

## DETOXIFICATION DEMYSTIFIED

The latest trend in alternative medicine is a “cleanse” or a “detox”. While most of us have an understanding of the definition of detoxification, the process in the body is usually unknown and often misunderstood by the general public. The confusion is compounded by differing opinions on the viability of such approaches. The truth is, the science behind detoxification is real.

All organisms are exposed to unavoidable external toxins (known as xenobiotics) in our environment as well as internal toxins as the by-products of metabolism. By design, our bodies are capable of handling these toxins through complex systems of detoxification, thereby decreasing the negative impact of these toxins on our bodies. However, the real story is a little more complicated than that. The majority of these toxic products are fat-soluble, especially those more resistant to breakdown, which enables easy penetration into our cells but also makes their elimination much more difficult.

### **Detoxification: Round One**

The process of detoxification in the body is one of biotransformation. Through a series of steps, toxins are made increasingly more water soluble and subsequently more easily excreted from the body. Biotransformation occurs primarily in the liver and here detoxification occurs in two phases. Phase I is the body’s first defense against harmful substances. Through a series of oxidation, reduction, and hydrolysis reactions, functional groups such as hydroxyl (OH), carboxyl (COOH) or amino (NH), are added to a toxin molecule. This is carried out by the action of many different enzymes, the most

common are the Cytochrome P450 superfamily of oxidases (enzymes that oxidize). This diverse group of enzymes (several hundred varieties) is responsible for the biotransformation of many xenobiotics, drugs, steroids, environmental pollutants, and carcinogens.

The biotransformation of a molecule can occur in two ways: bio-inactivation (neutralization) or bio-activation. Phase I detoxification is a predominantly bioactive process in which the intermediate metabolites produced are more reactive, and as a result are more toxic than the original. While this seems counter-intuitive, it is necessary in order for the second phase of detoxification to occur. Phase II detoxification reactions decrease the reactivity and thus toxicity of a molecule with the addition of a hydrophilic (water-loving) compound that allows for rapid removal by the kidneys through urine, or by the bowel through feces.

Ultimately the function of detoxification is to minimize the potential damage to the body as a result of toxicity. Dysfunction occurs when the system is overloaded or if one phase is out of balance with the other; it is this dysfunction or imbalance that has been linked to a number of disease processes; in particular, multiple forms of cancer and other chronic illnesses. If phase II reactions are inhibited or phase I reactions initiated without concomitant increase to phase II, the optimal balance is compromised and imbalanced detoxification results. The intermediate metabolites of phase I reactions are more reactive and toxic than the initial substance; a dysfunction in the system that increases these intermediate metabolites can cause damage to other cells of the body. The process of oxidation creates free radicals, which results in oxidative damage to surrounding cells. This creates excess demand for antioxidants, which leads to depletion of antioxidant defenses of other cells; these reactive molecules have an affinity for proteins, lipids, and nucleic acids, especially DNA and RNA. Oxidative damage of these cellular components causes structural changes that can lead to malfunction and carcinogenesis in the body.

Since phase II reactions involve the use of dietary cofactors that are used up in the process of detoxification, it is essential these be replenished. Nutritional deficiencies therefore can result in an impaired capacity of the liver to perform detoxification.

Ok, so what is the take-home message from all of this complicated biochemical gobbledygook? In essence, what this process is telling us is that if phase II detoxification cannot keep up with phase I, the body is placed in an ‘at-risk’ state because it cannot remove potentially damaging substances. When substances can’t be removed they cause damage in the body, initiate inappropriate hormonal reactions, or become stored in the body’s excess fat tissue.

## **Detoxification: Round Two**

The detoxification process does not end with the liver. The conjugated metabolic products of phase II are then transported to the kidney for excretion through urine. The kidney’s ability to properly excrete these substances is greatly affected by hydration levels; dehydration has serious consequences for the body’s ability to detoxify and excrete toxins due decreased urinary output. As the final organ of detoxification, it is imperative that the kidney is functioning optimally. Without the ability to excrete the conjugated metabolites of detoxification, a system wide “back-up” of toxins can result, leading to ill-health and disease.

The unique composition of each organism results in a normal range of variability in one’s susceptibility to toxins and the subsequent ability of the body to detoxify. Theoretically, the fat-soluble nature of xenobiotics makes those with greater fat distribution more vulnerable to toxic build-up. This is especially true of women who are naturally prone to an increased percentage of fat mass over men. The inevitable exposure to toxins in the air, water, and food is compounded by the high rates of

exogenous hormone consumption from various birth control interventions, and later, hormone replacement therapies. This makes detoxification for women of particular importance.

Naturopathic medicine is unique in its ability to target these differences in toxin metabolism by tailoring treatment plans suited to each individual. It is essential that any detox or cleanse be appropriately supervised to ensure proper balance and function of appropriate detoxification pathways. Through the elimination of toxicity, our bodies operate at their best; reducing disease risk and laying the foundation for a happier, healthier future.

## **Detoxification Support**

### **Dietary Choices**

- Based on the Whole 30 Book. Emphasize green vegetables and coriander, blueberries, raspberries, blackberries
- Remove: nightshades (tomatoes, potatoes, eggplant, and peppers), wheat, dairy, red meat, sugar, alcohol, fruit, and refined carbohydrates

### **Hydrotherapy**

Alternating hot and cold: 1 minute hot shower, 30 seconds of cold water.

OR

Alternate a sauna or steam room and a cold shower. Always end with the cold part of the alternating series.

## Detoxification Green Smoothie

When making smoothies without lemon you need to consume them the day they are made, otherwise the fruit will begin to oxidize. Lemon juice does such a great job of preserving them. Try adding in frozen blueberries or cherries, though your smoothie won't be green anymore (and may not look very appetizing). Frozen peaches work great too. You can follow the recipe below or get creative with what you have on hand.

2 apples, cored and cut into large chunks  
2 pears, cored and cut into large chunks  
handful of fresh or frozen cranberries  
1 to 2-inch piece of fresh ginger  
2 cups of water  
6 to 7 large kale leaves  
4 to 5 large collard greens  
large chunk of green cabbage (about 1 to 2 cups chopped)  
handful of fresh parsley

Place fruit and water into a high-powered blender and blend until smooth. Stuff in the greens and blend again until smooth. Add more water for a thinner smoothie.

Store in a glass jar in the fridge for up to a day. Source: [www.NourishingMeals.com](http://www.NourishingMeals.com).  
Drink daily for two weeks.