

Your body clears toxins through five pathways. Supporting each one — with a clean diet, hydration, movement, and targeted botanicals and nutrients — is what makes a cleanse work. Here's how each pathway functions, what decreased function looks like, and how to support it.

Skin

Gastrointestinal System

Kidneys

Liver

Lungs

Gastrointestinal System

FUNCTIONS

- The HCl acid in our stomach is our first line of defense against microbes.
- The GI tract is responsible for about 25% of the first-pass metabolism of toxins.
- The colon absorbs water, electrolytes (salts), and a limited amount of digested products.
- Temporary storage of waste products.
- Excretes toxins through feces.
- Bowel bacteria are a source of toxins, which are also excreted fecally.

SIGNS OF DECREASED FUNCTION

- Bowel movements >12–14 hours apart. "Ideal" is once upon rising and 20 minutes after every meal.
- Gas, bloat, reflux
- Food intolerances / allergies / "leaky gut"
- Eczema
- Fatigue
- Weight gain / loss
- Anemia

SUPPORTIVE MEASURES

- Clean diet high in fiber!
- Adequate hydration: 1/3 your body weight in ounces of water per day, plus 8 ounces for every vice and every hour of exercise.
- Exercise
- Stress reduction
- Botanicals: Licorice, Fennel, Chamomile, Cascara, Senna, Marshmallow, Comfrey, Peppermint, Quercetin
- Digestive enzymes
- Supplements: Antioxidants (vitamins A, E, C, and Zinc), B vitamins, Hydrochloric acid, L-glutamine, essential fatty acids (EFAs)

Gastrointestinal System — Endogenous Toxins

TOXINS PRODUCED WITHIN OURSELVES

- Can be due to major inherited inborn errors of metabolism, or minor genetic variations in particular enzymatic pathways.
- Can be due to intestinal products of dysbiosis — inappropriate organisms present, or appropriate organisms living in inappropriate populations.
- Products of dysbiosis include: bacteria — putrescine, cadaverine, ammonia; yeasts — arabinose, tartarate, citramalate; secondary bile acids (deconjugated); beta-glucuronidase (causing recirculation of hormones and other toxins).
- Deficiency of short-chain fatty acid (butyrate).

Kidneys

FUNCTIONS

- Filters and excretes toxins through urine (primarily the site for water-soluble toxins).
- 120 ml of filtrate processed per minute, 1 ml of urine produced (99% of the filtrate is reabsorbed!).
- Energy intensive: consumes 7% of body oxygen while being only 0.5% of body weight.
- Responsible for regulation of water and electrolyte balance, and for regulation of blood pressure.

SIGNS OF DECREASED FUNCTION

- Kidney stones
- Urinary frequency (normal is 6–8 times per day)
- High / low blood pressure

SUPPORTIVE MEASURES

- Adequate water
- Kidney / bladder tea
- Supplements: Antioxidants (vitamins A, C, selenium, zinc)
- Botanical medicine: Uva ursi, Equisetum, Cornsilk, Buchu, Dandelion, Horsetail, Hydrangea, Juniper, Marshmallow, Slippery elm

Liver

FUNCTIONS

- The primary site of both primary and secondary metabolism of toxins. The GI tract contributes about 25% of the first-pass metabolism; then the lungs, kidneys, and skin make contributions to secondary metabolism.
- Filters blood to remove toxins; it enzymatically disassembles unwanted chemicals through two specific steps (especially fat-soluble toxins):
 - *Phase I*: often makes the compound more toxic; activates many pharmaceutical drugs; involves the cytochrome P450 enzyme system, which is 3.5 billion years old and ubiquitous throughout the animal kingdom.
 - *Phase II*: makes the Phase I compound water-soluble.
- Synthesizes and secretes bile full of cholesterol and other fat-soluble toxins.

SIGNS OF DECREASED FUNCTION

- Chemical sensitivity (drugs, perfumes, caffeine, strong odors, paints, solvents, etc.)
- Food intolerances
- Leg / ankle swelling
- Hemorrhoids

SUPPORTIVE MEASURES

- Clean diet high in "liver foods" such as dark green, leafy vegetables; garlic; onions; beets; artichokes.
- Maintaining a clean environment.
- Botanicals: Milk thistle, Fennel, Licorice, Astragalus, Gotu kola, Red root, Dandelion, Fringe tree.
- Supplements: Antioxidants (vitamins A, C, E, Zn, Se, NAC, glutathione) and EFAs.

ENDOGENOUS TOXINS

- Byproducts of Phase I detoxification, such as reactive oxygen and nitrogen species (hydroxyl, superoxide, peroxy, NO radicals, peroxynitrite).
- Byproducts of hepatic and gastrointestinal detoxification.
- Byproducts of our immune system, i.e. microbial attack and "oxidative burst."

Lungs

FUNCTIONS

- To perform oxygen / CO2 exchange.
- Gaseous toxin release.

SIGNS OF DECREASED FUNCTION

- Cough
- Shortness of breath
- Wheezing
- Asthma
- Fatigue

SUPPORTIVE MEASURES

- Increased respiration (exercise). Meditation encourages proper breathing.
- Botanicals: Coltsfoot, Comfrey, Elecampane, Goldenseal, Horehound, Mullein, Myrrh, Usnea.
- Supplements: Antioxidants (vitamins A, C, E, and Zn) and EFAs.

Skin

FUNCTIONS

- Protective barrier from the outside world.
- Eliminates toxins through sweat, especially fat-soluble toxins such as DDT, and heavy metals such as lead.

SIGNS OF DECREASED FUNCTION

- Dryness
- Rashes (eczema, acne, rosacea)

SUPPORTIVE MEASURES

- Hydration
- Exfoliation (scrubs, dry skin brushing)
- Sweating (exercise, sauna)
- Botanicals: Gotu kola, Elder, Burdock, Nettle, Violet.
- Supplements: Antioxidants (vitamins A, C, E, and Zn) and EFAs.

Beyond Detox: Success Story

"The weight I have tried unsuccessfully for decades to lose is nearly gone. I am so grateful, you cannot imagine. For someone like me who has faced this struggle for most of my life, I hope you understand how life-altering this will be if I finally have a solution and a way of maintenance."

— C. Singh