Detoxification is the physiological process by which the body breaks down and eliminates toxins via feces, urine, sweat and expired air. These toxins accumulate from two predominant sources: (a) the environment (exotoxins) and (b) from our own metabolic functions (endotoxins).

The first category includes the more than 75,000 man-made chemicals in the environment, ranging from additives, pesticides, insecticides and fungicides that contaminate our produce supply to the hormones and antibiotics in our eggs and meats. Our water and air have been polluted by industry, including the heavy metals currently inundating our fish. The chemicals added to our water for purification, i.e. chlorine and fluoride, can suppress thyroid function. Prescription, over-the-counter medications and recreational drugs have toxic side effects. Even the manner in which we prepare our foods, such as frying and barbecuing, and our utensils i.e. aluminum cookware and plastic utensils, give off toxic residues. The total of all these chemical exposures place a heavy burden on the body’s capacity for detoxification.

The second group of toxins our body must eliminate result from our everyday metabolic processes. Some examples are hormones, inflammatory substances (histamine) and brain chemicals called neurotransmitters i.e. serotonin. Each of these chemicals has very specific function. Upon completion of their task they are broken down, neutralized and eliminated. If not, they slowly accumulate and cause a wide variety of problems, i.e. relative estrogen excess is involved in PMS, breast and prostate cancer.

When addressing issues of detoxification it is important to recognize each individual’s ability to handle and eliminate toxins is different. This “biochemical individuality” helps explain why a varied group of individuals exposed to the same toxins respond differently. Some may develop symptoms or illnesses. Others will feel no repercussions. But it is important to understand the basics of detoxification when starting any program and the main site for this process is the liver.

How does it Work?
Before toxins are eliminated through the feces, urine, sweat and expired air, they are filtered through the liver and neutralized through three basic means:
• large particle toxins are removed as the blood passes through the liver;
• the liver produces and secretes bile which carries out the fat-soluble toxins;
• the liver has a two phase, enzymatic system which breaks down toxins into inert compounds for elimination.

Blood passes through the liver at a rate of approximately two quarts per minute. As it moves through the liver it has specialized cells, known as Kupfer cells, which actually engulf toxic particles. This includes bacteria, toxins from their die-off, immune system chemicals and a variety of other compounds. These cells give off free radicals during their metabolic functions and require antioxidants (see basics of detoxification). As toxins enter phase II, each compound is directed to a specific pathway. This phase is comprised of primarily six different pathways. Each one uses different nutrients and enzymes to neutralize the toxins and make them available for elimination. Whereas Phase I functions by oxidation, this process of neutralization is known a conjugation. There are six pathways in Phase II:

- **Glutathione**: Needs adequate levels of glutathione (made from cysteine, glycine,glutamic acid, potassium and magnesium), pyridoxal-5-phosphate (B6), zinc, selenium
  - **Foods**: broccoli, cabbage, cauliflower, brussel sprouts, asparagus, avocado, and walnuts
- **Methylation**: Needs s-adenosyl-methionine(S-ame), folic acid, B12, choline, betaine(TMG), B6, magnesium, zinc, pyridoxal-5-phosphate (B6)
  - **Foods**: eggs (or lecithin), green leafy vegetables, animal proteins or B12 supplements
- **Glucoridation**: needs glucoronic acid
  - **Foods**: artichoke, citrus peel, dill weed seeds and caraway seeds
- **Sulfation**: Needs, cysteine, methionine, B6, molybdenum, iron
  - **Foods**: Beans, whole grains
- **Acetylation**: needs acetyl-CoA, B2, pantethine (B5),
  - **Foods**: whole grains and vitamin C rich foods, i.e. peppers, cabbage and citrus fruits
- **Amino Acid conjugation**: needs glycine, taurine, threonine
  - **Foods**: adequate protein diet

In general, there is an optimal pathway to detoxify specific compounds. This assures the quickest and safest route of elimination. However, pathways do have the ability to handle others compounds i.e. hormones are primarily eliminated through glucoridation, but sulfation can work as a backup if this pathway is sluggish or overburdened. Over time, if the backup pathways are forced to handle the extra load, its own ability to neutralize toxins will be compromised. The toxins from both pathways accumulate, resulting in damage to our health.
Herbs are very useful in supporting healthy liver function. Milk thistle acts as an antioxidant, increases the levels of glutathione, helps regenerate liver cells and decreases inflammatory enzymes. Phyllanthus is gentle detoxifier and performs its function very gradually. This may be useful in more severe or debilitated conditions. Dandelion root stimulates proper gall bladder function. Tumeric acts as an antioxidant, protects and detoxifies the liver. Artichoke leaves are protective of the liver, assist in regeneration, increase bile secretion and decrease cholesterol production.

Though this is a rather linear outline of liver detoxification and supplementation, the relationship between the two phases is not always that simple. As we get older, Phase I slows down (so does blood flow through the liver-this is one reason why physical activity is so important), compromising detoxification. Proper nutrition minimizes the effects of age and helps maximize detoxification capacity. Many of the same foods necessary for Phase II are beneficial for: whole grains, brassica family foods (broccoli, cabbage, brussel sprouts, cauliflower), vitamin C rich foods etc.

Another important dynamic to understand is the rate at which each phase operates. For detoxification to be highly effective there must be a balance between both phases. If Phase I works at a faster pace than Phase II, the level of intermediate toxins produced will increase quicker than Phase II can break them down. Slowly, an accumulation of these toxins occurs, increasing the burden of Phase II. This may potentially overwhelm Phase II and compromise one’s health drastically. People with this tendency have heightened chemical sensitivities i.e. perfumes, smoke, odors, cleaning products etc. and tend towards chronic illnesses.

**Am I Toxic?**

Everyone must deal with the toxicities of life. We are constantly in the process of assimilating and eliminating everything we come in contact with. The question more appropriate is whether your capacity for detoxification is working optimally.

Since there are so many variables involved in detoxification, there are certain signs and/or symptoms that indicate if you’re ability to detoxify is compromised:

- *fatigue*
- *skin disorders*
- *sluggish bowel movement*
- *PMS/hormonal problems*
- *constipation (less than one full bowel movement/day)*
- *chronic exposure to chemicals at work/home*
- *bad breath*

This is a small list of common symptoms related to toxicity. Many disease processes such as Alzheimer’s and rheumatoid arthritis are also reflective of a toxic system. Actually, whenever there is a breakdown or compromise in any body function, there will be some level of unabated toxicity in the system. It becomes important to diagnostically differentiate what toxicity exists, i.e. viral or metal, and its derivation: toxic bowel, poor nutritional habits, environmental exposure, genetic weaknesses or any combination of factors.

*Key note: We previously mentioned one source of toxins came from the body’s own, metabolic processes. When diagnosing toxicity, the most important point of concern is the individual’s digestive function. It must always be carefully evaluated. Many biochemicals are released from undigested foods and microbes. The integrity of the intestinal tissue may be compromised from antibiotic, drug or steroid use. The birth control pill alters the internal ecological balance of the microflora. Poor dietary habits can cause incomplete digestion and poor elimination, setting up a toxic environment in the bowels. Stress may also play a major role in digestive dysfunction. All these can contribute to a toxic overload on the liver. If this is not properly evaluated and corrected, any program set up to balance liver function will be incomplete and possibly futile.

### How do you Treat Toxicity?

The first place to start is with diet. Some basic starving points include a wide variety of leafy greens (at least two servings) and 5-7 vegetables (mix up the variety by choosing those with different colors; however emphasis may be placed towards the cruciferous vegetables, onions, garlic, watercress, asparagus and mustard) daily. Vary your daily consumption of whole grains. Animal proteins should be lean. For some, red meats, except lamb, may be too difficult to handle. Eat your larger meals in the first half of the day and dinner should be the lightest. Fruits are to be eaten as snacks with nuts and seeds. Eat every few hours and do not consume large quantities of food at any one sitting.

If toxicity is severe, some forms of fasting, modified fasting or a liquid diet may be necessary. An elimination diet protocol may also be considered. This should be conducted only under the supervision of your doctor.

Do not eat after 8pm if possible. The liver works hardest between 1 and 3 in the morning. Eating late at night places an additional burden on the liver. Eliminate all commercial sugars, refined and processed foods. Do not use oils that are hydrogenated or even partially hydrogenated. If you feel you may have food allergies or sensitivities, remove these foods from your diet. The foods most commonly involved are wheat, dairy, sugar, corn, soy, citrus, peanuts, eggs, and flavor enhancers MSG and aspartame. Specific conditions may exist that are aggravated by certain foods, i.e. arthritis and the nightshades, gluten and gladin intolerance (please check with your practitioner about specifics). People with chemical sensitivities should avoid perfumes, colognes and possibly dried fruits. They may be lacking the trace mineral molybdenum. No smoking. Have your dentist use non-toxic substances with any dental repair work. The meatier steak fishes, shellfish and sushi should be replaced with the white meat fish such as sole, bass, tilapia, flounder and snapper. Eat organic. Use filtered or bottled water. No caffeine and no fruit drinks. If you live or work in an environment that is polluted or affects you, use ozone and or hepa-filters to help purify the air. Stay away from over-the-counter medications unless absolutely necessary.

Do not use aluminum or copper cookware. Use only stainless steel. Avoid aluminum products, i.e. toothpastes, deodorants, carry out trays etc. Do not put hot liquids in plastic or styrofoam cups. Do not use plastic utensils. Often, the water pipes in our homes may be made from copper or lead. This can lead to heavy metal toxicity. You may need to have your water evaluated. Those who drink well water should also have their water checked for parasites, microbes and for iron (if you pump your own water). Other than weight loss diets, it appears there are more “detox programs” on the market that ever before. Many of them offer solutions and promises that seem so remarkable, it’s hard to fathom. With detoxification there is no “one-size fits all”. There are general understandings as outlined above, with proper dietary changes and nutritional support, one can make effective changes. Yet, we must come back to the original concept of biochemical individuality. Each person has specific needs based on their history, genetic make-up and lifestyle habits. If you feel that some of the information above applies to you, please contact your practitioner and discuss any changes you would like to make. If you are taking any medications, do not take any herbs or vitamin supplements without consulting your physician first.