

Human Detoxification: Why Should We Care And What To Do?

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This month's newsletter is about the often-discussed topics of the environment, exposure to toxins, and the science behind human detoxification. In this issue we will address the biological effects of toxins and what can be done about them. Despite the ever-growing concern over the subject there's much to be hopeful about, and there are significant protective measures available to us.

We will address the mechanisms in the body allowing us to live successfully in the face of undesired environmental exposures and proactive steps we can take to maximize our daily recovery and prevent disease. We will also discuss what can be done to alleviate condition-specific problems caused by toxic exposure.

The Body's Amazing Detoxification Abilities

The human body's intrinsic detoxification mechanisms are incredible! The body is uniquely designed to survive even the worst chemical exposures and toxic conditions. There are a number of major organ systems that protect us, predominantly the **skin, gastrointestinal (GI) tract, immune system, liver, kidneys, respiratory system, and during pregnancy, the placenta.** Within each system there are cellular components that maximize the efficiency of the toxin-neutralizing functions.

The **skin** is the largest organ of the body. It provides protection from external forces and substances. It allows the exchange of chemicals entering and leaving the body, and protects you from bacteria, viruses, fungi, etc.

With respect to the **GI tract**, just think of all the things we eat without knowing the exact content. It isn't just food and nutrients that goes into our mouths, but bacteria and hundreds of chemicals in each bite. However, how often do we hear of people becoming ill? Not often at all! That's due to the fact that the GI tract is very efficient at destroying and/or neutralizing most of those harmful substances. The GI tract also has the ability to eliminate toxins by trapping them in fat to prepare them for elimination in solid waste. What is generally not common knowledge is the relationship between the GI tract and the immune system.

The **immune system** refers to those parts of the body whose assignment it is to protect us from invaders that manage to penetrate our external defenses; the skin and the GI mucosa. (The mucosa refers to the cells which line the GI tract.) The mucosal cells allow absorption of nutrients and have antibodies and lymph nodes for protection. After mounting an initial attack against harmful foreign substances and organisms, the GI tract then alerts the immune system that an invader exists so it can be destroyed and/or



removed. The immune system is extremely complex, and scientists are learning new things about it every day. In order to comprehend the immune system, it may help to think of the military. In the military there are officers and there are troops. Officers plan, direct, and execute attacks, either offensively or defensively. The troops follow orders to complete their mission. In the case of the immune system, T-cells come from the thymus gland and are designed to be the officers of the immune system. B-cells, white blood cells, and many others comprise the troops. Each different type of B-cell and white blood cell does different things. For example, there are neutrophils, eosinophils, and lymphocytes, to mention a few. Neutrophils are responsible for mounting a defense against bacteria, while parasites and viruses are attacked by eosinophils and lymphocytes, respectively. There are also cells called immunoglobulins specifically designed to seek

out and kill cancer cells and other harmful invaders via the use of chemicals and antibodies. Collectively, the immune system components manage to render most toxins inactive.

The **liver** is amazing considering the number of functions it's capable of handling; over 400, all of which are important to survival. The main task of the liver is detoxification, so it is a primary site for metabolism and excretion of toxins. Hepatocytes are the liver cells designed to receive the moment-by-moment delivery of blood products, including processed food, drugs, hormones, toxins, and all other material that must eventually exit the body without causing us harm. These cells are amazingly resilient and have the power to regenerate, so if a part of the liver is removed, it has the ability to re-grow. In the initial phase of detoxification, hepatocytes take incoming chemicals from the blood, regardless of their origin and function, and temporarily convert them into what are often more toxic substances. This is simply a transient step to prepare them for elimination from the body through the skin, kidneys, lungs, and GI tract. If anything interferes with the hepatocytes' ability to usher converted chemicals out of the body during the second phase of detoxification, there will be an even greater accumulation of the more highly toxic chemicals within the body.

The **kidneys** are the organs primarily responsible for control of fluid and acid/base balance. That is, they regulate how much fluid remains in blood vessels and cells, which affects blood pressure, respiratory rate, and pH status (acidic, alkaline or neutral). A neutral pH for the human body is 7.4. The kidneys also rid the body of toxins prepared for elimination by the liver and other organs.

The **lungs** provide the body with the ability to exchange gasses. We inhale air, along with all of its contents, and exhale carbon dioxide and bodily metabolites that have been reduced to gaseous form. The air that we breathe includes all of the constituents from both our immediate environment

(such as our home, school and workplace), and from around the globe, which are carried from Asia, Africa, and elsewhere on wind currents.

Last in this discussion, but first in the line of defense, is the **placenta**. Designed to support life in utero (the womb), the placenta is also a barrier protecting the fetus from the outside world. Unfortunately, due to the number of pollutants in the environment, we now have infants that are being born toxic, with over 200 chemicals found in their umbilical cord blood. Our first line of defense has been breached! Now, our children are being born toxic!

What's Going On?

What's happening is that the planet is overrun with contaminants! This is because we live in an evolving world community that relies on technology, innovation and progress. The latter requires manufacturing, mining, chemicals, pharmaceuticals, processing, and the like. The human body, even with its amazing abilities, is subjected to far more poisons than what it is capable of handling. We refer to the ability to handle environmental exposures as "body burden." The body burden is the relationship between the total toxic load each person carries at any given time, and the innate ability of his/her body to cleanse itself. No two people are the same! Although there are mathematical formulas to calculate body burden, it is difficult to determine and requires constant blood and urine testing. Therefore, it's impractical and rarely done. Generally, people do not know where they stand until they reach the point where sickness sets in.

Consider a glass' ability to handle a liquid. As long as the glass is able to contain the liquid, that glass is working. However, once the glass is full to the brim with liquid, one additional drop will cause the contents of the glass to spill over. Even though the glass is still intact, it is effectively no longer working. The same concept applies to body burden. The organs of the body work successfully until they are presented with

contents in excess of their capacity. Then the toxins begin to spill over into tissues, bone, brain, immune system, etc., resulting in health problems.

A review of pregnant women is a good place to start when discussing the health issues associated with toxicity. Prior to conception all women should detoxify using natural means. The reason is clear, given the results of the study done every other year on the umbilical cord blood of newborns by the Environmental Working Group. Their report, "Body Burden: The Pollution in Newborns," detected 287 chemicals in the umbilical cord blood of 10 randomly selected newborns, collected by the American National Red Cross. The following are excerpts from the report, which can be found at <http://www.ewg.org/reports/bodyburden2/>.

"Of the 287 chemicals we detected in umbilical cord blood, we know that 180 cause cancers in humans or animals, 217 are toxic to the brain and nervous system, and 208 cause birth defects or abnormal development in animal tests."

'What's most startling is that we have such a wide range of compounds in us the moment we are born,' said Tim Kropp, the senior toxicologist for the project. 'Babies don't use any consumer products, they don't work in a factory, and yet they're already starting off with a load of these chemicals.'

Among the most pervasive pesticides found were:

- **DDE**, a contaminant and byproduct of DDT, which was banned in the US in 1972, but is still used in other countries to control mosquitoes;
- **Hexachlorobenzene**, a fungicide widely used on wheat until 1965, when the chemical magnates Bayer and Dow voluntarily discontinued its production, because it was deemed a probable carcinogen;
- **Dieldrin**, routinely used on corn and cotton until its use was banned in 1974, except for the purpose of controlling

termites.

With this as our starting point for body burden, we at InVite Health strongly recommend every person detoxify on a daily basis! Generally speaking, the body burden has been exceeded. Therefore, it is necessary to constantly assist your body in lowering the toxic load. Why? As indicated in the above excerpt, note the kinds of increased risks to which we are subjected: cancers, neurological damage, and birth defects. How did the chemicals get there? They come from food, water, air, and skin. Through the course of our lives we inadvertently compound the problem on a daily basis. Foods that are not certified as organic may contain pesticides, herbicides, steroids, hormones, and antibiotics. Toxins also enter our body when we drink water that is not tested to be pure. We inhale air that contains residues from soft plastics, polyaromatic hydrocarbons (from automobile exhaust fumes), contaminants from household cleansers, smoke stacks, etc. Our skin absorbs chemicals such as arsenic, which used to be found in treated lumber (this process was only banned 2-3 years ago). Arsenic is still found in drinking water and is used to combat infections in the chickens that we eat.

Another major source of toxic overload for our bodies is all the medications many of us take. (If you're taking medication it's because you were told you need it, so never discontinue doing so without consulting your doctor!) You may want to check with your doctor and/or pharmacist as to what effects the medications have with regard to nutrient depletions, liver and kidney health, and interactions with other medications if you are taking more than one.

Cellular Mechanisms

What really happens in the body as a result of exposure to all these potentially harmful chemicals? Cells are adversely affected by toxins in many ways, one of which is the increased production of damaging free radicals. Free radicals are molecules with a missing electron or single molecules of oxygen without their roving partner (another oxygen

molecule, which would make it O₂). The single oxygen molecule is the most damaging free radical in the body. An appropriate analogy would be throwing a bowling ball in a glass shop.

Various chemicals prevent our detoxification systems from performing their function. Some deplete the body of protective enzymes like glutathione. Glutathione is found primarily in the liver, lungs, and brain. It is very effective at removing toxins from the body in the final step of the major detoxification pathway. However, it is used up very fast when the body is overburdened with toxins, and often does not get replenished during illness or toxic overload. Hepatocytes and other cells in the body use an enzyme system called the cytochrome p450 system as an important first step in ridding the body of chemicals, drugs, hormones, alcohol, and many other potentially harmful substances. In the next step of this process, substances are prepared for removal by interaction with glutathione, after which they are directed to the GI tract, skin, kidneys and lungs for excretion. Without glutathione there's little elimination.

Other elements such as selenium, vitamin C, sulfa and methyl groups are then inordinately used up without being replaced. Therefore, not only is the body bombarded by free radicals which cause damage to DNA and mitochondria (every cell's energy factory), but the enzymes necessary for metabolism become damaged as well. The result of these depletions is that we cease to function efficiently and eventually become ill.

The Good News

One would think there isn't any good news here, but there is! There are actually many protective and corrective measures we can and should take. We'll address this section of our newsletter step-by-step.

Let's start inside the womb. All women, after checking with their

obstetrician, should consider detoxifying their body **before** becoming pregnant. Keep in mind that these recommendations are not just for pregnant women, but for anyone needing to reduce their body burden. There are many ways to go about this. First, eat primarily certified organic foods. Yes, they're more expensive, but what are you or your baby worth? Next, avoid soft plastics, such as the pliant plastic sometimes used to wrap foods or cover clothes from the dry cleaner. Change air filters in heaters and air conditioning units on a regular basis. Look for mold in bathrooms, kitchens, dark or damp areas, or any place in the house where water may have seeped. Discontinue using the toxic household cleansers sold in supermarkets. Go to a store that specializes in natural and organic products, or go online to find non-toxic cleaning supplies. Start taking **N-Acety-L-Cysteine (NAC)**, 600mg twice daily with food. Scientific literature is replete with data about the efficacy of NAC as a detoxifier because it only takes 32 minutes for it to be converted to glutathione in the liver, lungs and brain. **Glutathione** is required by a number of other enzymes so they may attach to, deactivate, and accelerate the removal of dangerous chemicals. It's a good idea to supplement with **Detox Hx**, which contains **NAC** as well as four other ingredients, all of which detoxify the body



safely: **Phyllanthus Amarus leaf, sulforaphane, alpha lipoic acid, and ellagic acid.** The **InVite Green Tea Tx** is a great all-purpose protectant, which contains **EGCG**, one of the most powerful antioxidants known. It assists the body in ridding itself of the free radicals created by toxins. Add to your regimen the **InVite Multivitamin**, which contains an excellent combination of vitamins, minerals, and additional important antioxidants, many of which are required for detoxification and cellular protection. This aforementioned grouping of InVite Health products constitutes our “Core Program” designed to keep anyone’s body burden from exceeding the toxic threshold.

A Brief Explanation of Major Detoxifying Nutrients

Ellagic acid is a large, highly complex nutrient found in the healthiest of foods; pomegranate, dark berries, and some tree nuts such as walnuts. As previously explained, the detoxification system in the first phase often amplifies the toxic potential of a chemical, making it more dangerous. This is a necessary step toward the eventual deactivation and removal of the chemical by glutathione which occurs in the second phase of detoxification. Ellagic acid has a very complex structure, one end of which modestly slows the activation of the toxins in phase one, and the other end which enhances enzyme activity in the second phase. By slowing phase one and boosting many enzymes in phase two, ellagic acid actually decreases the toxic burden on your body. Dangerous chemicals may be removed as quickly by phase 2 as they were activated by phase 1.

- **Sulforaphane** is a potent nutrient common to the cabbage family, with the highest concentration found in broccoli sprouts. Sulforaphane is a very powerful detoxifying agent, which ignites many very important enzymes in the second phase of detoxification.

- **Phyllanthus Amarus** is an herb used widely in countries throughout Asia and South America. It contains liver-protective polyphenols, some of which are similar to those found in milk thistle, but in a higher concentration. Additionally, research shows that **Phyllanthus Amarus** attaches to heavy metals such as lead, mercury, and aluminum, facilitating their removal. In addition to its ability to shield the liver from toxic damage, the herb may even offer protection against viruses that target the liver.

- **NAC** has the ability to protect the lungs, liver, and kidneys from toxins. It also increases glutathione levels and can directly attach to some very dangerous carcinogens, such as arsenic, hastening their excretion. **NAC** is an antidote to acetaminophen toxicity; a drug which accounts for many cases of acute liver failure.

- **Alpha lipoic acid (ALA)** is considered to be a universal antioxidant, as it is both water and fat soluble. **ALA** improves glutathione levels while shielding the liver and kidneys from the effects of toxic exposure. **ALA** also has the ability to regenerate several other antioxidants back to their active state, including vitamin C, vitamin E, and coenzyme Q10.

Dimercaptosuccinic acid (DMSA) is a naturally occurring chelating (binding) agent that attaches to and removes heavy metals such as lead and mercury from the body. **DMSA** has been used as a remedy for heavy metal exposure since the 1950s.

Triphala is a blend of herbs from India that falls under the category of a mild herbal bitter. It promotes healthy tone of the intestines and improves digestion. It also improves bowel movement and the removal of intestinal toxins. Herbal bitters have a tonic effect on the liver and may help improve liver detoxification.

Psyllium seed powder is a dietary fiber high in mucilage. It absorbs moisture into the stool and helps cleanse the colon. **Psyllium** promotes healthy bowel function and helps prevent or treat constipation without the use of irritant laxatives. It helps reduce cholesterol and may improve blood pressure. In diabetics **psyllium** helps normalize their blood sugar control. It also helps protect the colon in much the same way as whole wheat.

Calcium-D-Glucarate is a supplemental form of glucaric acid, an ingredient found in vegetables belonging to the cabbage family. To understand how it works, you need to know about an enzyme released by bacteria in the intestines called beta-glucuronidase. This enzyme cleaves the bond between our digestive bile acids and carcinogens (cancer-causing substances), allowing these carcinogens to become reabsorbed and eventually enter into sensitive tissues such as the breast or prostate, where they can contribute to disease. **Calcium-D-glucarate** inhibits the activity of this enzyme, thereby preventing the resorption of carcinogens from the stool. The **glucarate** also helps rid the body of many toxins by directly attaching to some very dangerous chemicals in the second phase of detoxification, through a pathway called glucuronidation. Some of the carcinogens inhibited by glucuronidation and **glucarate** include dangerous estrogen metabolites, polycyclic aromatic hydrocarbons, heterocyclic amines, aromatic amines, fungal toxins, and nitrosamines.

InVite Health is known for its condition-specific formulations. Many of our readers have health problems caused by toxins. Condition-specific formulas from InVite are available for:

- Nervous system toxicity;
- Hormonal system support and regulation;
- Respiratory system support;
- Immune system function;
- And, of course, detoxification