

From Chapter Four, Nutrient Supplementation:

~ Increasing Drug Efficacy and Tolerance ~

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I think another reason for nutrient supplementation that's been discussed very, very little, but that's very, very important is that certain nutrients may increase tolerance for and/or help to counter the negative effects of a number of the drugs commonly used with HIV infection. For example, in very interesting research at Tulane University, vitamin E has been shown to counter the bone marrow toxicity effects of AZT while potentiating the drug's antiviral activity.¹ The researchers note that their results suggest that AZT used in combination with vitamin E succinate has increased therapeutic efficacy against HIV. In addition, during the oral session at the 8th International Conference on AIDS entitled "*HIV and Nutrition*," Richard Beach, M.D., stated that "*patients who were put on AZT who had low plasma zinc levels did not do nearly as well on the drug as those who had normal plasma levels of zinc . . . In the original studies of AZT they found that B₁₂ deficiency correlated with an increased incidence of side effects from the drug. So both the efficacy and the tolerance of antiretrovirals can be influenced by nutritional status.*"²

So what we see here is that both the efficacy and the tolerance for the most commonly prescribed drug of all can be influenced by your nutrient levels. And now add to that the fact that the degradation pathway for AZT (in other words, the route that the drug takes to be broken down by the body) may use up several different nutrients, including vitamin B₁, vitamin B₃, vitamin B₆, and magnesium. You put all this together and there are at least seven different nutrients that you ought to be taking if you're on AZT. And don't forget, most of these nutrients have been found to be frequently deficient in this population. So you're taking a drug, the use of which can be strongly affected by your level of 7 different nutrients, and you're putting it in the body of a person who's extremely likely to be deficient in those same nutrients. Now to me, that ought to be a product insert. But since it isn't you should definitely be taking care of this on your own.

And I do think that we ought to be pursuing research on the nutrient aspects of the degradation pathways of all the drugs being used during the course of HIV disease. It's just crazy to me that we're putting drugs into people's bodies without paying attention to the fact that, in order to break them down, the body's going to need all sorts of nutrients in which it may already be deficient. I hope this research gets done in the foreseeable future. In general, it is known that detoxification pathways are significantly affected by protein, carbohydrate, fat, and micronutrient intake. Nutrient deficiencies can slow detoxification pathways. For example, the deficiencies that slow cytochrome P-450 activity (very important enzyme reactions used in detoxification of drugs in the liver) include B complex vitamins, vitamin C, vitamin A, vitamin E, calcium, copper, zinc, and magnesium. As you can see from the common deficiencies discussed earlier, many of these are often missing in people living with HIV so the ability to break down drugs may be seriously affected.

The small amount of analysis of degradation pathways (the route that drugs follow to be excreted from the body) that has been done has shown that several of the drugs in common use as antiretrovirals can use up specific nutrients as they are broken down for elimination from the

body. Other research has shown that certain other nutrients help prevent drug toxicity. Anecdotal reports have also supported the use of certain nutrient combos to reduce side effects. The combination of these would indicate the following:

If on AZT, add vitamin C (helps detoxify all drugs), vitamin E (may prevent bone marrow suppression), vitamins B₁, B₃, B₆, and the mineral magnesium (all of which may be used in the degradation pathway), vitamin B₁₂ (stimulates production of thymidine monophosphate which is used up by AZT breakdown and is, thus, not available for production of red blood cells; extra B₁₂ supplementation may help provide enough for both needs; if you are taking AZT, I would consider B₁₂ an absolute necessity), folic acid (works with B₁₂), L-carnitine (has been shown to reverse AZT-induced muscle inflammation), and zinc (see above);

If on ddI, take molybdenum, riboflavin, and iron (may be used in degradation pathway), and C (helps detoxify all drugs);

If on ddC, d4T, or any other drug known to cause neuropathy, consider taking the nutrients that may help to prevent or reverse neuropathy, including especially biotin, choline, inositol, B₆, B₁₂, thiamine, gamma-linolenic acid, and alpha-lipoic acid; [For details, see *Chapter Nine, Treatments for Neuropathy.*]

If on protease inhibitors that affect the liver, add the nutrients that promote maintenance of optimal levels of glutathione, the intracellular antioxidant that is very important for liver health. Included would be vitamin C, L-glutamine, alpha-lipoic acid, and N-acetyl-cysteine. Using sylimarin, the milk thistle-derived extract that can reduce inflammation and promote liver repair might also be quite useful. See more complete discussion in *Chapter Nine, Treatments for Liver Problems*. L-carnitine, the amino acid discussed in more depth in *Chapters Two and Six*, might also be useful as a way of helping to normalize the elevated triglyceride levels often seen with ritonavir. Although research has not specifically looked at its use in conjunction with protease inhibitors, L-carnitine has been shown to effect normalization of blood fats in HIV+'s with elevated triglycerides and may at least provide some help in this regard. [For more information, see *Chapter Six, Carnitine.*]

If on protease inhibitors that cause intestinal gas or bloating, the most effective approach seems to be taking pancreatic enzymes with every meal. For many people, this side effect can create a problem that is both embarrassing (a lovely rotten-egg, sulfurous-smelling gas that occurs throughout the day and night) and uncomfortable or even painful. Some people have felt that the problem is severe enough to warrant discontinuation of the drugs. To eliminate this, Dennis Rosa-Re, MD, a physician with a large HIV practice in Fort Lauderdale, Florida, recommends Ultrase MT-20, a potent pancreatic enzyme which contains the fat-digesting enzyme lipase. It is available by prescription and will usually be reimbursed. He has found that most of his patients have been able to eliminate the gas when they take 1-3 enzymes with each meal. Over-the-counter enzyme formulas may also work as long as they contain lipase. For those for whom this is insufficient to solve the problem, a community-derived solution that seems to work for many

is the addition of glutamine (in doses of 10-20 grams/day, taken in three doses, mixed into a liquid) and a high-colostrum whey protein product. The particular whey protein product used by the people I know has been Optimune, made by Optim Nutrition of Salt Lake City, Utah. Doses of 2-3 scoops (10-15 grams) of the Optimune are mixed into a drink and consumed once per day. I do not know why this combination would work to reduce the gas and bloating but enough people have reported the effect to me that it seems worth passing on. If this is a problem for you, it might be worth a try. [For more information on glutamine, see *Chapter Six, Glutamine*. For more information on whey protein products, see *Chapter Nine, Treatments for Diarrhea and Treatments for Cryptosporidiosis, Bovine Colostrum*.]

If on indinavir or any other drugs that affect the kidneys, drink large quantities of healthful liquids daily. Spread your water intake throughout the day; aim for a large glass every hour or so and, especially, every time you take your meds. A simple rule to ensure adequate water intake: divide your weight in pounds in half, and drink that many ounces every day. .

Much anecdotal evidence supports my observation that people on antiretrovirals who take nutrients along with them seem to do much better than the average with long-term drug use. I wish that all the companies selling drugs for use with HIV disease would provide information on the ways in which nutrient status may be adversely affected by drugs—and the ways in which the use of nutrients can help to prevent side effects—so that these facts could always be taken into consideration in developing people's programs. [See discussion of the individual nutrients in *Chapter Six*.]

1. Gogu SR, Beckman BS, Rangan SRS, and Agrawal KC. Increased therapeutic efficacy of zidovudine in combination with vitamin E. *Biochem. Biophys. Res. Commun.* 165:401-407, 1989; Gogu SR, et al. Protection of zidovudine-induced toxicity against murine erythroid progenitor cells by vitamin E. *Exper Hematol* 19:649-652, 1991.
2. Heyman J. Nutrition at VIII International Conference on AIDS. *AIDS Treatment News* (158):3, Sept. 4, 1992.