

DETOXIFICATION SUPPORT FOR CLINICIANS



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We are increasingly exposed to toxic compounds in the air, water and food we consume to sustain life. But, ironically, via this consumption, toxins have become the primary drivers of disease of the world's population, with increases in occurrences of conditions such as diabetes, various cancers, attention deficit hyperactivity disorder (ADHD) and Alzheimer's disease (AD).¹

Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment around the world. Because they can be transported by wind and water, most POPs generated in one country can, and do, affect people and wildlife far from where they are used and released.



When toxic metabolites accumulate, our detoxification system becomes overloaded and we become progressively more sensitive to additional chemicals (some of which may not normally be toxic). An overburdened system manifests in various ways – skin conditions (acne, psoriasis), headaches, inflammatory conditions and autoimmune diseases.¹

The type of toxic substance, and length of exposure to it, also affects the severity of the symptoms and disease states. The half-life of these chemicals ranges from 12 hours (benzene), to 2 months (mercury), to 25 years (PCBs)!²



TOXINS IN OUR DAILY LIVES^{1,3-21}

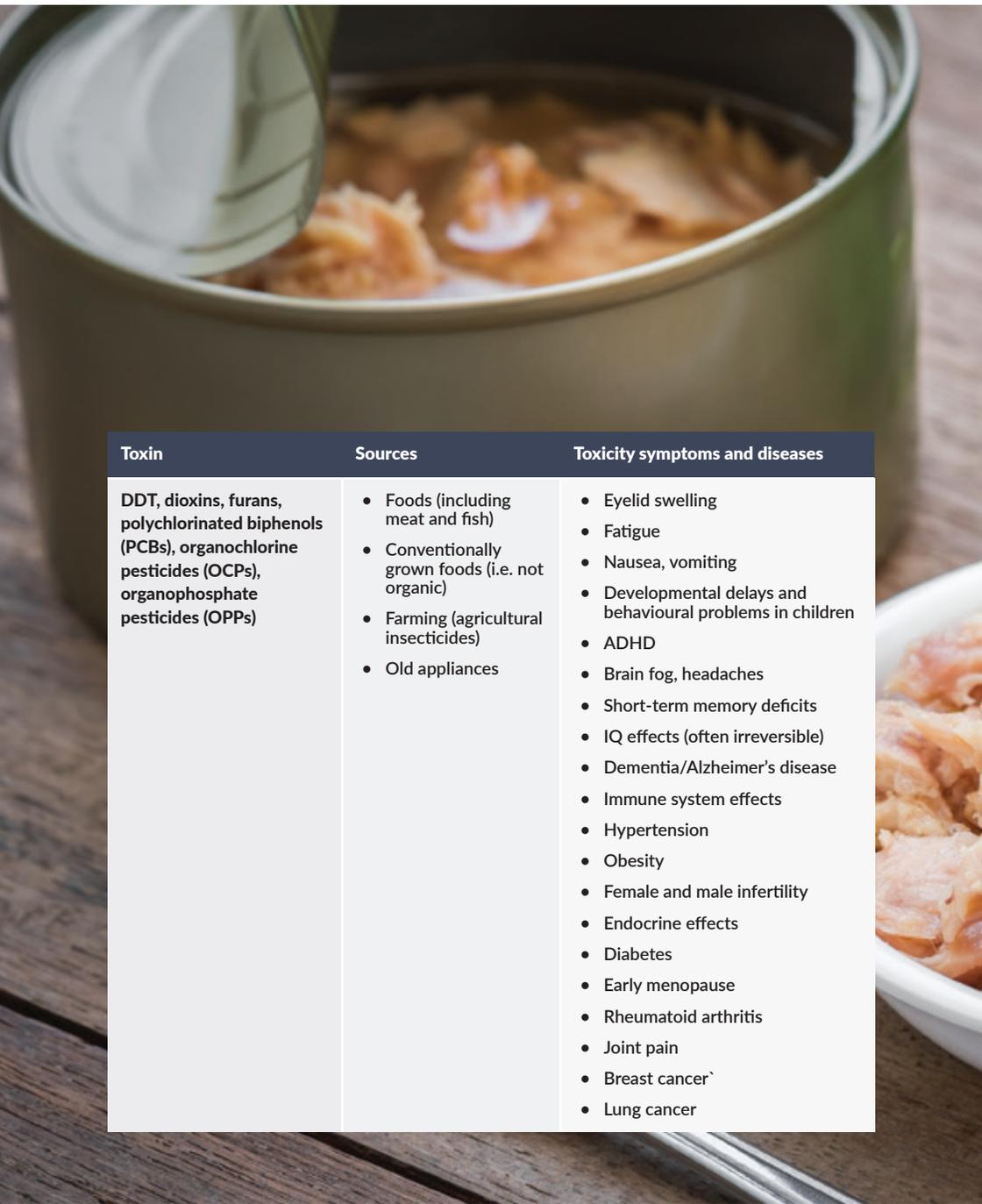
Toxins	Sources	Toxicity symptoms and diseases
Aluminum	<ul style="list-style-type: none"> • Water • Food (grains) • Deodorants • Toothpaste • Cosmetic products • Foil products 	<ul style="list-style-type: none"> • Brain fog • Dementia/Alzheimer's • Depression • Bone diseases • Joint pain • Inflammatory bowel diseases • Inflammation across multiple systems
Arsenic	<ul style="list-style-type: none"> • Water • Crops and food using contaminated water • Pesticides • Chicken • Rice • Tobacco 	<ul style="list-style-type: none"> • Gout • Cognitive issues • Asthma • Skin rashes and pigmentation • Loss of sense of touch • Glucose dysregulation and type 2 diabetes • Dyslipidaemia • Cancers

Toxin	Sources	Toxicity symptoms and diseases
Cadmium	<ul style="list-style-type: none"> • Cigarettes • Manufacturing batteries, plastics, coatings and solar panels • Jewellery making • Smelters, mines 	<ul style="list-style-type: none"> • Brain fog • Bone demineralisation • Infertility • Hypertension • Joint pain • Insulin resistance • Emphysema • Skin ulceration • Breast cancer • Lung cancer
Lead	<ul style="list-style-type: none"> • Paint (lead-based) • Old buildings • Water • Batteries 	<ul style="list-style-type: none"> • Increased inflammatory states across multiple systems • Loss of coordination • Loss of sense of touch • Brain fog • Mood disorders, irritability • Insomnia • Slurred speech • Hypertension • ADHD • Amyotrophic lateral sclerosis (ALS) • Blood disorders • Infertility • Erectile dysfunction
Mercury	<ul style="list-style-type: none"> • Amalgam fillings • Fish • Vapor from fluorescent light bulbs 	<ul style="list-style-type: none"> • Fatigue, muscle weakness • Metallic taste • Lack of coordination • Tremors • Excessive salivation • Headaches • Loss of memory, dementia • Anxiety, depression, moodiness • Hashimoto's disease

Toxin	Sources	Toxicity symptoms and diseases
<p>Solvents and chlorinated solvents</p> <p>(Benzene, methylbenzene, toluene, xylenes)</p>	<ul style="list-style-type: none"> • Cigarettes • Automobile service stations, exhaust from motor vehicles • Industrial emissions • Wood finishes • Adhesives • Paint and stain removers 	<ul style="list-style-type: none"> • Skin and eye irritations • Drowsiness, dizziness • Headaches • Vomiting • Unconsciousness • Loss of muscle control • Liver and renal toxicity • Respiratory irritation • Dementia/Alzheimer's disease • Erectile dysfunction • Rheumatoid arthritis
<p>Plasticisers</p> <p>(Bisphenol A (BPA))</p>	<ul style="list-style-type: none"> • Foods in plastic packaging and containers • Water bottles • Canned foods • Water pipes • Thermal sales receipts • CDs and DVDs • Feminine hygiene products • Toiletries • Dental filling sealants 	<ul style="list-style-type: none"> • Atopy • Liver dysfunction • Lipid and cholesterol dysfunctions • Polycystic ovarian syndrome (PCOS) • Hypertension • Diabetes, insulin resistance • Hyperactivity in children • Metabolic dysfunction • Non-alcoholic fatty liver disease (NAFLD) • Endocrine disruption • Erectile dysfunction • Memory loss • Frequent infections



Toxin	Sources	Toxicity symptoms and diseases
Plasticisers (phthalates)	<ul style="list-style-type: none"> • Food and food packaging • Personal care and beauty products • Toothbrushes • Automobile parts • Tools • Toys • Cleaning products • Aspirin • Vinyl flooring and products 	<ul style="list-style-type: none"> • Fatigue, muscle weakness • Headaches • Diabetes, insulin resistance • Liver dysfunction • Non-alcoholic fatty liver disease (NAFLD) • Endocrine disruption • Obesity • Osteoporosis • ADHD • Respiratory • Cancers
Polycyclic aromatic hydrocarbons (PAHs)	<ul style="list-style-type: none"> • Burning of coal, oil, gas, wood, garbage and tobacco • Cigarettes • Mothballs • High temperature cooking • Charred meats/ foods 	<ul style="list-style-type: none"> • Headaches, nausea • Frequent infections • Moodiness • Diabetes • Atopy (asthma) • ADHD • Blood and liver abnormalities • Dyslipidaemia • Cancers



Toxin	Sources	Toxicity symptoms and diseases
DDT, dioxins, furans, polychlorinated biphenols (PCBs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs)	<ul style="list-style-type: none">• Foods (including meat and fish)• Conventionally grown foods (i.e. not organic)• Farming (agricultural insecticides)• Old appliances	<ul style="list-style-type: none">• Eyelid swelling• Fatigue• Nausea, vomiting• Developmental delays and behavioural problems in children• ADHD• Brain fog, headaches• Short-term memory deficits• IQ effects (often irreversible)• Dementia/Alzheimer's disease• Immune system effects• Hypertension• Obesity• Female and male infertility• Endocrine effects• Diabetes• Early menopause• Rheumatoid arthritis• Joint pain• Breast cancer`• Lung cancer



Toxin	Sources	Toxicity symptoms and diseases
Polybrominated diphenyl ethers (PDBEs) and perfluorinated compounds (PFCs)	<ul style="list-style-type: none">• Flame retardant fabrics and materials• Electronics• Non-stick cookware• Mattresses• Furniture• Carpets• Fish	<ul style="list-style-type: none">• Dizziness, headaches• ADHD• Diabetes• Liver toxicity• Cancers• Infertility• Erectile dysfunction• Neurotoxicity• Endocrine effects`





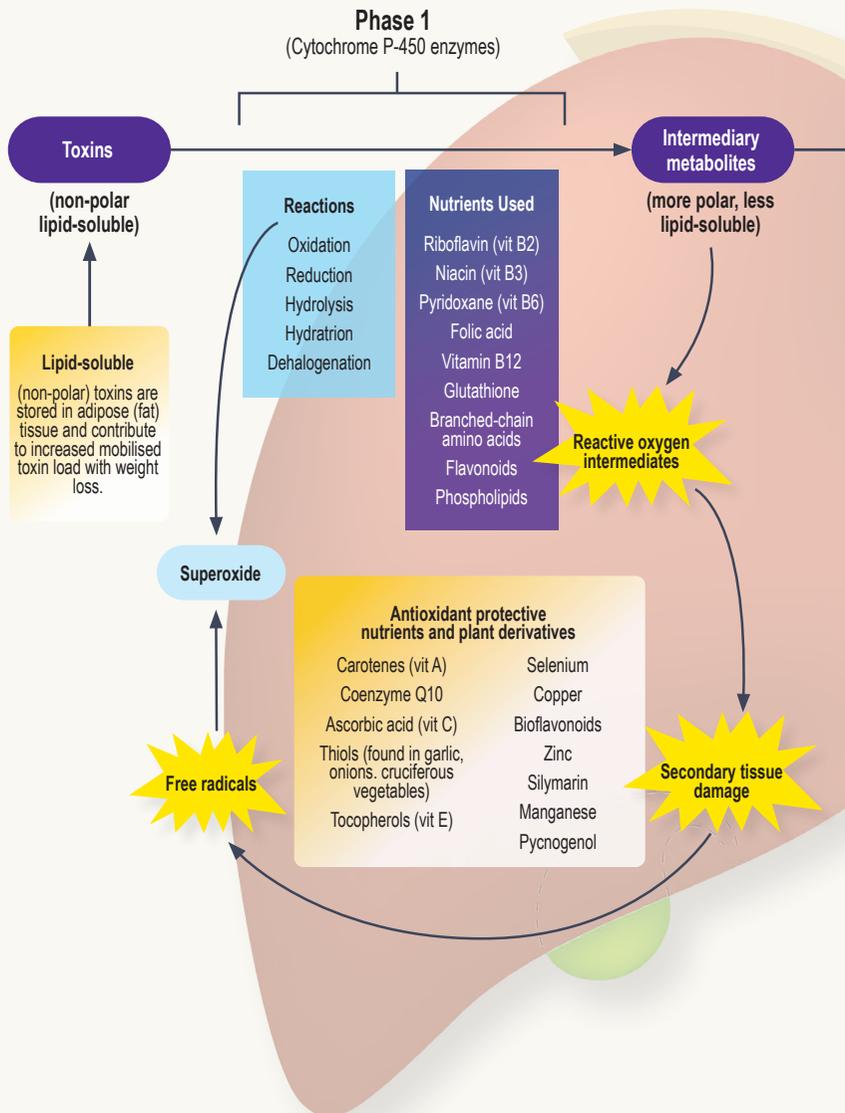
WHAT IS A DETOX?

“Going on a detox” is a way to lighten the load and reduce the impact daily toxins have on the body, helping the body’s natural detoxification mechanisms to breakdown and eliminate these harmful substances.

There are many types of detoxes, with varying degrees of difficulty and results. The level of toxicity, and accompanying health issues, should also be a factor to consider when deciding the protocol and duration of a detox.

It’s important the body is able to cope with the release, processing and removal of stored toxins. Without optimal functioning and support of the detoxification system, doing a detox is likely to cause an increase in side-effects.

PHASES, PATHWAYS AND REQUIRED NUTRIENTS IN DETOXIFICATION BY THE LIVER

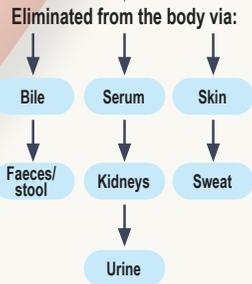


Phase 2
(Conjugation pathways)

Reactions	Nutrients Used
Sulfation	Glycine
Glucuronidation	Taurine
Glutathione conjugation	Glutamine
Acetylation	<i>N</i> -Acetyl/cysteine
Amino acid conjugation	Cysteine
Methylation	Methionine

Excretory derivatives

(polar, water-soluble)



TOXINS LIST

Endotoxins

End products of metabolism
Bacterial endotoxins

Exotoxins

Drugs (prescription, OTC, recreational)
Agricultural chemicals
Food additives
Household chemicals
Pollutants/contaminants
Microbial

The body eliminates toxins either by directly neutralising them or by excreting them via the urine and faeces (and to a lesser extent, via the lungs and skin). Toxins that the body is unable to eliminate build up in the tissues, typically in our fat stores, and accumulate to cause health problems.

The liver is the main organ of detoxification and is the body's primary filtration system, converting toxins into waste products, cleansing your blood, synthesising and secreting bile to excrete fat-soluble toxins and metabolising nutrients and medications. As such a fundamental part of the body's overall regulation, it's paramount to keep your liver healthy and support its function.

GENERAL DETOX FRAMEWORK

This detoxification framework has been developed to highlight the phases of detoxification. The time frames in this guideline are not definitive and should be reviewed and adapted at the practitioner's discretion, based on individual patient requirements.

In addition, certain steps can be attempted simultaneously i.e. 'decreasing toxic load' and 'preparing the body for detox'. Also 'displacing toxins and microbes' and 'supporting detoxification process' may be prescribed concurrently, however this decision is up to the practitioner. We recommend that the practitioner assess each case individually.

DECREASE TOXIC LOAD - 1-2 WEEKS

Identify toxin exposure and remove from environment (as much as possible). Follow healthy diet and lifestyle guidelines (as below).

PREPARE BODY FOR DETOX - 1-4 WEEKS

The digestive system and processes of detoxification need to be working optimally to cope with the release of toxins. The amount of time for this stage is dependent on level of toxicity exposure and symptoms, using ingredients such as:

Glutamine, vitamin A	Improves integrity of gut and mucous membranes.
Licorice	Heals damaged and permeable gut mucous membranes.
Multistrain probiotic	Improves balance of microbiome and support digestive function.
Milk thistle	Supports liver function.
Fibre	Regulates and optimises bowel function.

DISPLACE TOXINS AND MICROBES - 1-4 WEEKS

Now that the environmental load is reduced and digestive tract integrity is improved, the body is better equipped to deal with antimicrobial die-off and excretion using:

Antimicrobials (garlic, chitosan)	Kills harmful bacteria in the gut.
<i>Saccharomyces boulardii</i> (SB)	Regulates microbial homeostasis - neutralises and inhibits growth of bacteria and parasites, modulates immune responses, stabilises gut barrier function.
Quercetin	Decreases inflammatory processes in the gut.
Fibre	Regulates and optimises bowel function.

SUPPORT DETOXIFICATION PROCESSES - 1-6 WEEKS

For Phases I and II detoxification (liver):

B vitamins, iron, BCAAs	Activates phase I detoxification.
Glutathione	Neutralises free radicals and supports phases I and II detoxification.
Antioxidants – vitamin C, selenium, zinc, alpha lipoic acid, flavonoids, copper, green tea, chlorella, spirulina	Neutralises intermediary free radicals. Protects against reactive oxygen species (ROS) and oxidative damage.
Thiols – broccoli, cabbage, Brussels sprouts, garlic, onions	Supports phases I and II detoxification, and neutralises intermediary free radicals.
Milk thistle, turmeric/curcumin	Improves and supports liver function. Enhances the flow of bile, lessening liver congestion and enhancing detoxification.
Amino acids (glycine, taurine)	Supports phase II pathways.

For elimination and excretion (Phase III detoxification) – bowel and kidneys:

Fibre	Regulates and optimises bowel function.
Fibre, guar gum, chitosan, chlorophyllin	Binds and absorbs toxins.
Water	Helps keep toxins diluted.

REPAIR AND MAINTAIN - 1-4 WEEKS

Maintain all the hard work by continuing to reduce toxic exposures and supporting the natural detox processes of the body with:

Multistrain probiotic	Maintains and supports healthy bowel and digestive function.
Antioxidants	Neutralises free radicals and supports liver function.
Fibre	Maintains regular bowel function.
Multivitamin	Supports optimal intake of essential nutrients.

OTHER CONSIDERATIONS

LIFESTYLE

- Do not buy food packaged in plastic or use plastic for storing food.
- Avoid aluminium and Teflon cookware.
- Use natural products without fragrance that are low in chemicals and free of phthalates.
- Use fragrance-free natural household cleansers low in solvents.
- Avoid "Scotchgard"ing your furniture.
- Wear natural fibers.
- Use bedding materials made from natural products with no or low release of volatile organic compounds (VOCs).
- Clean, dust and vacuum regularly.
- Exercise moderately every day.



DIET

- Drink 1-3 L of filtered/purified water.
- Avoid alcohol, coffee, soft drinks and packaged juice.
- Avoid saturated fats, refined sugars and salt.
- Limit barbecued, grilled and charbroiled foods.
- Avoid eating processed foods and gluten-, dairy- and soy-containing food products.
- Don't eat farmed fish.
- Eat a diet of fresh and organic fruits, vegetables, whole grains, nuts and seeds and meats.
- Eat foods that support the liver and detoxification processes:
 - High sulfur content foods – garlic, eggs, onions, legumes.
 - Cruciferous family of vegetables - broccoli, cabbage, brussels sprouts.
 - Artichokes, turmeric, beets, carrots, dandelion, cinnamon.
 - Antioxidants – blueberries, goji berries, raspberries, kale, spinach.
 - Water-soluble fibres – pears, apples, oat bran, legumes.



FIBRE

- Fibre is an essential part of any detoxification protocol. It is beneficial because it binds to substances in the gut to decrease their absorption and interrupts enterohepatic circulation of bile acids so toxins are eliminated and not transported back to the liver.²²
- Sourced from the endosperm of the Indian cluster bean, guar gum is a good source of water-soluble, gel-forming fibre.
- As a dietary fibre, it helps in the maintenance of bowel regularity, significant reductions in total and LDL-cholesterol, control of diabetes and enhancement of mineral absorption.
- Partially hydrolysed guar gum (PHGG) is exposed to enzymes that break it down, reducing its thickness compared to guar gum.

FASTING

- Embark on a 3-day fast at the change of every season.
- Fasting is one of the oldest known therapies and quickest ways to increase elimination of waste and enhance the healing processes.
- During a fast, stored toxins are released from fat cells, so supporting the body's detoxification processes is important.
- Participate in only light exercise such as walking and stretching while fasting.
- Ensure lots of rest and naps.
- Caution in diabetes or other health conditions; consult a GP.



SWEATING/SAUNA

- The physiological process of sweating has long been regarded as “cleansing” and of low risk, and is a beneficial consideration for detoxification.
- It has been shown that the levels of most heavy metals are lower in people who exercise regularly, i.e. increased levels and occurrence of sweat and increased elimination.²³
- In those with higher toxic exposure or body burden, excretion via sweat generally exceeds plasma or urine concentrations, and dermal could match or surpass urinary daily excretion.²⁴
 - Arsenic, cadmium, lead and mercury are excreted from the skin via sweat (during exercise or sauna) and rates of excretion are reported to match or exceed urinary excretion in a 24-hour period.²⁴
- Induced sweating appears to be a potential method for eliminating BPA,²⁵ as well as certain PCBs from the body.²⁶



TESTING AND PATHOLOGY²⁷⁻³⁰

Accurate assessment is important for not only determining if toxicity needs to be addressed but also for tracking efficacy of treatment.

There are a number of accepted tests, but they rely mostly on blood and urine, which are known to be primarily useful only for acute exposure and are unreliable to indicate body load. Tests also don't tell us the exact toxin or toxins that are causing the problem, but they do suggest types of toxins.

Result guides are also population based, so unless a patient is in the top 5% of blood levels, they are not considered toxic. Obviously, the problem with this is the assumption that those with lower levels are healthy and not being damaged by their toxic load. But, as practitioners, we know "normal isn't necessarily healthy".

Test	Marker	Indication
Full blood count (FBC)	WBC count	Low count is early indicator of toxic exposure. Decreases in proportion to body load of PCBs and OCPs.
	Platelet count	Low count is early indicator of toxic exposure. Chronic low-level exposure to solvents decreases platelet count.
	RBC count	Basophilic stippling occurs in arsenic and lead poisoning.

Test	Marker	Indication
Liver enzymes	GGTP	<p>Increased by most environmental toxins.</p> <p>Increases in proportion to load of toxic metals and POPs.</p>
	ALT	<p>Increases in a dose-dependent manner with load of blood cadmium, lead, mercury, OCPs, PCBs and PFCs within and above the normal range.</p> <p>10.4% of adults have an elevated ALT typically due to NAFLD, which is likely caused by toxin exposure and excessive consumption of high-fructose corn syrup.</p>
	AST, GGT, ALP	Increases with load of PCBs, OCPs and PFCs.

Test	Marker	Indication
Metabolites	Serum uric acid	Increases in proportion to body load of PFCs.
	Bilirubin	An indicator of chronic liver dysfunction. Increases in proportion to the level of various PCBs.
	Urinary 8-OHdG (and other DNA repair metabolites)	A biomarker of generalised, cellular oxidative stress; possible risk factor for cancer, atherosclerosis and diabetes. Correlates with toxic load, such as mercury.
	Homocysteine	An indicator of cadmium and lead toxicity.
	LDL-cholesterol	An indicator of PCB toxicity.
Inflammatory markers	CRP	Increased by most environmental toxins.
Blood sugars	All markers	Very strong correlations between toxic load and all measures of blood sugar regulation.
Urine (24 hour)*	Creatinine	Elevated results indicate exposure. Normal results exclude recent, clinically significant exposure to those metals analysed. Higher cut-offs may apply for industrial exposure.

Test	Marker	Indication
Stool**	Heavy metals	Comprehensive evaluation of environmental exposure, accumulation and endogenous detoxification of, as well as a direct indication of dietary exposure to, toxic metals.
Hair mineral analysis***	Minerals Heavy metals	Gives an indication of exposure that has occurred over time (in the past); it does not show recent exposures.

Except for FBC, it is ideal to be in the lowest quartile of the range of each of these tests.

* The window of exposure for urine is a few hours to a few days, whereas blood is often a longer window from a few hours to up to a few months. However, there are multiple variables that impact which sample type is most appropriate including the element's half-life, valence state/form/species, toxicokinetics, dose, time span of exposure and route of exposure.²⁸

** For many toxic metals, faecal (biliary) excretion is the primary route of elimination from the body.²⁹

*** HMA is an ideal base line test. Blood and urine will reflect exposures that are chronic or that have happened in the last few days, and can be subject to daily and even sometimes, hourly variations.³⁰

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