seminars. I will always be in your debt for your help.
The Wealthy Business Man

• 60 yo relatively healthy, but noticing progressive loss of energy and brain function
• Involved in aggressive healthy aging program
• Seeing integrative medicine MD, who sought my advice due to high mercury levels
• Also seeing an acupuncturist
Blood Tests Show Current Exposure

- 6/2013
- Blood test results
  - Bilirubin: high at 1.6 (0.2-1.2 mg/dl)
  - ALT: high at 51 (9-46 U/L)
  - Hg: high at 19 (≤10 mcg/L)
  - FBS: High at 117 (65-99 mg/dL)

⇒ Current exposure to chemicals and Hg (possibly other metals, but not tested)
Elevated Body Load Hg and Pb

- 8/2013
- Challenge test:
  - Oral DMSA: 500 mg
  - Oral DMPS: 300 mg
- High Hg and Pb
- No fillings
- Only eats low Hg fish
- Put on my standard metal elimination protocol
Blood Tests Still Not Normal

- 7/2014
- Blood test results
  - Bilirubin still elevated at 1.7 (0.2-1.2 mg/dl)
  - ALT “normal, but marginal 30 (9-46 U/L)
  - Mercury still high at 18 (≤10 mcg/L)
  - FBS still high at 111 (66-99 mg/dL)

⇒ Continuing current exposure to chemicals and Hg (possibly other metals)

- Told to stop taking Chinese herbal formulas and stop eating any fish
Blood Tests Still Not Good, But Hg Down

• 12/2014
• Blood test results
  ▪ Bilirubin still elevated at 1.5 (0.2-1.2 mg/dl)
  ▪ ALT “normal, but high 33 (9-46 U/L)
  ▪ Mercury normal at 6 (≤10 mcg/L)
  ▪ FBS still high at 109 (66-99 mg/dL)

⇒ Problem was fish and possibly Chinese herbal medicines

⇒ Still unidentified chemical exposure
Summary

1. Body load of exogenous toxins substantial
2. Most of the population has body loads at levels associated with increased incidence of a wide range of diseases
3. Avoidance works, but exposure not avoidable
4. Many effective natural medicine treatments:
   - Fiber
   - Specific nutrients
   - Specific botanicals
   - Systemic detoxification
   - Drugs when needed