



Enhancing Neurological & Psychiatric Function through Improving the Innate Detoxification Systems

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Prepare First, Then Detoxify

- Worldwide Epidemic of Chronic Disease, Exp Neurological Degeneration
- Primary Cause Has Become Environmental Toxins
- Total Toxic Load Almost Always More Important Than Specific Toxins—Must Think Broadly
- Don't Do a Detox Program (Until Body Prepared)
- Preparing the Organs of Elimination
- Deep Detoxification
- Summary



Toxins – Think Broadly

Environmental

- Metals
- Chemicals
 - Inorganic
 - Solvents
 - Plasticizers
 - POPs
 - Drugs
- Microbial/mold
- Ozone, SO_x, NO_x
- Particulate matter
- PAHs
- Radiation

Endogenous

- Non-end product metabolites
- Poor detoxification of hormones
- Gut-derived endotoxins
- Free-radicals produced by detox

Toxins of Choice

- Alcohol
- Marijuana
- Acid-forming diet
- Salt
- Wheat if zonulin (70%)



8 Weeks to Prepare—Then Detox

Weeks	Purpose
1,2	Learn to avoid toxins
3,4	Clean up gut
5,6	Restore liver
7,8	Revive kidneys
9--??	Deep detoxification
Life-long	Living toxin-free



Stop the Toxins!

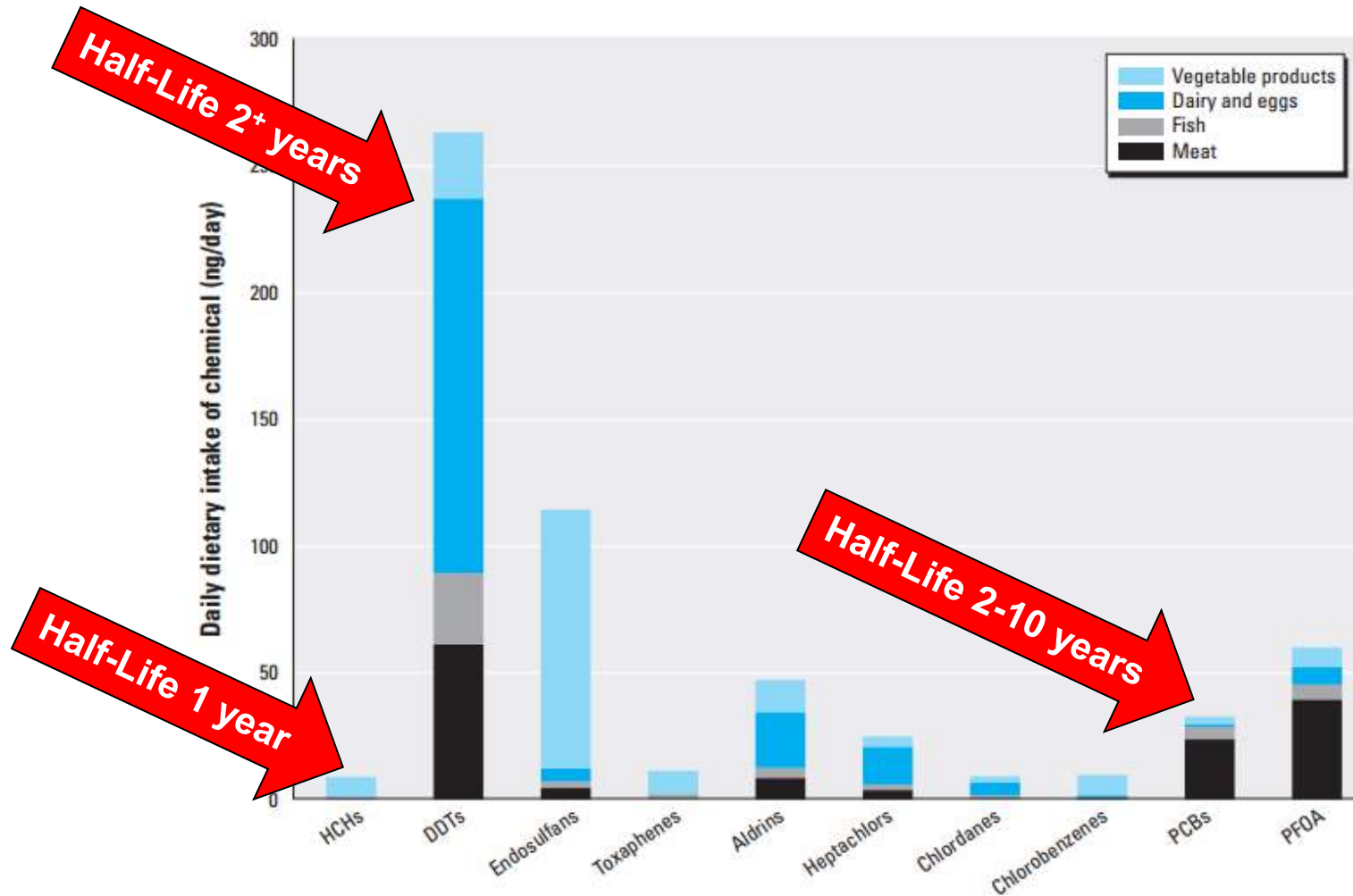


Weeks 1,2: Stop the Toxins

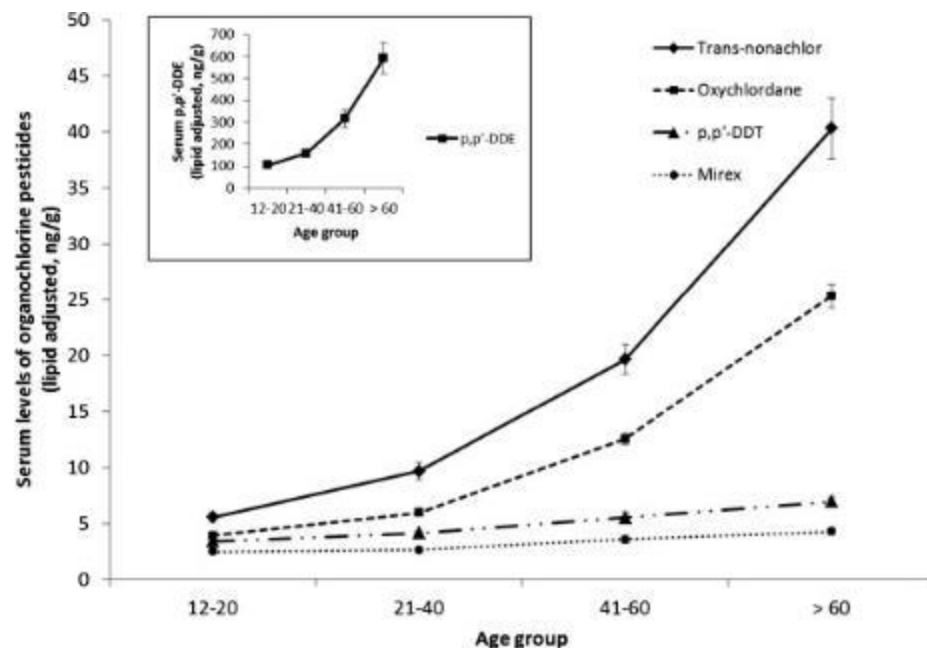
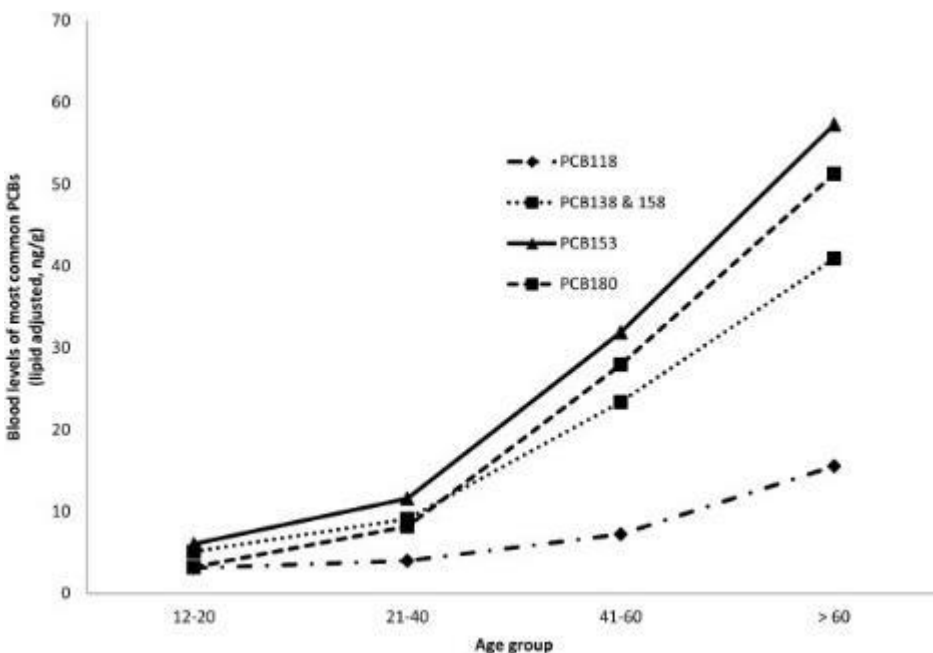
- No point in doing detoxification work if toxins still coming in.
- About half of toxicity is due to non-persistent toxins:
 - Complete avoidance will clear all within two weeks.
 - Patients will clearly feel better within about a week.
 - MUST MONITOR CLOSELY — MANY HIDDEN SOURCES.
 - Direct measurement best.
 - Serum GGT and urinary 8-OHdG good measures of total toxicity.



Significant Daily Toxic Exposure



Bioaccumulation (Persistent Organic Pollutants)



DDT banned in 1972

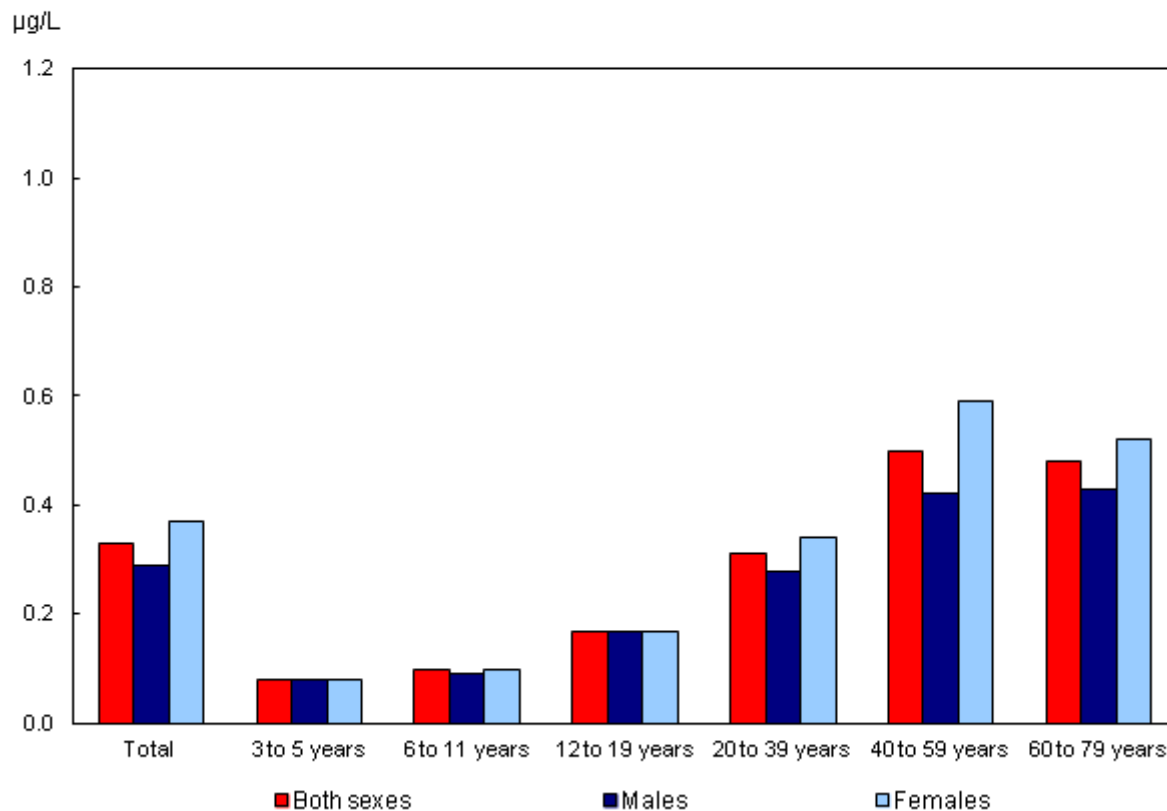
PCBs banned in 1977

Serdar B, et al. Potential effects of polychlorinated biphenyls (PCBs) and selected organochlorine pesticides (OCPs) on immune cells and blood biochemistry measures: a cross-sectional assessment of the NHANES 2003-2004 data. *Environ Health*. 2014;13:114.

Bioaccumulation (Cadmium)

Chart 3

Cadmium concentrations in blood ($\mu\text{g/L}$) in Canadians aged 3 to 79, by sex and age group, household population, Canada, 2012 and 2013





Notes

1. Optimal strategies are recommended, regardless of cost
2. Costs of various strategies highly variable
3. Prioritize according to seriousness of toxin source and implementation cost

Strategies - All

1. Do not allow any new products into home unless clear of metals and chemicals
2. Progressively replace everything in home with safer alternatives
3. Extreme vigilance on all sources of persistent toxins

TOP EIGHT TOXINS IN YOUR HOME



We are all exposed to cleaners whether we like to clean or not. While we have good intentions, many of our cleaners are dangerous and even deadly.

by Kern Wellness

1 BPA

BPA is found in many household plastic items. This chemical imitates estrogen in our bodies. BPA has been linked to cancers such as breast, reproductive issues, weight gain, early puberty and heart disease.
*93% of Americans have BPA in their bodies!



2 AIR FRESHENERS

You may think it's a smart move covering up those pesky odors with an air freshener. The danger here is many of these air fresheners contain irritants which can impair lung function and bother the eyes, throat and skin.
*Some air fresheners have been linked to cancers.



3 BORAX

Found in laundry and dishwashing detergents, borax and boric acid have been linked to reproductive issues. After chronic exposure to these ingredients at high doses, studies have shown decreased sperm count. Animals studies have shown this substance can cross the placenta and impact skeletal development and birth weight.

4 CHLORINE

Also seen as sodium hypochlorite, this chemical is very toxic to aquatic life and can cause severe burns, respiratory issues and eye damage. You can find this in many household cleaners.
*If exposed to chlorine gas, a person can develop asthma after a single intense exposure.



5 1,4-DIOXANE

Found in many household liquid laundry detergents. A study commissioned by the Campaign for Safe Cosmetics found dioxane in children's bath products. This chemical has been linked to cancer and skin allergies.

6 PINE OR CITRUS OIL

It may sound safe and smell pretty sweet but when these scented oils mix with the ozone in the air, they can create formaldehyde, a known carcinogen.



7 GLYCOL ETHERS

You can find these listed as 2-butoxyethanol (EGBE) and methoxydiglycol (DGME) on your cleaning products, paint solvents, brake fluid and cosmetics. These ethers can cause blood abnormalities, lower sperm counts and aggravate allergies and asthma in children.
*Caused shrunken testicles in rats.

8 PERFLUORINATED CHEMICALS (PFCs)

Commonly used to make non-stick cookware, this chemical has been linked to decreased sperm quality, low birth weight, kidney disorders, thyroid disease and high cholesterol.
*Avoid non-stick pans to avoid PFC's sticking to your body.

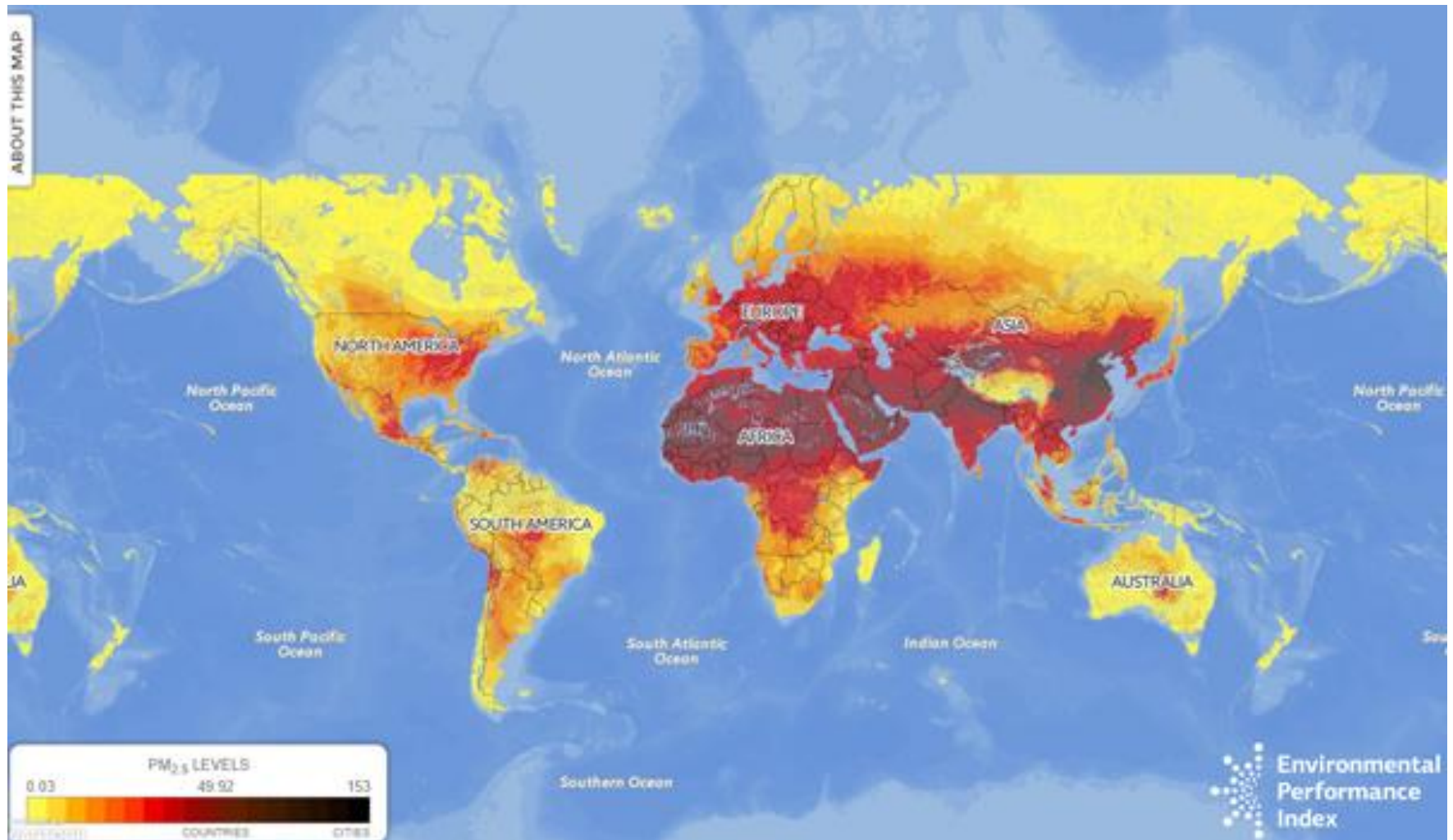




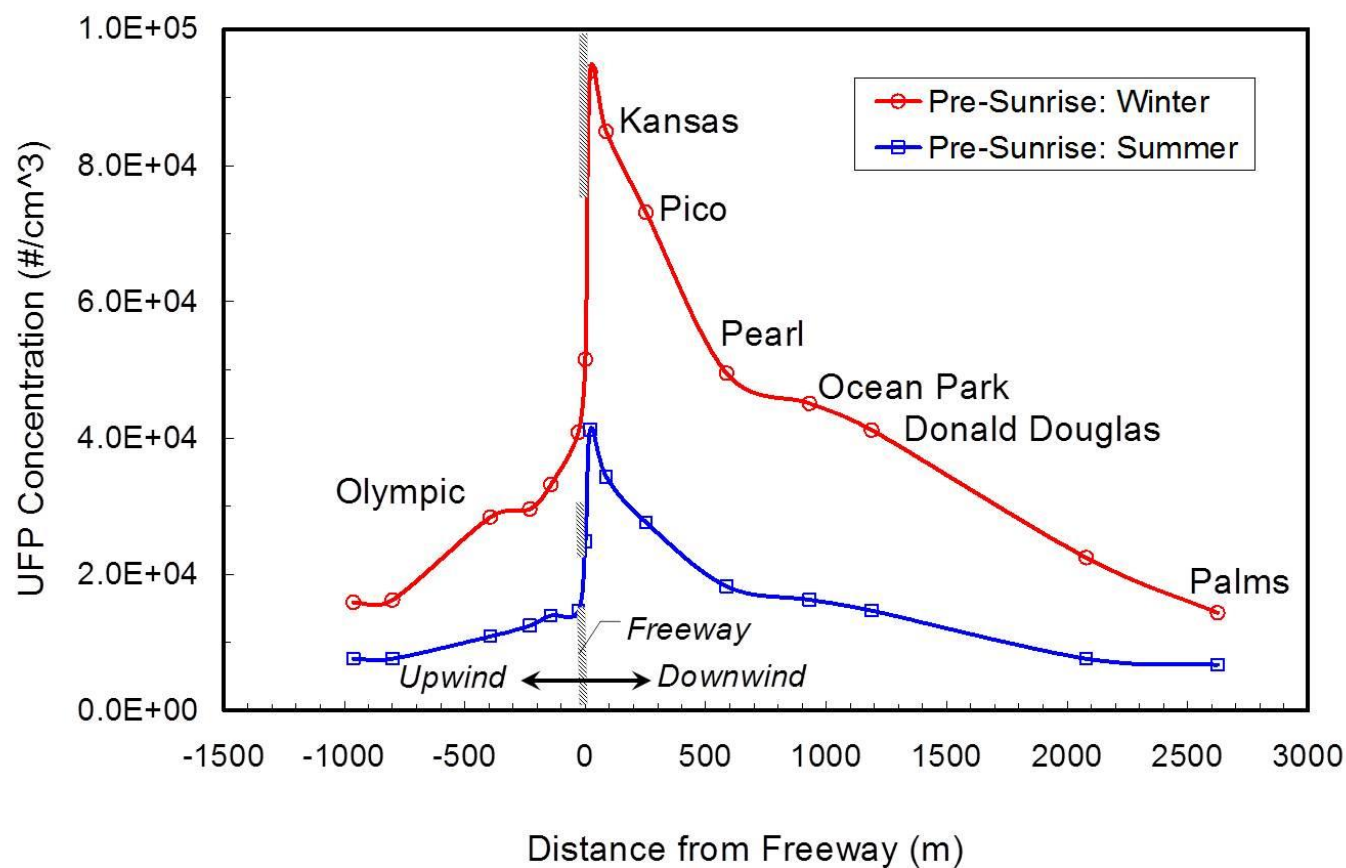
AIR POLLUTION



Air Pollution Common, Esp. in Cities



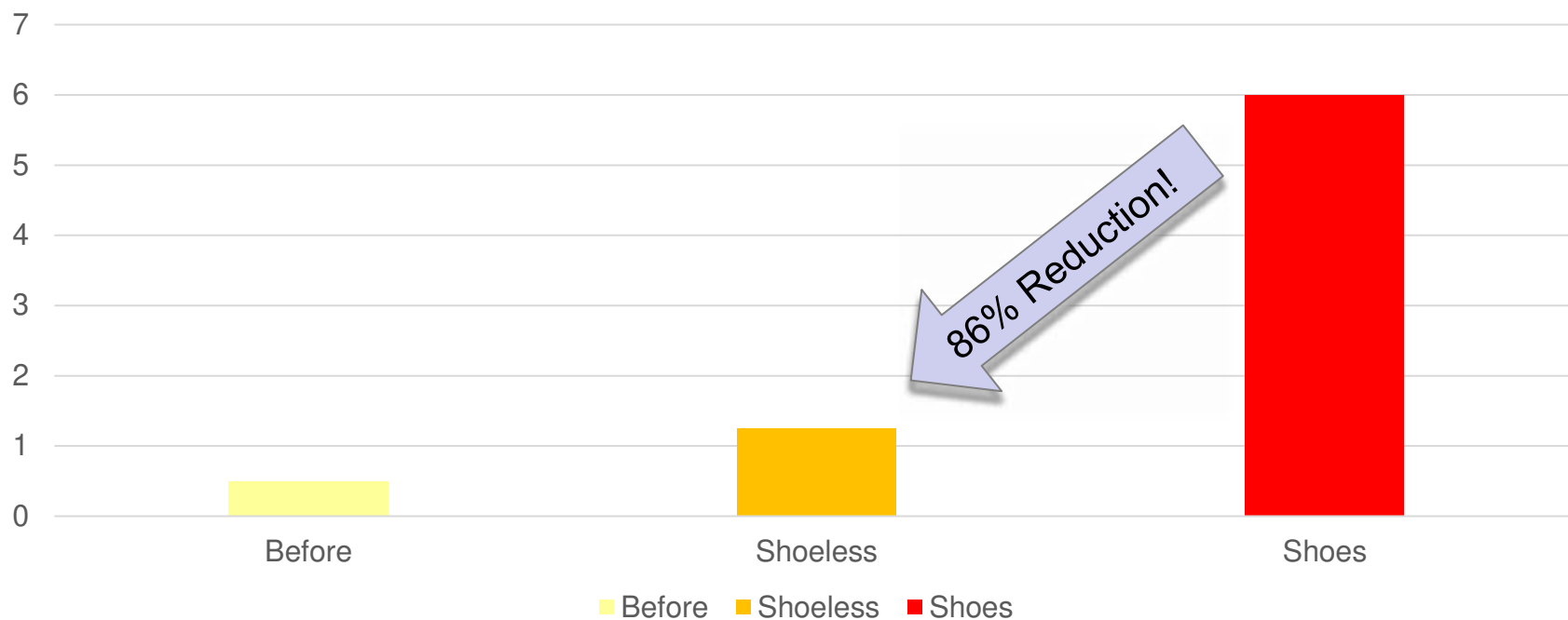
Living in Cities or Near Highways Increases Toxic Exposure





Take off Shoes Before Entering House

2,4D After Spraying Lawn with Herbicide



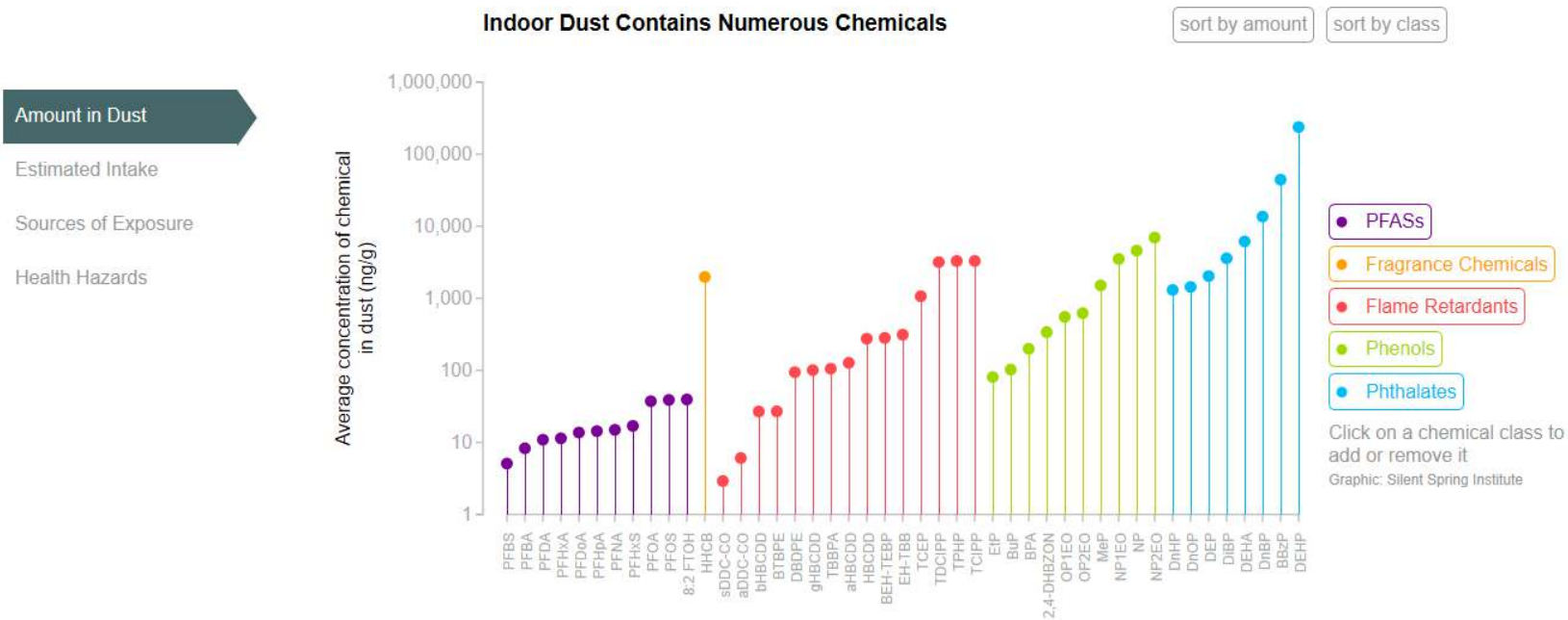
Nishioka MG, Burkholder HM, Brinkman MC, Lewis RG. Distribution of 2,4-Dichlorophenoxyacetic Acid in Floor Dust throughout Homes Following Homeowner and Commercial Lawn Applications: Quantitative Effects of Children, Pets, and Shoes. Environmental Science & Technology 1999 33 (9), 1359-1365



This Photo by Unknown
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Keep House Clean as Possible

- Especially if crawling children



Average (geometric mean) dust levels in nanograms of chemical per gram of dust for the 45 chemicals reported in at least three data sets. The average concentration of DEHP is about 45,000 times higher than PFBS.



Strategies - Air

- Whole house filter: Merv-8 (at least), run 24/7
 - If not: HEPA filters in main rooms
- Take off shoes before entering house
- Declare scent-free zone
- Filter outdoor air for fresh circulation
- Toxin-absorbing plants decrease chemicals in air





Plants Absorb Toxic Air Chemicals

TABLE 60.4 Percentage of Chemicals Removed From a Sealed Chamber by Houseplants in a 24-Hour Period in a NASA Study

Plant	Formaldehyde	Benzene	Trichloroethylene
Mass cane	70	21.4	12.5
Pot mum	61	53	41.2
Gerber daisy	50	67.7	35
Wernicke	50	52	10
Ficus	47.4	30	10.5
Leak control	2.8	5	10

From Wolverton, B. C., & Johnson, A. (1989). Interior landscape plants for indoor air abatement. *National Aeronautics and Space Administration*. Retrieved from <https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19930073077.pdf>



Just 2 Days in Clean Room Improves Health

- Merv-12 filter
- 33-58% reduction in inflammatory mediators
- Decrease in blood pressure

TABLE 33.3 Reduction in Blood Pressure and Inflammatory Markers After 48 Hours of Residence in a Room with a MERV 12 Filter Unit

Cardiovascular	Biomarkers
Systolic pressure – avg. 2.7 mm Hg drop	IL-1B – 58% reduction
Diastolic pressure – avg. 4.8% mm Hg drop	Soluble CD40 ligand – 55% reduction
Exhaled nitrous oxide – 17% drop	Myeloperoxidase – 33% reduction
	Monocyte chemoattractant protein 1–17.5% reduction

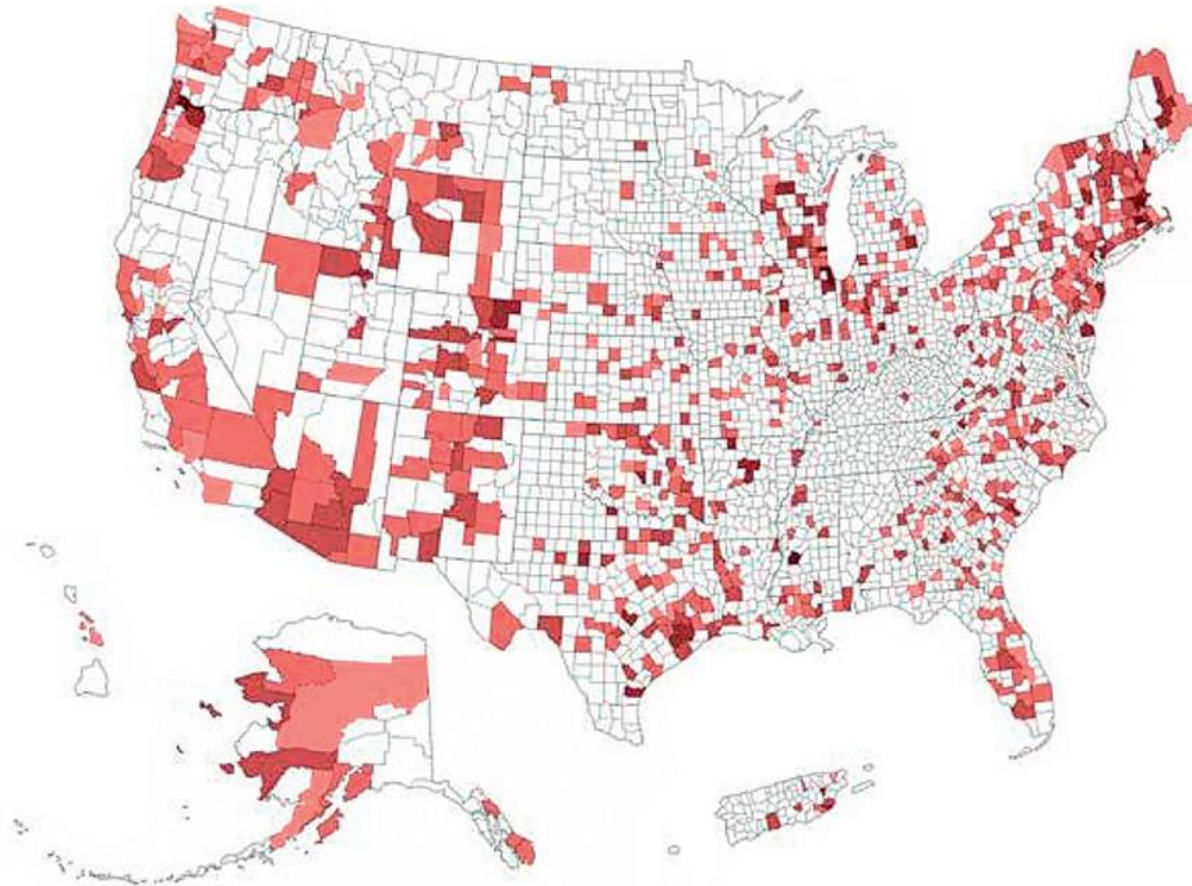
Data from Chen, R., Zhao, A., Chen, H., Zhao, Z., Cai, J., Wang, C., et al. (2015). Cardiopulmonary benefits of reducing indoor particles of outdoor origin: a randomized, double-blind crossover trial of air purifiers. *Journal of the American College of Cardiology*, 65(21), 2279–2287.



WATER POLLUTION

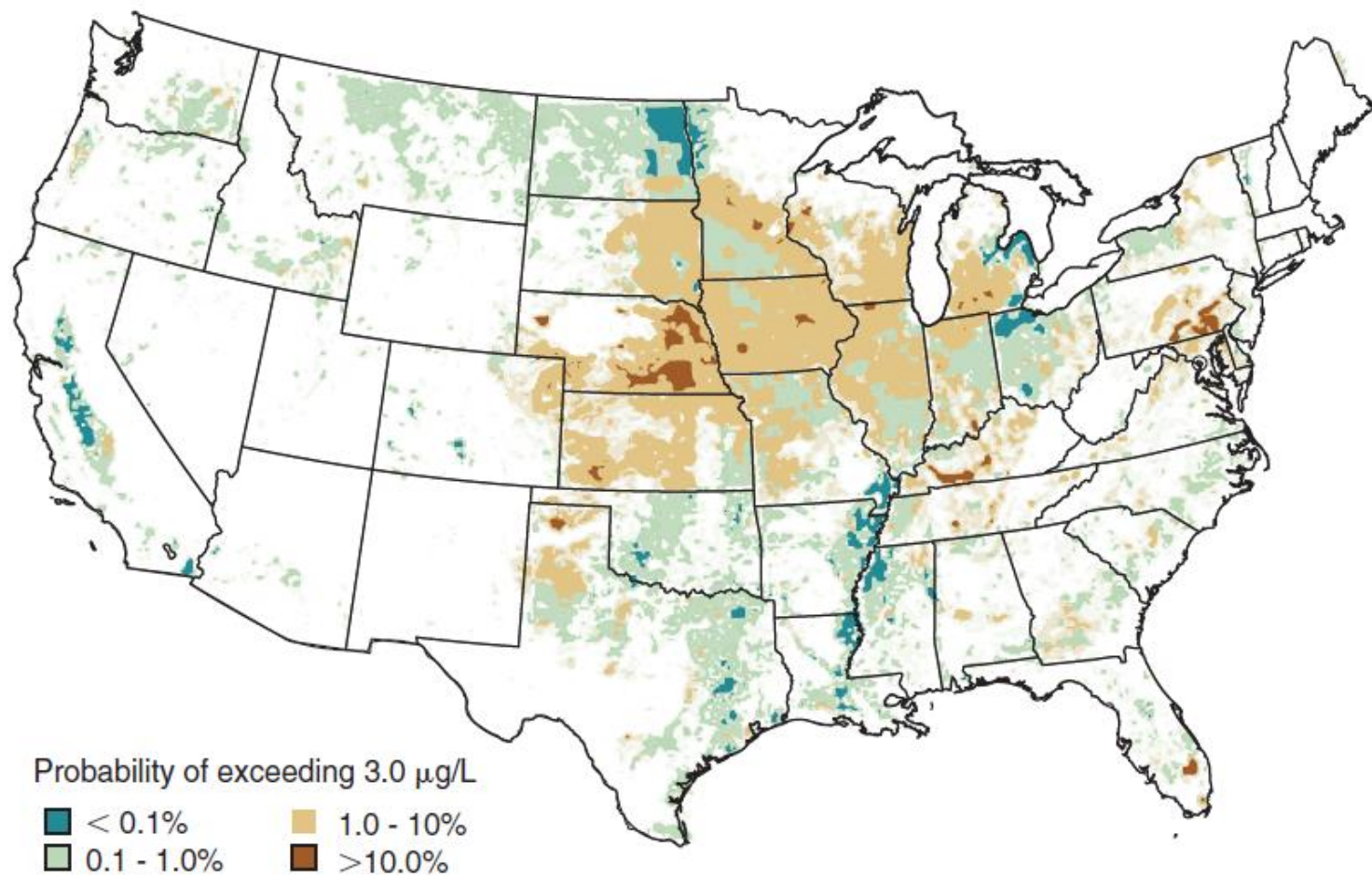


Public Water Supplies Exceeding Allowed Lead





Public Water Supplies Exceeding Allowed Atrazine



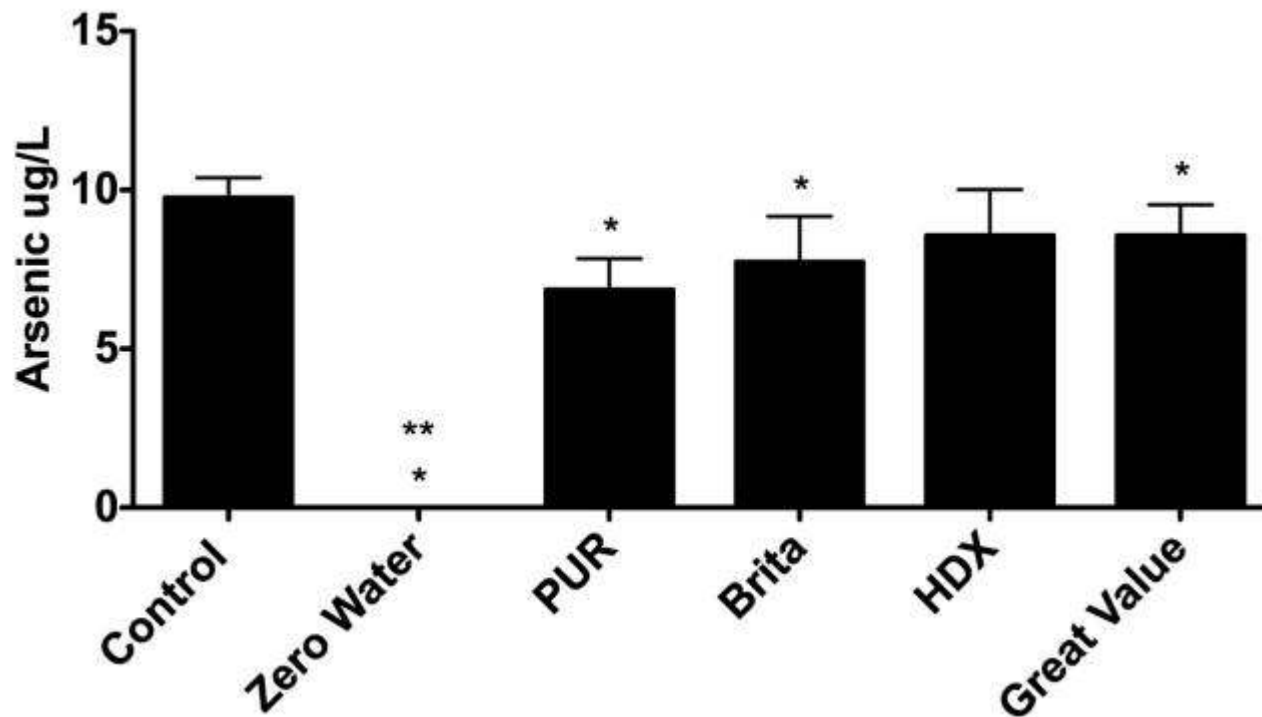


Strategies - Water

- Faucet filters of limited value
- Whole house carbon block filter with metal precipitator
- If arsenic or high fluoride, must use more expensive reverse osmosis, distillation or ion exchange



Tabletop Filtration



Barnaby R, Liefeld A, Jackson BP, Hampton TH, Stanton BA. Effectiveness of table top water pitcher filters to remove arsenic from drinking water. Environ Res. 2017 Oct;158:610-615. PMID: 28719869



FOOD POLLUTION



Mercury in Fish Varies 1,000-Fold

- The bigger the fish, the more the mercury
- Choose small, cold-water, wild caught fish

TABLE 3.9 Mercury Levels in Commercial Fish and Shellfish 1990 to 2010

Highest in Mercury	PPM	Lowest in Mercury	PPM
1. Tilefish (Gulf of Mexico)	1.45	1. Scallop	0.003
2. Swordfish	0.995	2. Clam	0.009
3. Shark	0.979	3. Shrimp	0.009
4. King mackerel	0.730	4. Oyster	0.012
5. Tuna (bigeye/ahi)	0.689	5. Sardine	0.013
6. Orange roughy	0.571	6. Tilapia	0.013
7. Marlin	0.485	7. Salmon, canned	0.014
8. Spanish Mackerel (gulf)	0.454	8. Anchovies	0.016
9. Grouper (all species)	0.448	9. Salmon, fresh, frozen	0.022
10. Tuna (other species)	0.415–0.391	10. Catfish	0.024
11. Tuna (albacore)	0.358	11. Squid	0.024
12. Chilean sea bass	0.354	12. Pollock	0.031
13. Tuna, yellowfin (ahi)	0.354	13. Crawfish	0.033
14. Croaker, white (Pacific)	0.287	14. Shad	0.038
15. Scorpion fish	0.286	15. American mackerel	0.050
16. Halibut	0.241	16. Haddock	0.055
17. Spanish mackerel (Atlantic)	0.166	17. Flounder/sole	0.056
18. Snapper	0.182	18. Crab	0.065
19. Lobster	0.166	19. Trout	0.071
20. Canned tuna	0.128	20. Cod	0.111



Amount of Fish Eaten Predicts Hg

TABLE 14.1 Blood Methylmercury ($\mu\text{g/L}$) in Women Ages 16 to 49, Years by Fish Intake, from NHANES 1999 to 2000

Fish Intake	Geo Mean	25th %	50th %	75th %	90th %	95th %
Never	0.43	ND	ND	0.60	1.4	2.1
<1 times/week	0.93	ND	0.82	1.80	4.4	6.4
≥ 1 times/week	2.04	0.83	2.56	5.54	8.8	11.6
≥ 2 times/week	2.70	1.12	3.02	6.68	12.0	13.4

From Mahaffey, K. J., Turner, R. P., & Bodurow, C. C. (2004). Blood organic mercury and fish consumption: National Health and Nutrition Examination Survey, 1999 and 2000. *Environmental Health Perspectives*, 112, 562–570.

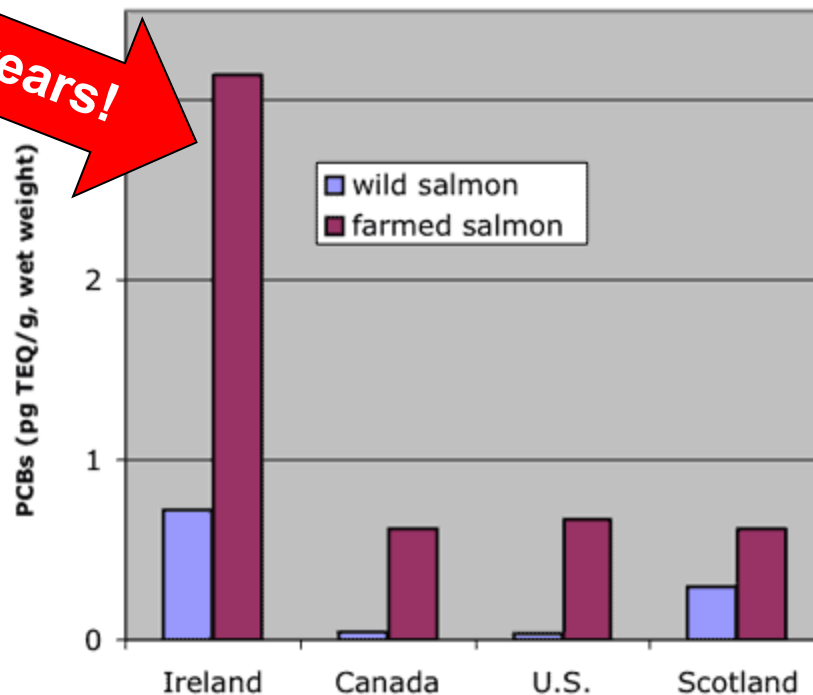
6 Times Higher

>10% Above "Safe Level"

Farmed Fish Full of Persistent Organic Pollutants

PCB ½ Lifes 2-10 years!

A growing number of studies show that farmed salmon contains more PCBs than wild salmon

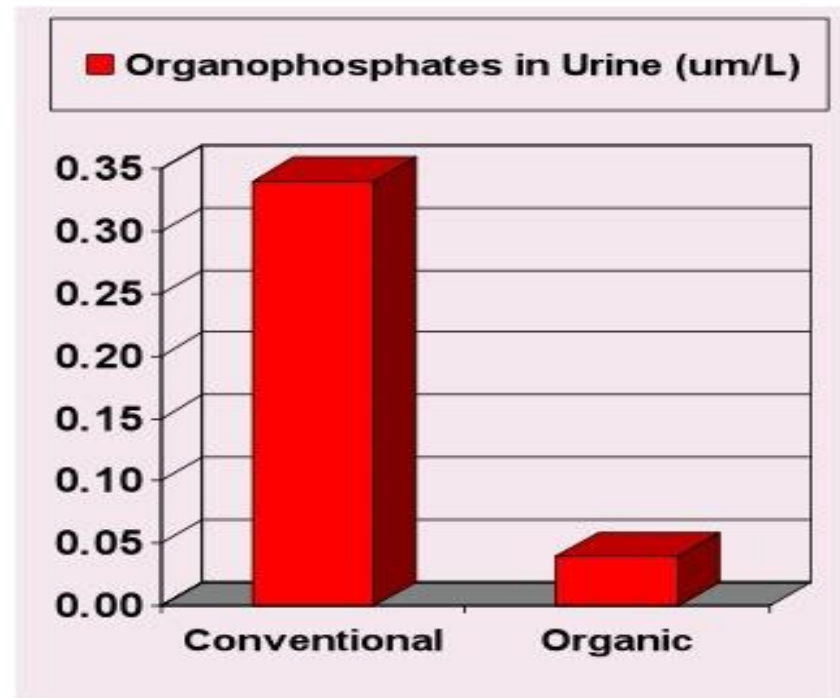


Source: EWG analysis of data from Axys (2003), CFIA (1999), Easton (2002), and Jacobs (2002a,b). The data shown for Scotland reflect six of twelve dioxin-like PCB congeners – numbers 105, 114, 118, 123, 156, and 167. Test results for the remaining six were not presented.



Eating Organically-Grown Foods Decreases Pesticide Load

- Study in Seattle of children eating 75% organically-grown versus 75% chemically-grown foods
- 10-fold increase in pesticides doubles ADHD



Curl CL, et al. Organophosphorus pesticide exposure of urban and suburban preschool children with organic and conventional diets. *Env Health Perspect.* 2003;111:377-82

Bouchard MF, et al. Attention-deficit/hyperactivity disorder and urinary metabolites of organophosphate pesticides. *Pediatrics.* 2010 Jun;125(6):e1270-7



Eating Organically Decreases Glyphosate

- Healthy people have lower glyphosate levels
- Glyphosate levels a measure of RoundUp exposure

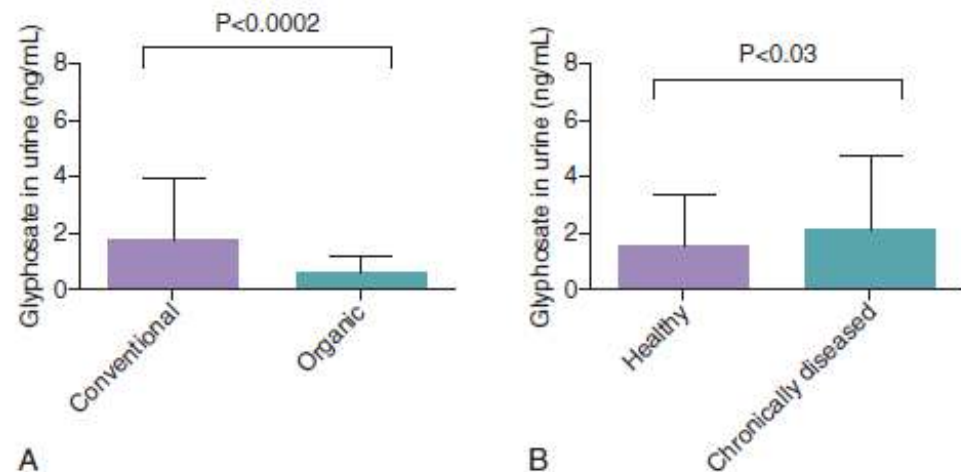


FIG. 23.1 Eating organic food decreases glyphosate levels, and chronically ill people have higher glyphosate levels. (A) Comparison of glyphosate excretion in urine of humans with conventional (N = 99) and predominantly organic (N = 41) foods. (B) Glyphosate in healthy (N = 102) and chronically diseased (N = 199) humans. (From Goen, T., Schmidt, L., Lichtensteiger, W., & Schlumpf, M. [2017]. Efficiency control of dietary pesticide intake reduction by human biomonitoring. *International Journal of Hygiene and Environmental Health*, 220(2 Pt A), 254–260.)



Washing Chemically-Grown Foods Does Decrease Pesticides

- Acid washes, in general, most effective

TABLE 3.12 Reduction of Chlorinated Pesticide Residue with Water, Acid, and Alkaline Washes, %

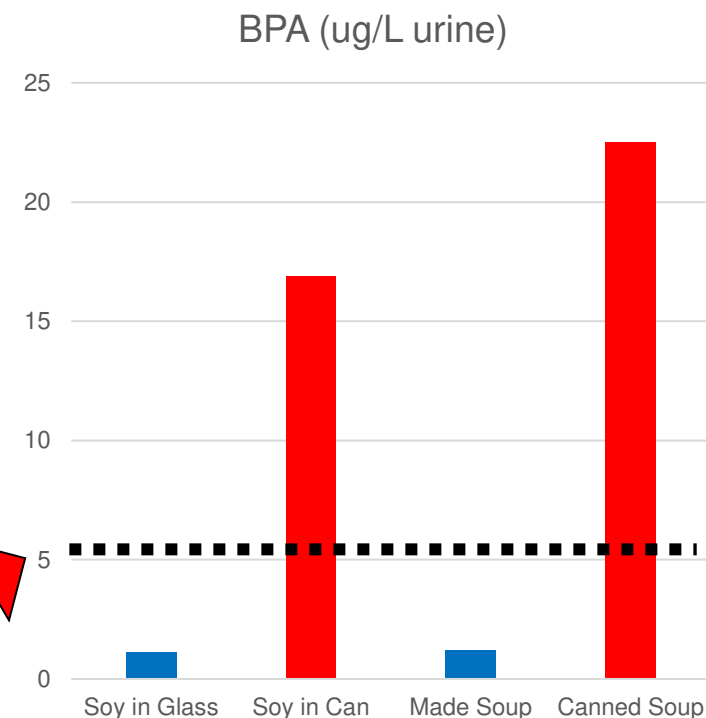
Solution	Lindane	Aldrin	Heptachlor Epoxide	o,p-DDE	p,p-DDE	o,p-DDD
Radish-5 conc.	100	100	100	67.6	100	100
Radish-10 conc.	100	100	100	73.1	100	100
Acetic acid-5 conc.	66.7	72	95.2	75.2	96.1	96
Acetic acid-10	78.3	84	96.6	86.7	97.4	97.4
Citric acid-5	100	76	100	73.1	98	100
Citric acid-10	100	85.2	100	77.5	18.4	100
Ascorbic acid-5	100	84	100	57.5	91.9	100
Ascorbic acid-10	100	90.8	100	67.6	94.9	100
H ₂ O ₂ -5	81.2	64	94.5	80.4	100	100
H ₂ O ₂ -10	89.1	78	95.9	87	100	100
Tap water	12	10	9.8	2	3.5	3.9
Na ₂ CO ₃ -5	89.1	84	93.2	NA	NA	NA
Na ₂ CO ₃ -10	92	88	95.2	NA	NA	NA

Modified from Zohair, A. (2001). Behavior of some organophosphorus and organochlorine pesticides in potatoes during soaking in different solutions. *Food and Chemical Toxicology*, 39(7), 751-755.



Proper Containers/Storage Critical

- One 12oz serving daily for 1 week of either fresh soup or canned soup (Progresso)
 - 12-fold increase in BPA
- 2 servings of 6 ounces Soy milk in can compared to glass
 - 16-fold increase in BPA
 - Systolic BP elevated 4.5 mm Hg
- **Diabetes risk threshold?**



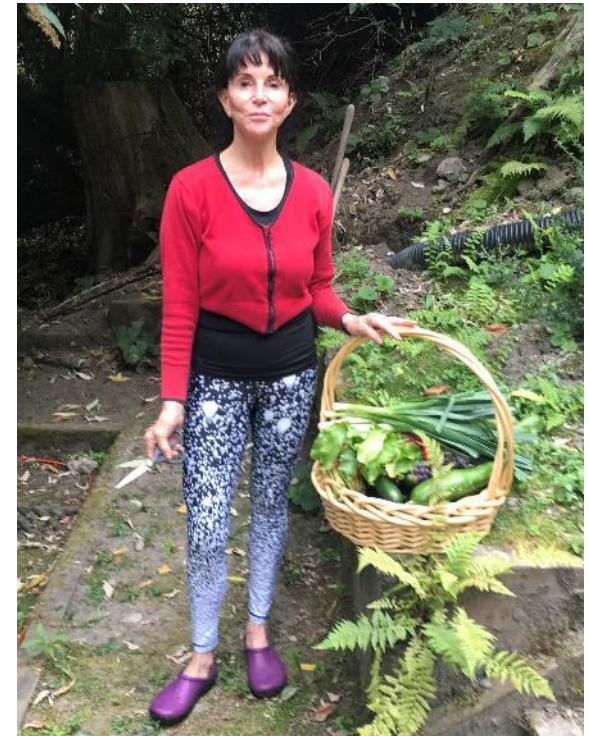
Carwile JL1, Ye X, Zhou X, et al. Canned soup consumption and urinary bisphenol A: a randomized crossover trial. JAMA. 2011 Nov 23;306(20):2218-20.

Bae S1, Hong YC2. Exposure to bisphenol A from drinking canned beverages increases blood pressure: randomized crossover trial. Hypertension. 2015 Feb;65(2):313-9.



Strategies - Food

- Grow your own food as much as possible
 - Compost everything healthy
- Eat as organic as possible
- If only chemically-grown food
 - Wash with mild acid (e.g., vinegar)
- **NEVER eat farmed or large fish**





Dirty Dozen/ Clean15™

Environmental Working Group
(www.ewg.org)

From: <https://www.nestedblissfully.com/clean-15-dirty-dozen-2018/>

2018	
<i>Dirty Dozen</i> (always buy Organic)	<i>Clean 15</i> (OK to buy Regular)
 1. Strawberries	 1. Avocados
 2. Spinach	 2. Sweet Corn
 3. Nectarines	 3. Pineapples
 4. Apples	 4. Cabbage
 5. Peaches	 5. Onions
 6. Pears	 6. Sweet Peas
 7. Cherries	 7. Papayas
 8. Grapes	 8. Asparagus
 9. Celery	 9. Mangos
 10. Tomatoes	 10. Eggplant
 11. Sweet Bell Peppers	 11. Honeydew
 12. Potatoes	 12. Kiwi
	 13. Cantaloupe
	 14. Cauliflower
	 15. Broccoli

Nested Blissfully



Strategies - Food

- Buy nothing in cans
 - Glass best
 - TetraPak okay
- No plastic containers
- No perfluoride-based nonstick pans, storage





HEALTH AND BEAUTY AIDS POLLUTION

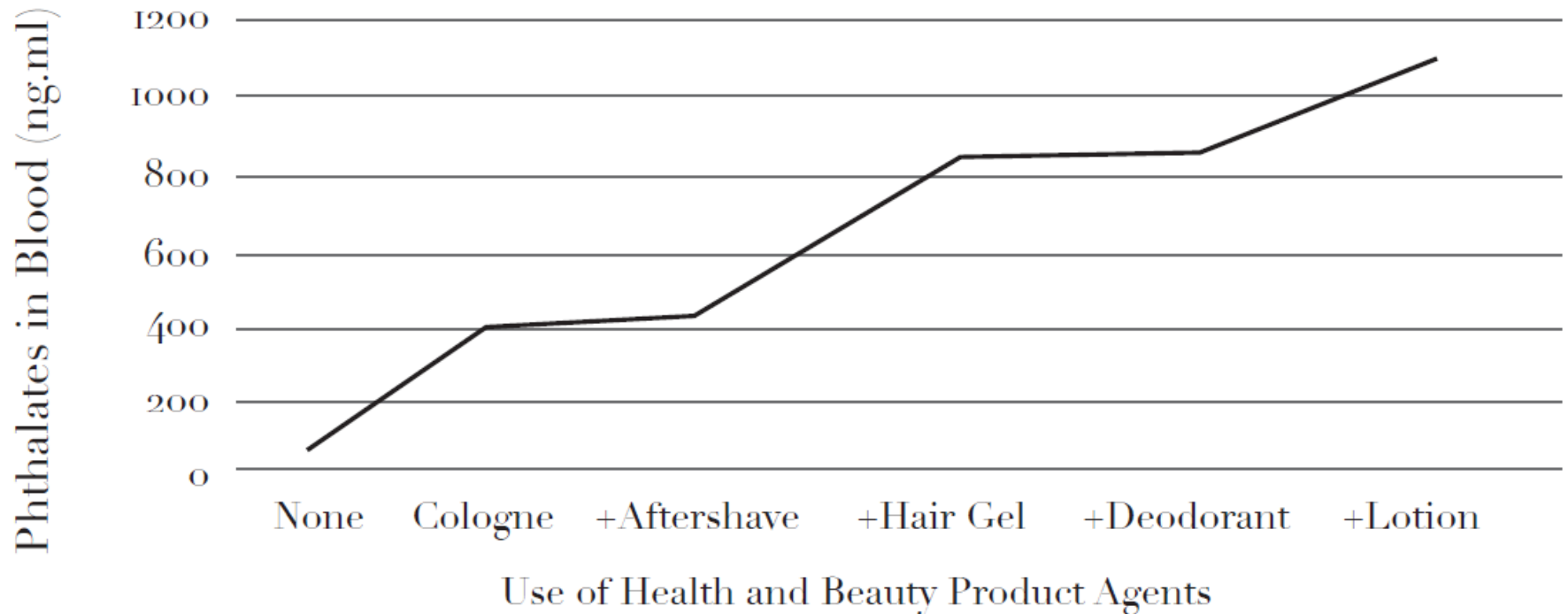


HABAs Full of Metabolism Disrupters

- Parabens
 - Estrogenic
 - Anti-androgen
 - Inhibit mitochondrial ATP formation
 - Impair Phase II sulfation \Rightarrow toxins stuck in activated form
- Phthalates
 - Allergies, asthma, autism, diabetes, Infertility, low testosterone, mood disorder, obesity, reduced cognition



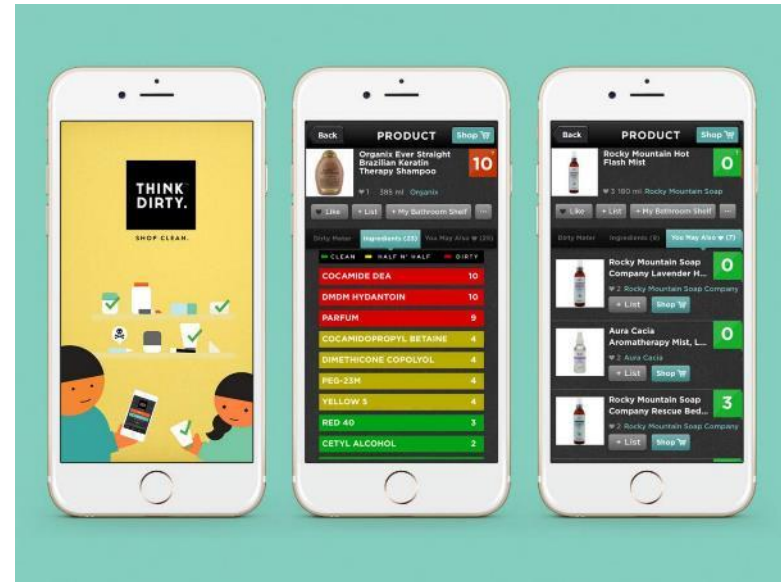
Health and Beauty Aids (HABAs) Significant Source of Phthalates



Duty SM, et al. Personal care product use predicts urinary concentrations of some phthalate monoesters. Environ Health Perspect. 2005 Nov;113(11):1530-5

Strategies - HABAs

- Health and Beauty Aids
- Use apps such as “Think Dirty” to determine level of toxicity of products normally used
- Use less toxic versions
- Remember, sun exposure needed for health. Don't over OR under-do it.





HOUSE AND YARD CHEMICAL POLLUTION



Strategies – House & Yard Chemicals

- Make up own non-toxic (and cheap!) cleaning solution (Lara's solution):
 - $\frac{1}{4}$ vinegar
 - A few drops of favorite essential oil (vary from time to time)
 - $\frac{3}{4}$ water
- Buy premade safer products like from Honest Company (no commercial relationship)
- Fertilizer greatly facilitates pest control
- Weed by hand early in season
- If old wooden children's gym: remove carefully



Fine Netting Not Toxic Sprays





Decreasing Exposure is Safe and Effective

TABLE 60.1 Rating of Treatment Efficacy for Reduction of Morbidity Associated With Chemical Intolerance in Percentages of Respondents—Listed by Help/Harm Ratio

Treatment	n	% Harmed	% No Effect	% Helped	Help/Harm Ratio
Chemical-free living space	820	0.6	4.5	94.8	155.2
Chemical avoidance	875	0.8	4.7	94.5	118.6
Prayer	609	1.4	34.4	64.2	48.3
Meditation	423	2.8	43.3	53.8	19.2
Acupressure	308	4.5	28.3	67.2	14.9
Touch for health	75	3.8	41.8	54.4	14.3
Air filter	786	6.0	11.8	82.1	13.7
Rotation diet	560	5.7	22.1	72.2	12.7
Acidophilus	661	4.1	44.0	52.0	12.7
Relocation	513	7.4	6.0	86.6	11.7
Reflexology	204	4.8	38.5	56.6	11.6
Personal oxygen	326	7.3	14.2	78.4	10.6

Modified from Gibson, P. R., Elms, A. N., & Ruding, L. A. (2003). Perceived treatment efficacy for conventional and alternative therapies reported by persons with multiple chemical sensitivity. *Environmental Health Perspectives*, 111(12), 1498–1504.



Clean Up the Gut



1. Eliminate inappropriate gut bacteria
2. Bind toxins as they are released
3. Reseed with healthy gut bacteria
4. Monitor with Obermyer Test

CLEAN UP THE GUT



Weeks 3,4: Clean Up Gut

- Primary source of toxins for liver (and rest of body)
- Avoid allergic/intolerant foods
- Stop antacids, NSAIDs and anything else damaging the gut
- Restore proper gut flora
- Old time naturopathic adage:

Disease begins in the gut!

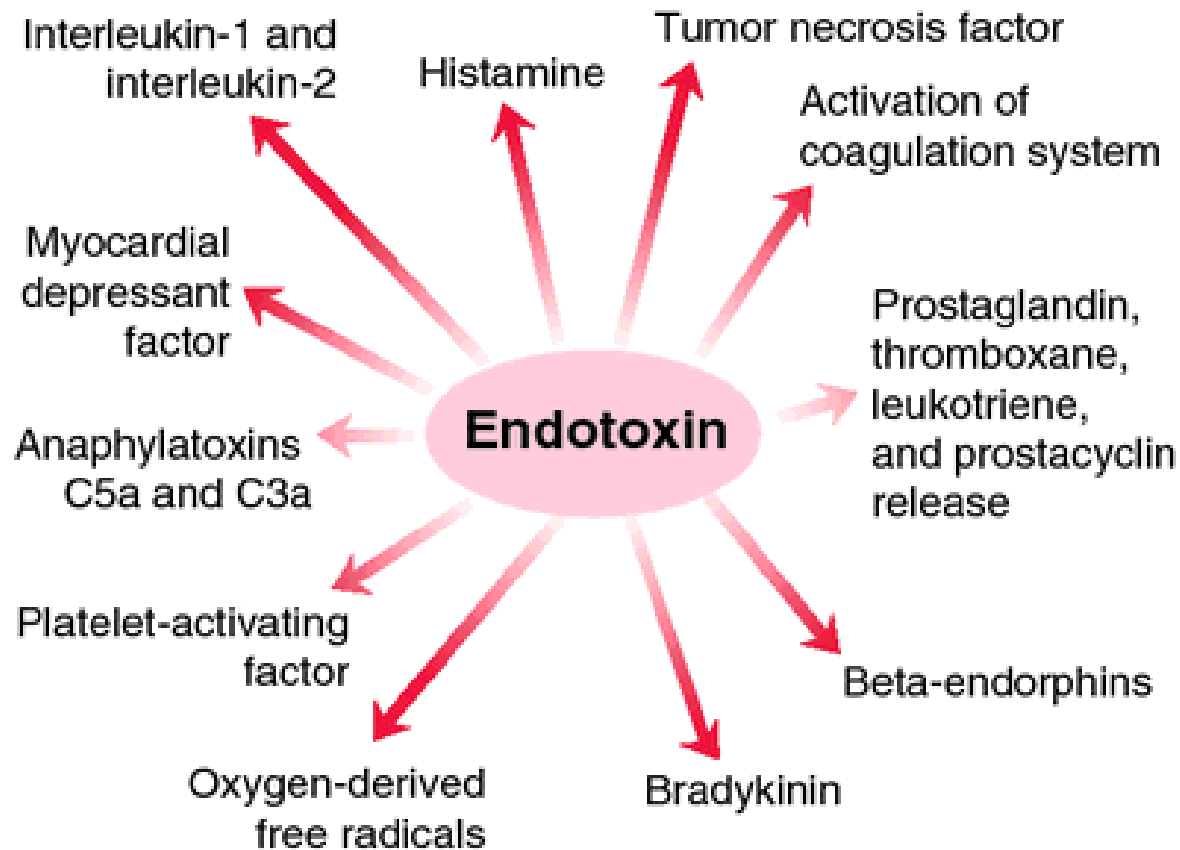


Gut Dysfunction Common

- *H. Pylori* 30-40%
- Small bowel overgrowth 20%
- Lactose intolerance 17%
- Hypochlorhydria 15%
- Leaky gut 14%
- Pancreatic insufficiency 6%



Endotoxins from Gut Huge Contributors to Disease





Reestablish Healthy Gut Flora

- Kill toxic bacteria (esp. Clostridia family)
 - 1 tsp goldenseal root powder 3 times a day
- Absorb toxins from dying toxic bacteria
 - Fiber, e.g., PGX 2.25 g 3 times a day
- Seed with healthy bacteria
 - Good quality, multi-strain probiotic like Ultra Probiotic 12
- Feed health bacteria
 - Prebiotics like artichoke, oats
- Facilitate healing gut mucosa
 - Glutamine, quercetin, licorice root
- Use objective measure like Obermyer (Indican)
 - Test every 2 weeks



Eliminate Toxic Bacteria

- Growth of bacteria in small intestine and inappropriate bacteria in large
- Putrefaction of proteins to vasoactive amines and carcinogens
- Increase bowel permeability
- Clostridia and other anaerobes
- *Hydrastis canadensis*: 1 tsp 3x/d
 - Toxic to anaerobes, esp. Clostridia
 - Gentle to lactobacilli
- Garlic: 1 clove 2x/d



Scazzocchio F, et al. Antibacterial activity of *Hydrastis canadensis* extract and its major isolated alkaloids. *Planta Med.* 2001;67:561-4

Ruddock PS, et al. Garlic products exhibit variable constituent levels and antimicrobial activity against *Neisseria gonorrhoeae*, *Staphylococcus aureus* and *Enterococcus faecalis*. *Phytother Res.* 2005;19:327-34



Monitor with Obermeyer/Indican Test

- **Method**

- Place 5 ml of fresh urine in a test tube.
- Add 5 ml of Obermeyer reagent.
- Mix.
- Add 2 ml of chloroform and invert several times.
- Allow the chloroform to settle and observe.
- Results are the color in the chloroform layer.
- Requires use of a hood to exhaust toxic fumes and avoid skin contact.

Toxic Level	Color
0	Yellow
1	Light Blue
2	Medium Blue
3	Dark Blue
4	Black

- **Reagents**

- Obermeyer reagent - dissolve 0.8 g ferric chloride in 100 ml. concentrated hydrochloric acid (*caution*: caustic).
- Chloroform (*caution*: volatile and toxic; keep tightly capped).



Bind Released Toxins

- Many toxins released as inappropriate bacteria die
- Fiber: 3 tbsp/d
- Charcoal: 2 tsp between meals
- Colon irrigation(?)

Ward PB, Young GP. Dynamics of *Clostridium difficile* infection. Control using diet. Adv Exp Med Biol. 1997;412:63-75

Bond GR. The role of activated charcoal and gastric emptying in gastrointestinal decontamination: a state-of-the-art review. Ann Emerg Med. 2002;39:273-86

Neuvonen PJ, Olkkola KT. Oral activated charcoal in the treatment of intoxications. Role of single and repeated doses. Med Toxicol Adverse Drug Exp. 1988;3:33-58

Korshunov VM, et al. [Effect of the lavage of the digestive tract on microflora in patients with polyps in the large intestine] [Russian] Zh Mikrobiol Epidemiol Immunobiol. 2001;3:76-80



Reseed with Health Gut Organisms

- Multi-strain probiotic
 - Must be from reputable source
- Regular consumption of healthy yogurt and other fermented foods
- Increase in stool volume and (usually transient) gas
- Avoid antibiotic contaminated foods
- Fecal transplant if serious gut disease



Probiotics: Dosages

- Dosage: 10^7 - 10^{11} organisms
- Toxicity:
 - In 143 human clinical trials, no adverse effects or events were reported by any of the 7,526 subjects
 - There have been cases of fungemia reported in immunocompromised or critically ill individuals using *Saccharomyces cerevisiae*
- Interactions: The metabolism of sulfasalazine, chloramphenicol palmitate, and phthalylsulfathiazole is affected by some strains of *L. acidophilus*

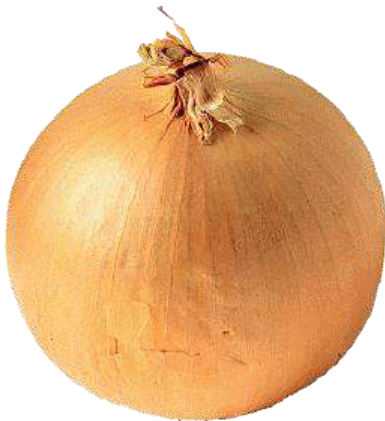
Naidu AS, et al. Probiotic spectra of lactic acid bacteria. Crit Rev in Food Science Nutr 1999;38:13-126

Riquelme AJ, et al. *Saccharomyces cerevisiae* fungemia after *Saccharomyces boulardii* treatment in immunocompromised patients. J Clin Gastroenterol 2003;36:41-3

Pradhan A, Majumdar MK. Metabolism of some drugs by intestinal lactobacilli and their toxicological considerations. Acta Pharmacol Toxicol (Copenh) 1986;58:11-5



Prebiotics





Prebiotics: Forms

- *Bifidobacterium* spp.
 - Fructooligosaccharides (asparagus, onion, leek, garlic, artichoke, Jerusalem artichoke, chicory root)
 - Galactooligosaccharides (cow's milk, yoghurt, human milk)
 - Xylooligosaccharides (oats)
 - Galactosyl lactose (human milk)
- *Lactobacillus* spp.
 - β -glucooligomers (oats)
 - Raffinose (legumes, beets)



Prebiotics: Dosages

- FOS
 - Dosage: 10-40 g/d
 - Toxicity: dose-dependent mild digestive symptoms, such as flatulence, borborygmi, abdominal bloating and abdominal discomfort
 - Contraindications: CHO intolerance, SIBO
 - BUT: these are really manifestations of unhealthy gut microbiome

Hawrelak J. Prebiotics. In *Textbook of Natural Medicine*. Elsevier, 2006

Terada A, Hara H, Kataoka M, Mitsuoka T. Effect of lactulose on the composition and metabolic activity of the human faecal flora. *Microb Ecol Health Dis* 1992;5:43-50

Clausen MR, Mortensen PB. Lactulose, disaccharides and colonic flora. Clinical consequences. *Drugs* 1997;53:930-42



Stimulate Regeneration

- Raw cabbage juice: 1 qt/d
 - Glutamine
 - Phase I and Phase II liver detox promotion
- Glutamine
 - Preferred energy substrate for intestinal cells
 - Increases thickness of intestinal membranes
 - Increases secretion of sIgA
 - Inhibits bacterial penetration of GI membranes
 - 500 mg 3x/d



Restore the Liver



1. Decrease total toxic load from gut
2. Fiber to absorb toxins and prevent enterohepatic recirculation
3. All nutrients needed for proper Phase I and Phase II function
4. Glutathione to protect liver from free radicals produced by detox

RESTORE LIVER



Weeks 5,6: Restore Liver

- Detox gut
- Nutrient cofactors
- Cholagogues
- Inducers
- Fiber
- Glutathione
- Old time naturopathic adage:
When in doubt, detoxify the liver



Relentless Increase in Liver Dysfunction

- NAFLD, once rare now common
- 16% in lean and ~75% in obese worldwide
- ~35% in Russia
- Major causes:
 - HFCS
 - Obesity
 - Gut endotoxins
 - VOCs
 - POPs
 - Cd, Hg

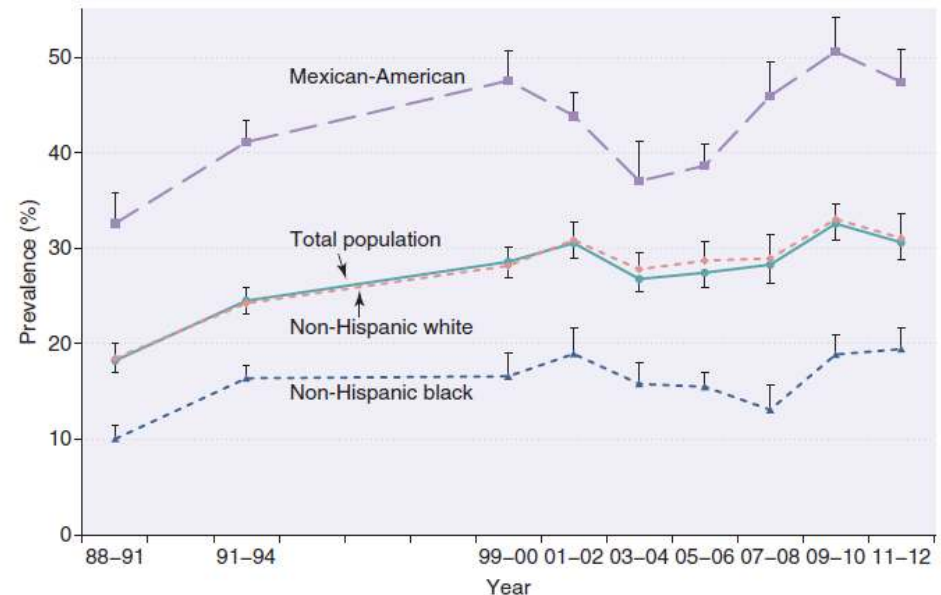
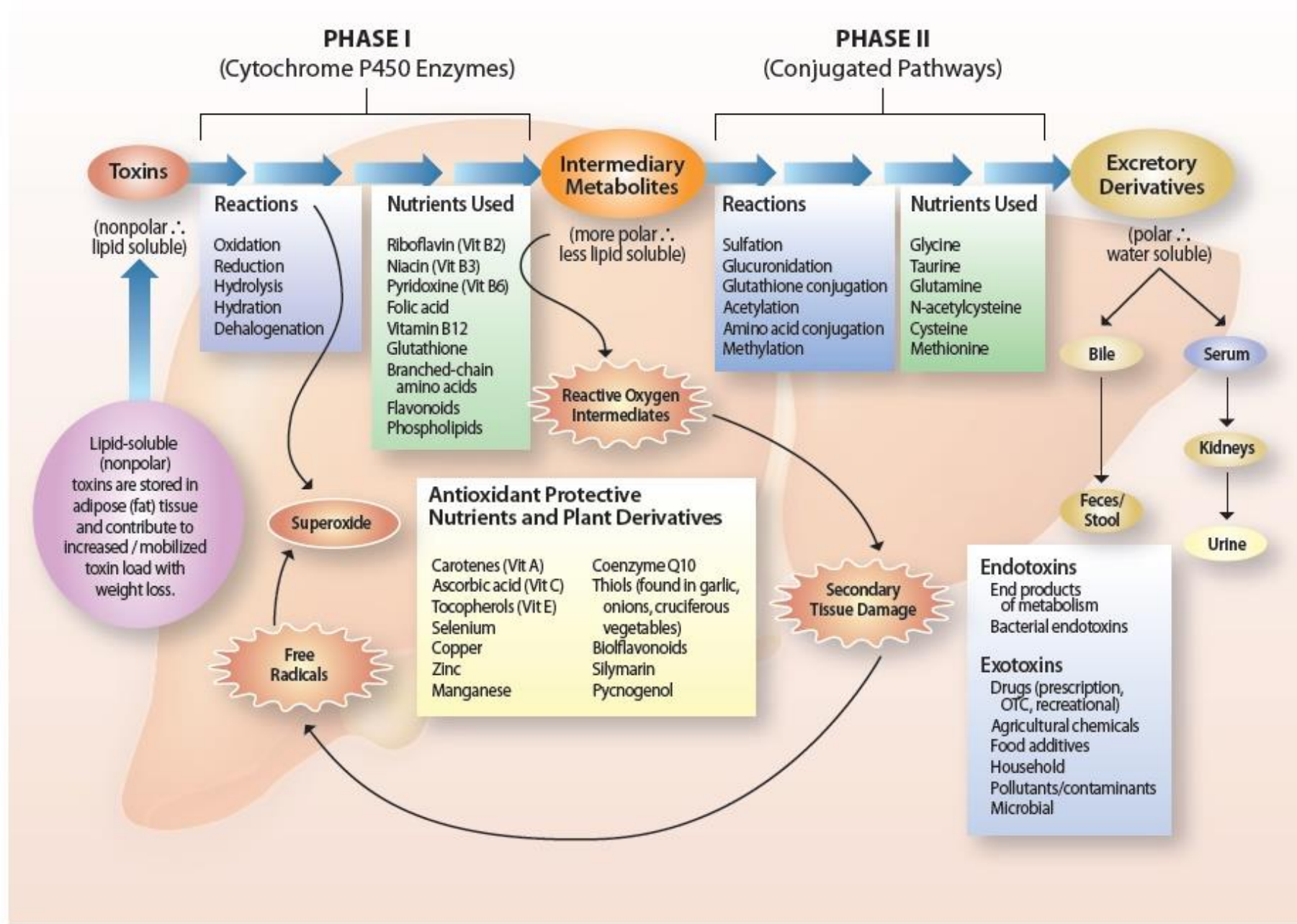


FIG. 49.1 Time trends of fatty liver prevalence in the United States population. (From Ruhl, C. E., & Everhart, J. E. [2015]. Fatty liver indices in the multiethnic United States National health and Nutrition Examination Survey. *Alimentary Pharmacology and Therapeutics*, 41[1], 65-76.)

Ivashkin VT, Drapkina OM, Mayev IV, et al. [The prevalence of non-alcoholic fatty liver disease in patients of outpatient practice in the Russian Federation: the results of the study DIREG 2]. *Russian Journal of Gastroenterology, Hepatology, Coloproctology* 2015;25:31-8

Liver Detoxification





Liver Detoxification Inducers and Cholagogues

- Cabbage family foods
- Artichoke
- Dandelion
- Turmeric (curcumin)
- Phosphatidylcholine

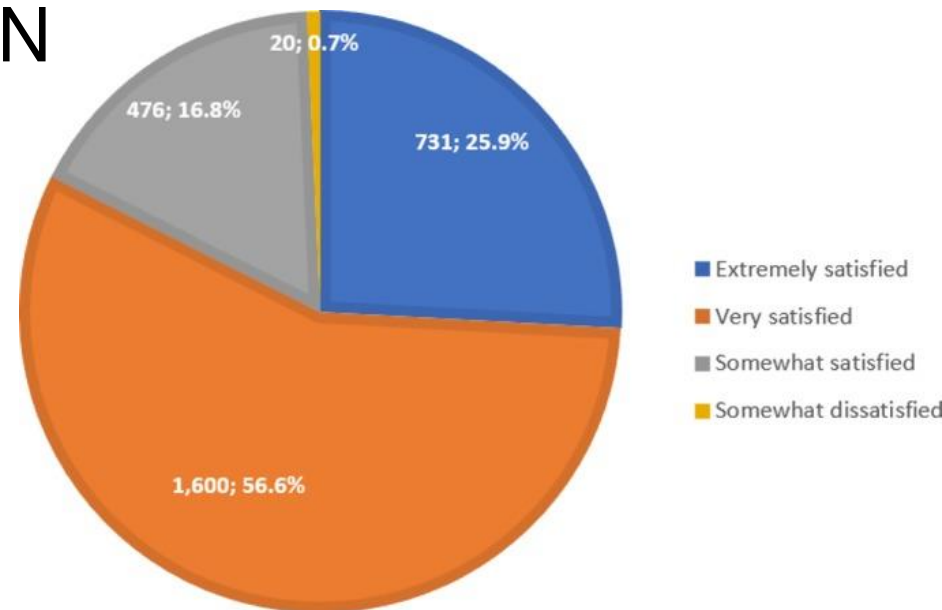
- Avoid grapefruit juice as slows liver enzymes

- “Liver flush” not recommended
 - Good way to induce gall stone blockage



Reversing Fatty Liver Disease

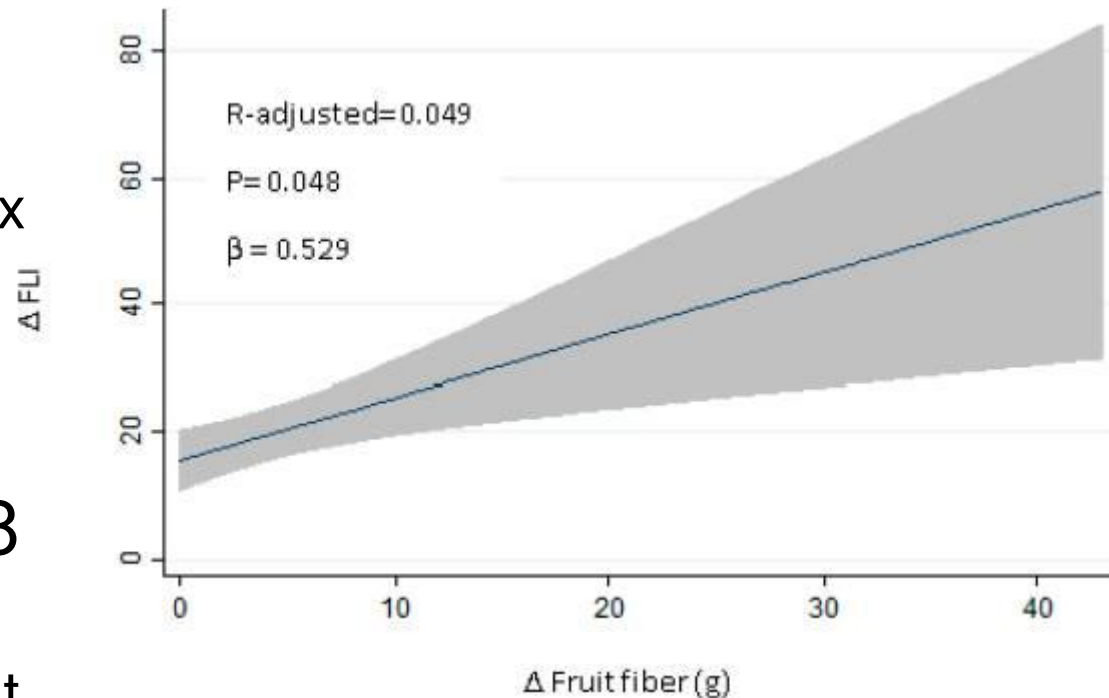
- Phosphatidylcholine
- 300 mg Essentiale Forte N
- 2843 patients with newly diagnosed NAFLD
- 174 medical sites in 6 major federal districts of Russian Federation





Fiber Critical For Liver Detox Function

- Improvement in:
 - Fatty liver index (FLI)
 - Hepatic steatosis index (HIS)
 - NAFLD liver fat score
 - GGT
- Benefits begin at 8.8 g fruit fiber/d
 - (Note: graph is amount of decrease in FLI)





Increase Glutathione Levels

- Critical to protect liver from free radicals produced during detoxification
 - One free radical produced per molecule detoxed by CYP
- Topical or liposomal glutathione
- NAC: 500 mg once or twice a day
 - Or whey powder 15 g/d
- Non-alcoholic beer: 1 pint a day
- Resveratrol: 1 g/d
- Almonds: 83 g/d
- Meditation: Daily
- Exercise: Both aerobic and strength training



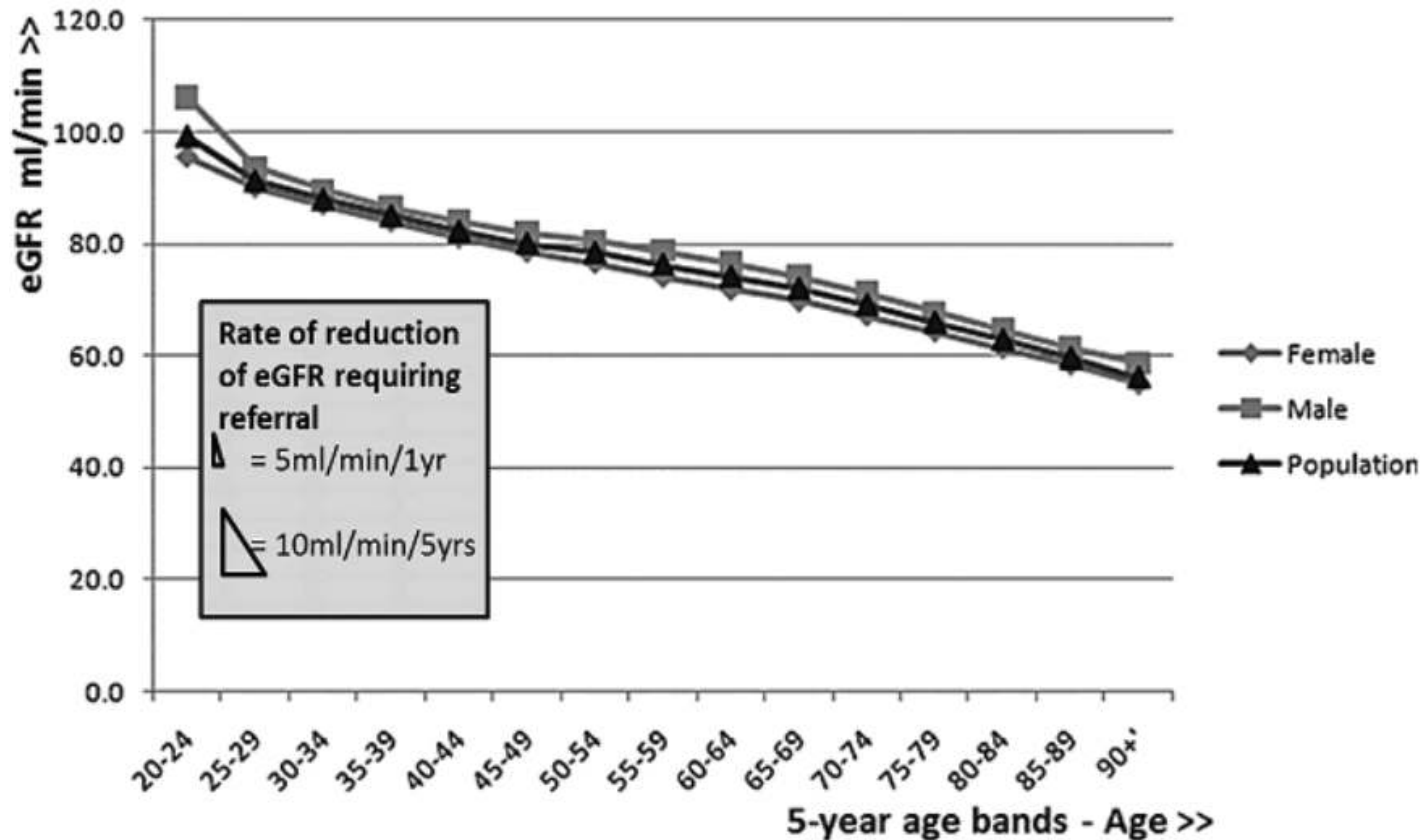
Revive the Kidneys



1. Decrease total toxic load on the kidneys.
2. Aggressively reduce exposure to nephrotoxins.
3. Increase microcirculation of kidneys.
4. Protect the kidneys from oxidative stress.

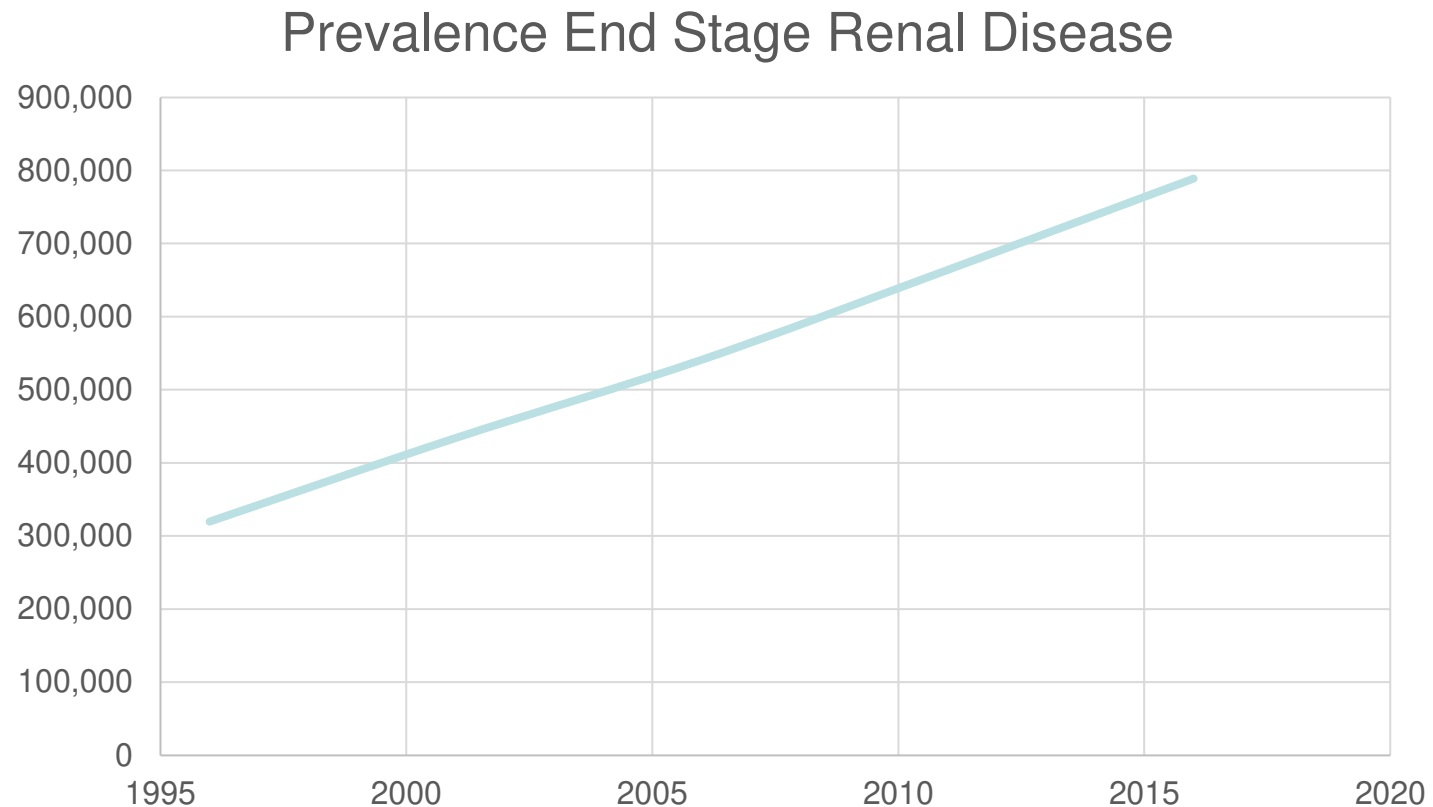
REVIVE THE KIDNEYS

Kidney Function Declines with Age

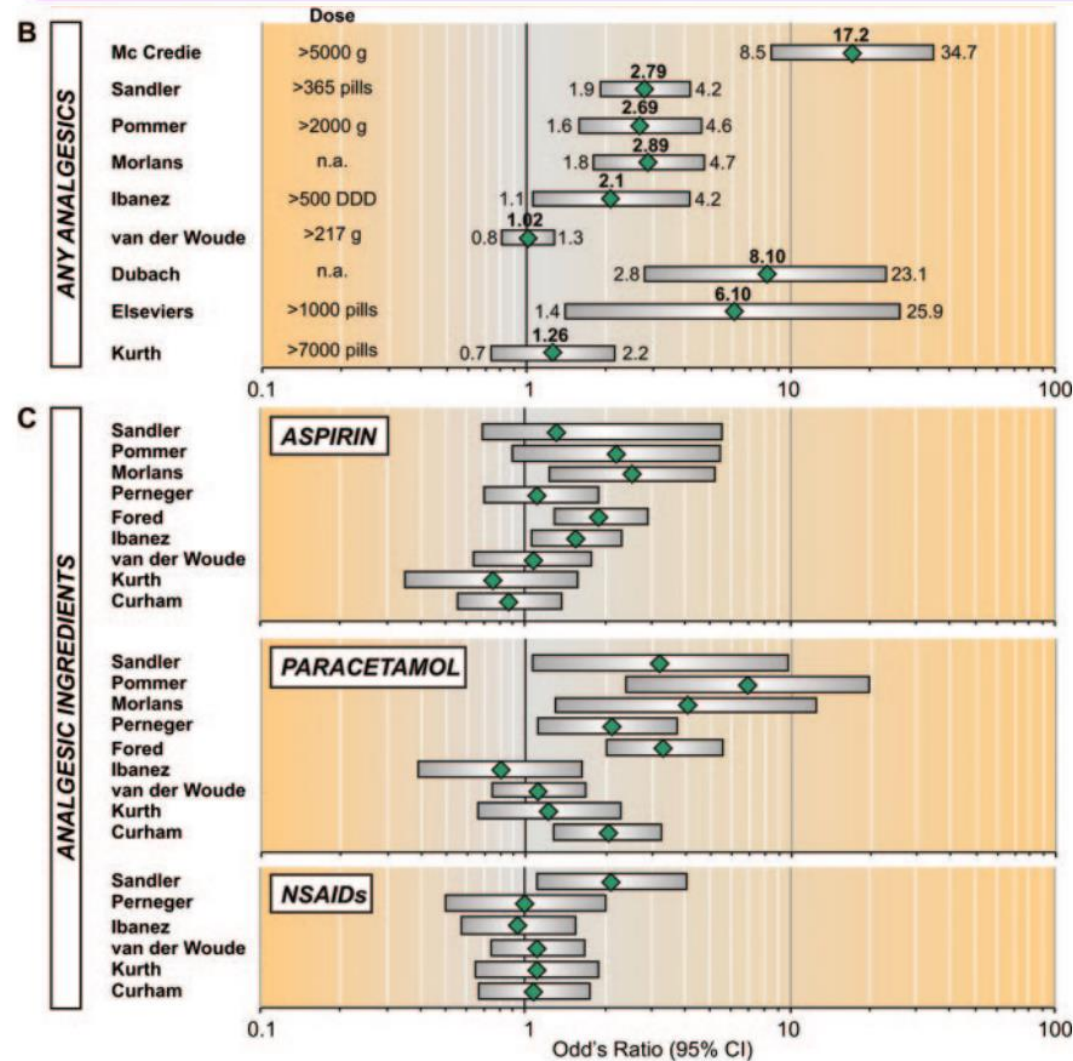




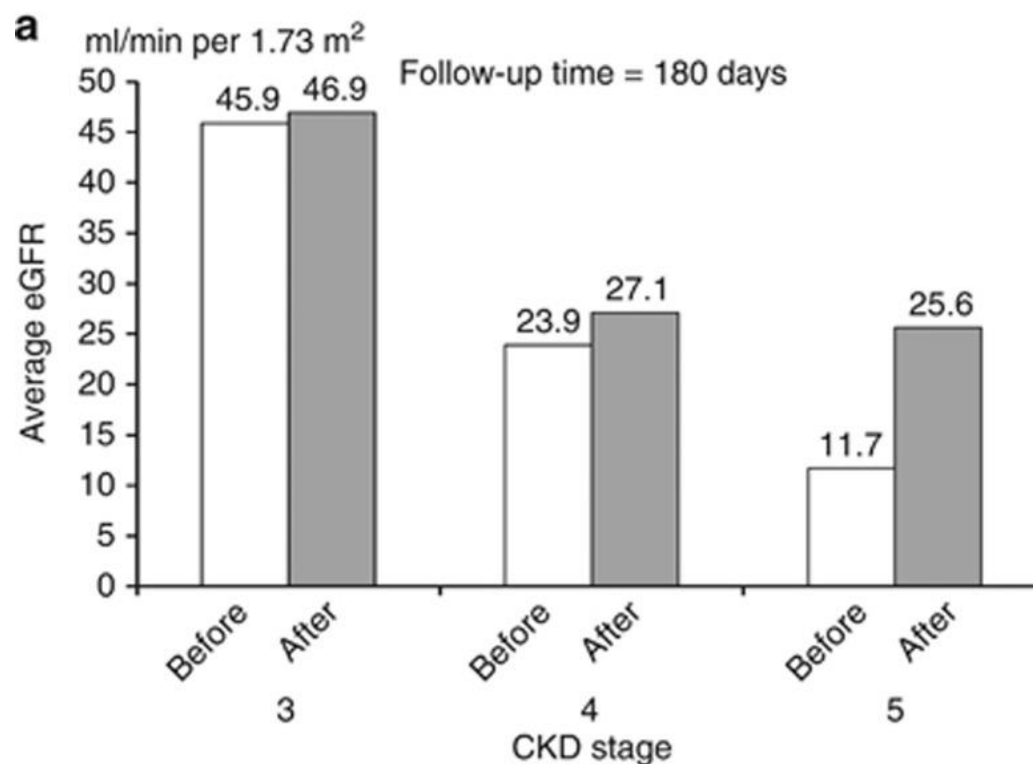
ESRD Increasing Relentlessly (US)



NSAIDS A MAJOR CAUSE OF KIDNEY DAMAGE



Stopping NSAID Use Improves Kidney Function In All Stages



Wei L, Thomas M MacDonald TM, et al. Estimated GFR reporting is associated with decreased nonsteroidal anti-inflammatory drug prescribing and increased renal function. *Kidney Int* (2013) Jul;84(1):174-8

Beet Juice Increases Blood Flow

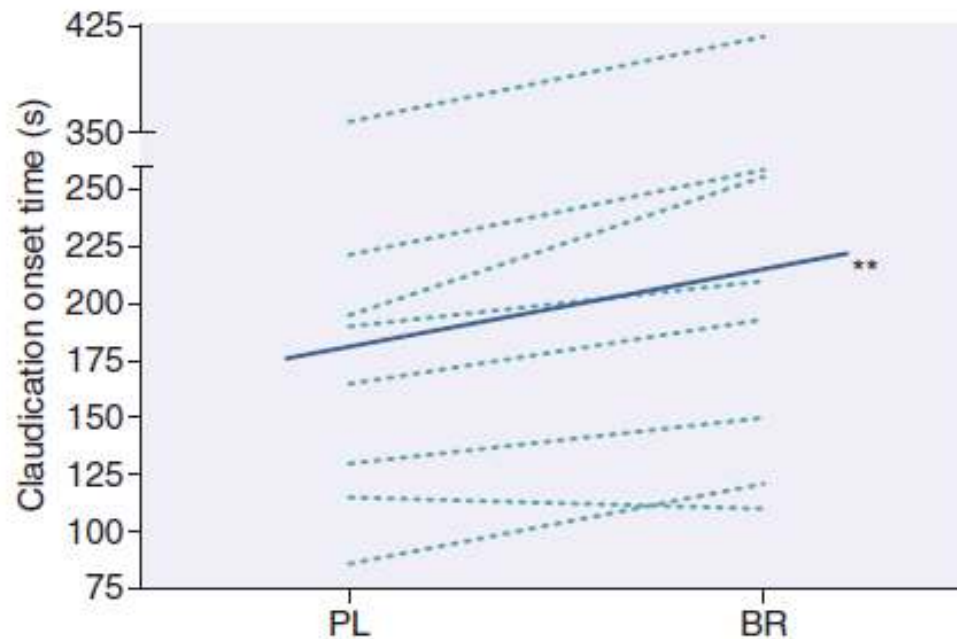


FIG. 50.7. PL, placebo; BR, beetroot. Beetroot juice improves peripheral blood supply. (From Kenjale, A. A., Ham, K. L., Stabler, T., Robbins, J. L., Johnson, J. L., VanBruggen, M., Privette, G., Yim, E., Kraus, W. E., Allen, J. D. [2011]. Dietary nitrate supplementation enhances exercise performance in peripheral arterial disease. *Journal of Applied Physiology*, 110[6], 1582–1591.)

Blueberries Improve Function and Protect Kidneys from Endotoxins

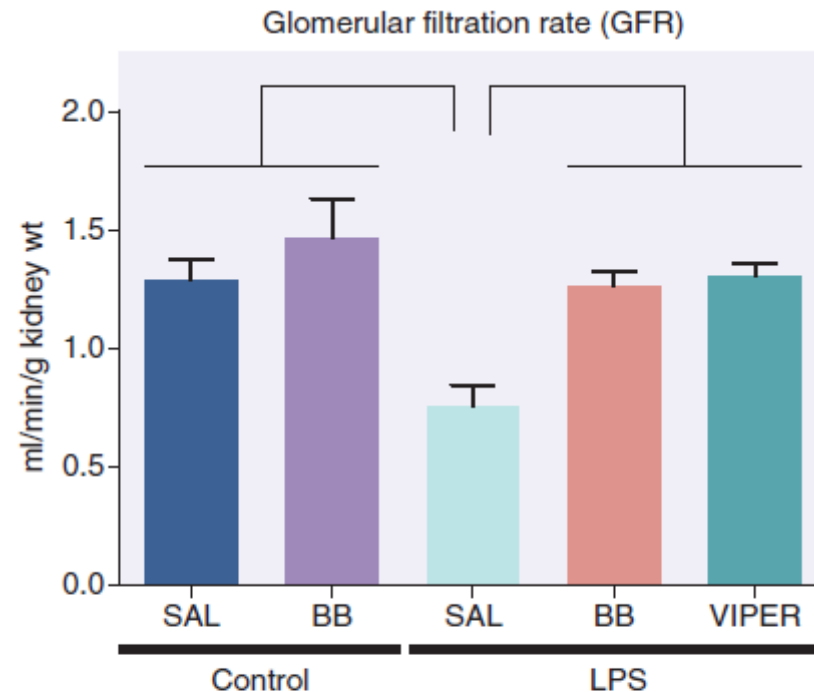


FIG. 50.8. Blueberries protect the kidneys from gut-derived toxins. (From Nair, A. R., Masson, G. S., Ebenezer, P. J., Del Piero F, & Francis J. [2014]. Role of TLR4 in lipopolysaccharide-induced acute kidney injury: Protection by blueberry. *Free Radical Biology and Medicine*, 71, 16–25.)



Deep Detoxification



1. Saunas—multiple times a week
2. Alkalinizing fluids

DEEP DETOXIFICATION



Weeks 9+ Deep Detoxification

- Sauna
 - Temperature: start sweating freely in 15-20 minutes
 - Fluids:
 - Weight before and after (empty bladder) to be sure drank enough
 - Typically about 1 pint/20 min heavy sweating
 - Best is mildly alkalinizing with trace minerals
 - 20-40 min heavy sweating
 - Leave earlier if not feeling well
 - Every 2-4 days—listen to body
- After blood levels low, consider water fasting
 - Best done under supervision the first time
 - 4-7 days



Depuration Protocol (Saunas)

- Temp: high enough to start sweating freely in 15-20 minutes
- Type not critical—each has + and -
- Fluids:
 - Weight before & after (empty bladder)
 - Drink enough to maintain weight
 - Typically about 1 pint/20 min heavy sweating
 - Best is mildly alkalinizing with trace minerals
- 20-40 min heavy sweating
- Leave earlier if not feeling well
- Every 2-4 days—listen to body



Saunas Increase Excretion of Many Toxins

TABLE 61.4 Mean Total PCB Levels in Adipose and Serum in 10 Electrical Workers and 10 Controls

Group	Prepurification Average Levels	Postpurification Average Levels	12-Month Follow-Up Average Levels
Group A Adipose mg/kg	20.9	14.5	16.7
Group A Serum	139.4	80.3	168.8
Group B Adipose mg/kg	40.9	37.0	38.2
Group B Serum	284.8	292.6	287.1
Control Adipose mg/kg	22.4	23.1	27.4
Control Serum	139.8	179.4	183.8

Data from Tretjak, Z., Root, D. E., Tretjak, A., Slivnik, R., Edmondson, E., & Graves, R., et al. (1990). Xenobiotic reduction and clinical improvements in capacitor workers: A feasible method. *Journal of Environmental Science and Health, A25*(7), 731–751.



Depuration (Saunas)

- People who sauna regularly have less disease

TABLE 61.2 Hazard Ratios of Finnish Males (Aged 42–60 Years of Age at Beginning of Study) for Dementia and Alzheimer’s Disease Based on Their Sauna Frequency Over 20+ Years Follow-Up

	Sauna 1 × Weekly	Sauna 2–3 × Weekly	Sauna 4–7 × Weekly
Disease			
Dementia	1	0.78	0.34
Alzheimer’s	1	0.80	0.35

Data from Laukkanen, T., Kunutsor, S., Kauhanen, J., & Laukkanen, J. A. (2017). Sauna bathing is inversely associated with dementia and Alzheimer’s disease in middle-aged Finnish men. *Age and Ageing*, 46(2), 245–249.

TABLE 61.1 Hazard Ratios for 40- to 61-Year-Old Finnish Males Based on the Number of Weekly Finnish Sauna Sessions Typically Taken

Sauna Frequency	Sudden Cardiac Death	Fatal Coronary Heart Disease	Fatal Cardiovascular Disease
1 time weekly	1	1	1
2–3 times weekly	0.71	0.71	0.68
4–7 times weekly	0.49	0.60	0.55
p trend	<0.008	<0.006	<0.001

Modified from Laukkanen, T., Khan, H., Zaccardi, F., & Laukkanen, J. A. (2015). Association between sauna bathing and fatal cardiovascular and all-cause mortality events. *JAMA Internal Medicine*, 175(4), 542–548.



Sauna Contraindications

- Aortic stenosis, unstable angina, severe orthostatic hypotension, or any history of recent MI avoid sauna therapy
 - However, men who used Finnish saunas 6 weeks after an MI experienced a reduced risk of a subsequent MI
- Some researchers suggest fevers and some skin conditions (cholinergic urticaria, abrasions, and oozing rashes) are contraindications.
 - We do not agree.
- Saunas during pregnancy remains an area of controversy.
 - Very unlikely a problem for regular users



Patience!

Don't expect the speed of results seen with drug or even nutrition therapy

1. Identify and stop exposure
2. Greatly decrease body load
 - Some toxins become apparent only after others removed
3. For damaged enzymes to work:
 - Must displace enzyme poison with nutrient cofactor, or
 - Degrade and replace enzyme
 - **$\frac{1}{2}$ life MAO-B in baboon brain = 30 days**
4. Finally, the damage has to be repaired

Arnett CD, Fowler JS, MacGregor RR, et al. Turnover of brain monoamine oxidase measured in vivo by positron emission tomography using L-[11C]deprenyl. J Neurochem. 1987;49:522-7



Summary

1. Toxins are ubiquitous in the industrialized world
2. Toxins are now the primary drivers of chronic disease
3. Being healthy and preventing disease requires:
 1. Avoiding toxins as carefully as possible
 2. Ensuring body's detox systems are functioning properly
 3. Regularly detox

**Seriously,
Toxin Exposure**

Everyday





"The definitive book linking the exploding burden of environmental toxins to chronic diseases, including autoimmunity, obesity, and cancer."

—MARK HYMAN, MD

THE TOXIN SOLUTION

How Hidden Poisons in the Air, Water, Food, and
Products We Use Are Destroying Our Health—
AND WHAT WE CAN DO TO FIX IT



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Identification and Natural Treatment of
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