



Learn how diet plays a role in the detoxification process and how RDs specializing in integrative and functional medicine are applying the research to clinical practice.

Diet *and* Detoxification

By Juliann Schaeffer

Detox: For one small word, it has a whole host of meanings, depending on who's talking—and possibly what they're selling. When a client reaches out for nutritional guidance with "detoxing," he or she may reference a weight-loss cleanse marketed by a celebrity or maybe some simple information on juicing. Or a client may come to an RD complaining of general malaise or illness and wonder whether detoxing can alleviate the symptoms.

Whatever images of detoxing clients bring with them to a consult, likely they have questions about how a diet may work or how it may help them, and they're looking to you for answers. Yet the topic of detoxification is a contentious one, not just among consumers, but among the RD community as well.

While debate may linger among dietitians as a whole, there are many RDs within the integrative and functional medicine community who believe today's highly toxic environment necessitates a form of detox diet as medical nutrition therapy (MNT) that could benefit many individuals based on their exposure level, diet and lifestyle habits, and genetics. Dietitians refer to previous and emerging research that suggests specific nutrients play an integral role in the detoxification process, noting that many tenets of a clinical detox diet contain guidance quite similar to what most dietitians already provide each day.

The Debate

Some dietitians, skeptical of what they perceive to be fad diets, steer clients away from over-the-counter detox plans and toward whole-food prescriptions. Other RDs, many specializing in integrative and functional medicine, point out that proper detoxification protocols can help clients conquer any number of ills.

Much of the debate surrounding detox centers on whether the body needs help flushing from its system any foreign toxins (also known as xenobiotics, which refers to any chemical substance foreign to the human body), since detoxification is a natural human bodily process.

According to Marjorie Nolan Cohn, MS, RD, CDN, ACSM-HFS, a spokesperson for the Academy of Nutrition and Dietetics (the Academy) and the author of *The Belly Fat Fix*, the human body can eliminate any toxins it comes into contact with just fine and says RDs should warn consumers of the risks involved with such fad diets. "Detox diets are illusive and popular, but they aren't proven to do what they say they'll do—ie, flush toxins out of your system," she says. "Organs and the immune system can handle detoxification on their own, no matter what you eat. The best detox is an overall healthful eating plan along with plenty of fluid that promotes regular trips to the bathroom."

Robin Foroutan, MS, RDN, HHC, an integrative medicine nutritionist who's given presentations on the subject of detoxing, is a big proponent of assisting the detoxification process with diet and supplements, though she may agree with Cohn's second

point. According to Foroutan, while RDs may reject detox on the above principle, she says a proper detoxification regimen can look similar to an overall healthful eating plan, and that research exists supporting nutrition's role in the detoxification process.

In Foroutan's eyes, the detoxification debate largely is an issue of semantics. "The term 'detoxification' has been co-opted and overused by nonscientific practitioners, self-educated consumers, and the media, resulting in the large-scale rejection of the term detoxification by scientific practitioners, including RDs who are weary of the term and the practice," she says. "The problem is, when many RDs hear the word detoxification, they instantly think of the pop-culture version of detox rather than the systemic support of this critical physiological process.

"On the one hand, we have untrained health 'experts' talking about cleansing and detoxification in nonscientific terms, often in the context of products that make exaggerated claims," she continues. "In response, practitioners meet these claims with appropriate skepticism, especially since detoxification pathways aren't typically included as part of our RD training."

But the insistence that there's no evidence in support of detoxification simply is untrue, she emphasizes. "RDs need to better understand what detoxification actually is from a physiological perspective to be able to evaluate the research and understand the whys and hows of a medical detoxification protocol. Detoxification in medical terms isn't synonymous with popular cleanses, juice fasts, or water fasts, though a medical nutrition therapy detox may include an elimination diet."

Sheila Dean, DSc, RD, LD, CCN, CDE, an integrative medicine nutritionist and adjunct professor at the USF Health Morsani College of Medicine, agrees: "The words 'toxin' and 'detox' mean different things to different people. It means different things to the layperson and even among the scientific community, even within the field of dietetics. I don't believe that there's consensus and, in my opinion, it's more about a lack of understanding than a lack of scientific research."

Foroutan says that integrative and functional medicine RDs, and even the integrative and functional medicine community as a whole, largely agree about the benefits of assisting the detoxification process through diet, supplements, and lifestyle protocols. She even sees the beginnings of a paradigm shift in the general dietetics community. Whereas five years ago educational sessions at the Food & Nutrition Conference & Expo (FNCE) were devoted to debunking the myth of detoxification, now sessions on the topic address the specifics of "what is it, why is it important, and who needs it," she says.

"While detoxification is still controversial within the medical mainstream, we're seeing more sessions at FNCE aimed at the research to support detoxification protocols, so I think more and more practitioners will be looking at detoxification with less suspicion and skepticism, and more from a perspective of scientific curiosity," Foroutan adds.



Three Bean Salad

Kathie Madonna Swift, MS, RDN, LDN, an integrative medicine nutritionist and the author of *The Inside Tract, Your Good Gut Guide to Great Digestive Health*, who gave a presentation on detoxification at FNCE 2013, notes the importance of debate itself and appreciates the fact that RDs aren't quick to accept any nutritional therapy without science-driven evidence. "Scientific debate is good, and I think there should always be debate whether it's about detoxification or diabetes," she says, adding that she believes more education is needed across the RD community on the specifics behind the detoxification process and the role nutrition plays.

"There's absolutely research to support the use of detoxification protocols," Foroutan says, noting that the human body is constantly in some state of detox every minute of every day. "Without being able to detox, you would die. So this debate isn't a question of if detoxification happens or matters; this is a question of who needs additional detoxification support and who may benefit from it."

And this debate, as Foroutan and others concede, still is ongoing, as researchers evaluate how particular foods may speed up the detoxification process and test specific clinical detoxification protocols in clinical trials. There still are many unknowns, but that isn't stopping integrative nutrition and other health experts from perusing what Foroutan says is promising research to date and translating it into nutrition counseling advice that could help many clients dealing with the myriad toxins they're exposed to every day.

The Process

So what does the detoxification process entail? Spanning professional organizations and textbooks, the actual definition of detoxification varies slightly. But in general terms, detoxification is a natural process by which the human body rids itself of xenobiotics and endotoxins. "Physiologically speaking, detoxification is the primary biochemical process for removing toxins by converting non-water-soluble toxic compounds into water-soluble compounds that can be eliminated through urine, sweat, bile, or feces," Foroutan explains, noting that these processes primarily occur in the liver and are influenced by genetics and the environment, including diet.

In general terms, the detoxification process involves two, potentially three, phases. "Phase 1 enzyme activities include oxidation, reduction, and hydrolysis reactions during which the chemical [or toxin] is 'activated' to a more unstable, reactive form," Foroutan says, adding that the cytochrome P450 is the family of enzymes responsible for phase 1.^{1,2}

"Most pharmaceutical drugs are metabolized via phase 1 detoxification as well as endogenous toxins like steroids," she says. More is known about phase 1 enzyme systems through research conducted on the metabolism of pharmaceutical drugs, she adds. This process creates an unstable intermediary metabolite (free radical) that's further metabolized in phase 2, becoming a water-soluble molecule that can then be excreted through urine or bile.^{1,2}

In research that's still under way, Foroutan says a third step of detoxification has been suggested "in which an energy-dependent 'antiporter' pumps xenobiotics out of the enterocytes, which would decrease the intracellular concentration of that toxin."² She says this is thought to provide additional opportunities for phase 1 detoxification to occur before a toxin reenters circulation via the portal vein.¹

"It's hypothesized that when xenobiotics enter the intestinal enterocyte, some get 'effluxed' or pumped back into the intestinal lumen by an 'efflux' protein, p-glycoprotein," Foroutan explains. "Glutathione is a required cofactor, and the purpose is thought to provide additional opportunities for phase 1 detoxification to occur before the toxin reenters circulation via the portal vein."^{1,2}

"When the body detects high xenobiotic loads, phase 1 and phase 2 enzymes normally are induced so that more enzymes are present and detoxification occurs at an increased rate," she continues. "However, some toxic compounds, like those in cigarette smoke and charbroiled meats, increase phase 1 but not phase 2 enzymes, resulting in high levels of unstable intermediate molecules that can trigger free radical damage. This increase in circulating free radicals may be part of the mechanism linking the cancer-promoting toxins in cigarette smoke and charbroiled meats to increased cancer risk."³

Dean notes that it's important to understand that xenobiotics include much more than just the obvious toxic offenders, such as cigarette smoke and lead. In fact, the past 50 years have seen tens of thousands of new synthetic compounds introduced into the environment.³ A simple look at a person's morning routine shows the potential for being exposed to chemical compounds in deodorant, shampoo, and makeup, not to mention artificial substances and heavy metals ingested through food or chemicals inhaled through air-sanitizing products or air pollutants.

Much of the details of just how these toxins affect the human body still is to come, but in a January 2011 article in *Human and Experimental Toxicology*, Stephen Genuis, MD, a clinical professor at the University of Alberta and a key researcher of toxins and detoxification explains the potential health implications: "There is compelling evidence that various chemical agents are important determinants of myriad health afflictions—several xenobiotics

have the potential to disrupt reproductive, developmental, and neurological processes, and some agents in common use have carcinogenic, epigenetic, endocrine-disrupting, and immune-altering action. Some toxicants appear to have biological effects at miniscule levels, and certain chemical compounds are persistent and bioaccumulative within the human body.⁴

This highly toxic environment, argues Mary Purdy, MS, RDN, an integrative medicine nutritionist, is in large part why the human body needs assistance with a natural process it's been performing on its own for centuries. "I am well aware that our bodies are equipped with a system to eliminate the daily toxins we produce as well as some outside toxic compounds to which we are exposed daily," she says, "but in this day and age, we are overloaded with toxic compounds—from pollution to pesticides to the myriad of chemicals in our household and personal care products as well as the plasticizers used in everyday food and nonfood items, the dozens of additives, preservatives, and other chemicals in our food.

"We have a significant body burden going on here, and I imagine a sort of traffic jam going on in our livers," she adds, noting that a person's genetic makeup (having genetic variations in liver enzymes that can decrease the body's ability to detoxify substances) also may cause someone to have impaired detox capabilities through no fault of their own.⁵

Nutrition's Role

So the question is can diet be used to aid the body's natural detoxification process? As Dean explains, the detoxification system already depends on specific nutrients from the diet, and although research on using specific foods in clinical practice to aid detoxification still is in its infancy, certain foods and nutrients have been found to be associated with the upregulation, or inducing, of detoxification enzymes, leading to more enzymes being present and a faster rate of xenobiotic detoxification.²

"When something is upregulated, it's 'turned on' or activity is enhanced," Foroutan explains. "And when it's downregulated, it's 'turned off' or blunted. So, in this case, upregulation of an enzyme pathway by a gene would mean more of that enzyme will be produced and secreted, assuming the proper cofactors are present in adequate amounts." So eating certain foods has great potential to help facilitate or speed up the detoxification process, she says.

In general, B vitamins, glutathione (the body's main detoxifying antioxidant), and flavonoids have been shown to assist phase 1 detoxification, whereas all major conjugation reactions in phase 2 require micronutrient coenzymes, including glycine, N-acetylcysteine (NAC), and B vitamins.^{6,7} "Phase 2 detox is dependent on nutritional status and genetic variability," Foroutan says.

While a typical detoxification protocol recommended by integrative medicine nutritionists as MNT is based on whole foods, it takes into account the emerging and past research on how certain foods could help the detoxification process along,

whether by speeding it up or making it more efficient. "Some foods upregulate CYP450 enzymes that regulate phase 1 detoxification; others provide fiber to bind to toxins within the intestine for elimination in stool," Dean says.

For example, the phytochemicals that induce phase 2 enzymes can be found in cruciferous vegetables, onions, and garlic.⁸ Fiber intake supports regular elimination, which is crucial for excreting toxins through the bile and stool, Foroutan says, noting that brown rice fiber may be particularly beneficial in eliminating fat-soluble toxins. Turmeric/curcumin has shown promise in protecting the gallbladder and promoting bile flow,⁹ and research has shown the potential for pomegranate/ellagic acid in assisting detoxification pathways.¹⁰

Much research has focused on green tea's potential benefits in detoxification, according to Purdy, and one study showed its particular promise in promoting the induction of phase 2 detox enzymes.^{11,12} Foroutan notes that research has shown promise for various other foods in assisting the detoxification process, including high-quality proteins, artichokes, watercress, cilantro, and apples.¹²

In addition, laboratory and animal studies have shown how supplementation may aid the detoxification process, such as with NAC and glutathione.¹³⁻¹⁵ "The former is the precursor to glutathione, and glutathione is the master detoxifier in the body," Foroutan says. "Since it's thought that glutathione doesn't 'survive' digestion, NAC is recommended to increase glutathione stores." She also says research has shown that milk thistle may support glutathione production and, as such, research has looked into its potential application in ameliorating long-term hepatic and cardiovascular effects of cancer treatment.¹⁶⁻¹⁸

Admitting that research on clinical detoxification methods, especially related to diet, still is in its infancy, Genuis says he believes nutrition is "absolutely essential for proper detoxification and optimal health. Endogenous mechanisms of detoxification are totally dependent on nutrient sufficiency to allow the body to carry out various requisite functions such as conjugation in the liver—requiring glutathione—and glycine to facilitate water solubility of various compounds."

Even though nutrition's role in detoxification is an emerging science and the specifics of what foods aid detoxification most (and how) still is under way, Genuis urges nutrition professionals, including RDs, to stay abreast of the research on this subject and use their nutrition expertise in a clinical health care team approach to address the complete picture of patients' health, which he says includes assessing toxin exposure and aiding efficient detoxification processes.

"Sadly, medical graduates are not adequately trained to address the nutritional needs of patients, including those biochemical nutrients required for detoxification," he says. "Accordingly, the role of nutrition professionals as part of the contemporary health care team to assess and advise with various matters, including detoxification, is paramount."

Detox in Clinical Practice

When determining whether a detoxification protocol may benefit a client, qualified RDs often will assess a person's toxic exposure and genetic profile with one or more of a variety of tools and tests. While an in-depth discussion of these testing methods is beyond the scope of this article, Swift says the Quick Environmental Exposure and Sensitivity Inventory (QEESI), a validated evidence-based questionnaire,¹⁹ developed by Claudia Miller, MD, MS, as well as genomic profiles, heavy metal panels, and organic acid tests are some of the more common and useful screening and assessment tools used today. "A practitioner can request blood or urine profiles to test for specific toxic accumulation in the body, and gene panels can be done via blood testing or cheek swab tests," Foroutan says.

However, Swift notes that the search for reliable biomarkers to accurately assess toxicity and chemical and environmental sensitivities continues.²⁰

Encouraged by the research conducted so far, many integrative medicine nutritionists and other health professionals are including detoxification protocols in their clinical practice.²¹ Because research still is under way regarding the details of how food can be used as a clinical detoxification tool, no one detoxification protocol currently exists, leaving health practitioners to review the research and interpret how that translates to clinical practice.

According to Foroutan, she believes there are many different ways to think of detoxification in terms of MNT. "There is the general advice for supporting detoxification pathways that can and should be done year-round, such as eating more cruciferous vegetables and high-antioxidant foods, choosing organic foods [to minimize pesticides and other toxins], drinking green tea and more water, establishing optimal bowel habits, working up a sweat regularly, and reducing contact

with external toxins," she says, adding that she believes this advice could benefit many clients.

For people who might have tested high for a particular metal, for example, she says a formal, short-term detoxification plan could be an intervention to systematically help the body release and excrete toxins. "For healthy people with moderate exposure to toxins, I typically recommend a targeted detoxification protocol once to twice a year during seasonal shifts—spring and fall," Foroutan says. "For someone who's tested for bioaccumulation of specific toxins, like mercury, lead, parabens, plastics, or other kinds of industrial products, or when there's evidence of hormonal disruption, the intervention may last for a longer period of time and would involve retesting."

Certainly, detoxification regimens are highly individualized and should be customized to the client based on the person's habits, lifestyle, environmental exposure, and genetic makeup. But at its core, detoxification is a straightforward prescription: "It's as simple as R and R: remove and replace," Swift says. "You look at what do we need to think about removing from this person's diet, which are the foods that precipitate metabolic endotoxemia and adverse reactions [foods related to the Western diet such as refined sugars, trans fats, and saturated fats], and then what do we need to think about replacing those foods with [such as foods with fiber, flavonoids, and antioxidants along with lifestyle modalities that support the body's healing potential]." Metabolic endotoxemia, as Foroutan describes, is a subclinical increase in circulating "endotoxins" that triggers an inflammatory cascade that has been linked to chronic disease, including diabetes.²²

"There's no doubt in my mind that certain foods can both impair and enhance liver function," Purdy says, adding that her vision of a detox diet is "short term—about one to three weeks—based on eating healthful whole foods—eg, vegetables, fruits, nuts, seeds, beans, whole grains, herbs and spices—as well as eliminating foods that may add to the traffic jam or cause additional inflammation for some people such as refined sugar and certain food additives or preservatives."

Based on the research to date, integrative nutrition professionals acknowledge there's still much to learn about what an effective clinical detoxification protocol looks like as well as how best to determine which clients are in need of such. For now, health professionals interested in learning more about past and ongoing research are encouraged to seek further information from the Academy's Dietitians in Integrative and Functional Medicine Dietetic Practice Group or the Institute for Functional Medicine (see Resources).

Safety Considerations

Foroutan says that eating detoxifying foods, beverages, and spices almost always is beneficial, but because of the lack of evidence-based, peer-reviewed clinical trials evaluating specific detoxification protocols, she says certain patient populations, such as pregnant and breast-feeding women, shouldn't follow

Resources

**Centers for Disease Control and Prevention
Toxicology and Risk Assessment Conference**
www.cdc.gov/niosh/conferences/TRAC

Dietitians in Integrative and Functional Medicine
<http://integrativerd.org>

Environmental Working Group
www.ewg.org

Institute for Functional Medicine
www.functionalmedicine.org

**University of Wisconsin Integrative Medicine
Program Detox handout**
www.fammed.wisc.edu/sites/default/files//webfm-uploads/documents/outreach/im/handout_detoxplan.pdf

any vigorous detox program due to the potential for toxins to be released to the fetus or through breast milk.

Purdy says this caution applies to young children as well and says nutrition professionals also should exercise caution when working with clients taking medication because this requires specific knowledge of drug metabolism. In general, further research is needed to determine the safety and efficacy of using specific clinical detoxification therapies among specific patient populations.²¹

Overall, however, the basics of a detoxification program are safe and can benefit almost anyone, Foroutan says. "I believe that anyone can do a detox if it's just about increasing and focusing solely on eating whole foods and eliminating processed foods. That kind of diet will benefit everyone," she says.

"I think it's really important that dietitians not be turned off by the word detoxification but start embracing it, understanding that their programs likely are already supporting detoxification for people," she continues. "It's just a different way of looking at a healthful lifestyle. We always recommend whole foods and exercise, and so much of what we're already doing can be considered detoxifying.

"Detoxification is an important part of health and healing, and it can be supported by diet and lifestyle," she notes. "The question for practitioners will always be: How can I help my patients feel better and be healthier? Detoxification surely has a role to play there because so many steps in the detoxification pathway are dependent on nutrient status."

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