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The Seattle Treatment Education Project's (STEP) EZINE is an electronic treatment resource newsletter distributed monthly to case Managers, front-line workers, people affected by HIV/AIDS, physicians, other public health and allied health professionals and people living with HIV/AIDS.
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Personal Perspective: The Road from Perfection

by Heidi M. Nass

If I had been asked in the months following my diagnosis whether what I ate and whether I exercised could somehow control the HIV in my body I would have said, "No." Looking back, though, my behavior suggested a different answer.

Almost overnight I stopped caffeine and sugar, started taking vitamins and supplements with religious devotion, switched to unprocessed organic foods, added more long-distance runs and resistance work to my schedule and took up yoga. At the time, I was doing what I believed necessary to manage my health. Looking back, it seems pretty clear I was trying to outrun a train.

I started to realize things were out of hand when I visited an acupuncturist during this time and she asked me to write down all the supplements and vitamins I was taking. When she pointed to a few specific items on the lengthy list and asked what they were for, I heard myself say, "I don't remember." It wasn't that I had been taking things without meticulously researching them; I just couldn't keep them all straight.

Maybe in my head I knew "do everything perfectly" didn't equal "control HIV," but my behavior came straight out of "I need to do something or I'm gonna die." In the crisis of my diagnosis, I suppose I needed something to control, as if my brain took on a hobby while the rest of me was freaking out.

The irony of all this self-care was that it threatened whatever pleasure was in my life at the time. My runs were no longer the relaxing detours of my week but what I was supposed to do to purge toxins and keep my cardiovascular system toned. Yoga class felt less like a chance to practice meditation with my body and more like an obligation. The chores just kept piling up. Even the occasional six ounces of coffee acquired the taste of guilt.

Meanwhile, my viral load went up and my CD4s went down. When I ultimately went on antiretroviral therapy - the thing I was desperate to avoid - I found unexpected relief in what felt like surrender. As my viral load went to undetectable and my CD4s climbed above 1,000, I relaxed into the knowledge that I wasn't going to die next week. I started to believe I was in it for the long haul and I began to behave that way.

To be honest, I somewhat resented drug therapy. I hadn't taken an antibiotic in over ten years, let alone the three medications my regimen required every day. While HIV had never shown me a symptom, the diarrhea caused by Viracept was very real.

Strangely, though, I think this helped me start to see how diet and exercise fit into the picture. Some research and experimentation led me, for example, to the discovery that glutamine and calcium supplements could completely resolve my intestinal upset. I began to focus on supporting my body to tolerate the medications and reduce their potentially toxic effects.

Six years later, I have what I would call a recovered attitude about the role of diet and exercise in managing my HIV disease. I have a better understanding of all the tools of wellness and I've had some time to get adjusted to what it means to live with HIV.

The pleasure is back in my running. That cup of coffee tastes good again.

I don't look at my diet and exercise habits as ways to knock down the virus; I eat well and I exercise because it's really good for my body, and it feels that way. I try to keep it simple. The two things that I've always felt were most important for long-term strength and survival - gut health and muscle mass - are the two things I try to support with what I eat and what I do.

By anyone's standards, I eat well - organic vegetables and fruits, whole grains, plenty of protein and water. I'm a vegetarian, which probably helps me avoid some of the more unhealthy foods, but forces me to pay more attention to what I eat to be sure I get all the nutrients I need.

These days I exercise with realistic goals, a commitment to do the work, and forgiveness. Last year I trained successfully for a half-marathon but had to pull out a few days before the race when I got a hypersensitivity reaction during a drug switch. I was disappointed, but I took great satisfaction in knowing I could go the distance and committed myself to finding another race. For someone perpetually at risk of death-by-perfectionism, learning how to say "Oh, well…" - and meaning it - is as important to a successful exercise regimen as being disciplined about putting in the time every week.

These days my life feels too short to fill with "shoulds" and too long to opt out of investing in it. I've discovered a vast, sort of unruly world that exists beyond the pre-diagnosis denial that I would ever die and those first post-diagnosis months of being consumed by the idea of my death.

I engage in a fairly constant process of negotiating what I am willing and able to contribute on any given day to feeling healthy and strong. No one makes me find creative ways to eat broccoli (not my favorite) or get myself out the door for a run on a dreary day. Sometimes, though, these simple choices about what to put into my body and how to keep it strong remind me that I'm also choosing to participate fully in my life…and that feels good.

Heidi M. Nass is a community advocate based in Madison, Wisconsin.

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Mitochondrial Damage

By Brad S. Lichtenstein, ND

The topic of mitochondrial damage is gaining more and more press as a potential side effect of anti-HIV medication. Simply put, the mitochondria are the "energy factories" of the cell, which are tiny, rod-shaped structures, or "organelles," within each cell responsible for producing roughly 90% of all the energy that cell needs in order to survive. The number of mitochondria in a particular cell is based upon the energy needs of that cell and can range from 200 – 2,000.

The main way in which mitochondria generates energy, about 80%, is through a cellular aerobic (meaning requires oxygen) process called oxidative phosphorylation, which creates adenosine triphospahte, or ATP. Creating ATP includes an intricate series of steps that involve five multi-subunit enzymes or complexes. Each complex has a different nutritional and chemical need in order to function properly. This is important to remember when exploring the nature of treatment for mitochondrial damage.

As mitochondria produce ATP, they simultaneously yield reactive oxygen species (ROS), which are harmful free radicals that circulate throughout the cell, the mitochondria, and the body, causing more damage. The circulation of ROS leads to the activation of reactive nitrogen compounds, which in turn induce, or activate, genes in the DNA that are associated with many degenerative diseases such as Alzheimer's, Parkinson's, strokes, and multiple sclerosis. The term "mitochondrial toxicity," therefore, is a misnomer and actually refers to the process of mitochondrial damage.

The DNA for each mitochondrion (mtDNA) remains unprotected within the membrane of the mitochondrion itself. In comparison to the DNA in the nucleus of the cell (nDNA), mtDNA is easily damaged by free radicals and the ROS that it produces. Freely floating mtDNA lacks protective measures associated with nDNA, and therefore suffers from multiple mutations. It has been estimated that this lack of protective measures results in mutations to mtDNA occurring 10 to 20 times more frequently than mutations to nDNA.

In order for mitochondria to reproduce themselves, a specific enzyme called polymerase gamma, or "pol gamma" is required. Many medications have been found to interrupt pol gamma. Studies suggest that virtually all the nucleoside analog reverse transcriptase inhibitors (NARTIs) -- such as AZT, 3TC, ddI, ddC, d4T, and abacavir interrupt pol gamma to some extent. The consequence of such interference is a decrease in the number of newly formed mitochondria, and therefore, a decrease in cell function, and possibly even cell death. Subsequently, symptoms developed by an individual would depend upon the type of cell that is affected. However, the most common symptom is generalized, overall fatigue.

Test tube ("*in vitro*") studies have demonstrated that ddC, ddI, and d4T are the most potent inhibitors of pol gamma, although the other NARTIs exert some influence as well. To date, studies have not shown the extent of mitochondrial damage when anti-HIV medications are combined, which is standard practice for most individuals currently on anti-HIV therapy. Moreover, the effect of combining NARTIs with other anti-HIV medications, like protease inhibitors, is not known. However, one study demonstrated a reduction in number of mitochondria produced in a cell in people taking d4T. Data from yet another small study suggested that HIV-positive individuals taking any of the NARTIs had up to 44% fewer mitochondria per cell than those individuals who are either not taking NRTIs or are HIV-negative.

In a study examining the number of mitochondria per cell, participants were separated into four groups: (1) HIV-positive individuals who were on medications and had fat loss/wasting, (2) HIV-positive individuals on medications without signs of fat redistribution, (3) HIV-positive individuals who had not taken anti-HIV drugs, and (4) individuals

who were HIV-negative. The group with the greatest decrease in mitochondria in cells was the group with fat loss/wasting, followed by the HIV-positive group on medications yet without signs of lipodystrophy. The latter two groups showed no difference in the number of mitochondria. The conclusion drawn is that anti-HIV medications do interfere with the production and lifecycle of mitochondria.

It has been postulated that mitochondrial damage is always present, but the question is to what extent. Mitochondrial damage is poorly diagnosed, and when symptoms do occur, they can run the range from mild, to severe, to life threatening. For instance, common symptoms include fatigue, muscle weakness (myopathy), peripheral neuropathy, and pancreatitis. However, some researchers suggest that regardless of HIV serostatus, damage to mitochondria can be a possible factor in low platelet count (thromboycytopenia), anemia, and low neutrophil count (neutropenia). Furthermore, there is a significant link between damaged and dysfunctional mitochondria and the development of Type II diabetes in adults, again, regardless of HIV serostatus.

With early enough detection, many of these symptoms and conditions are reversible by altering therapy. This may include stopping medication, or significantly reducing dose. However, before such a course of action is to be undertaken, it is best to consult with your healthcare provider to identify the specific cause for the symptom.

How can mitochondrial damage be detected? The easiest way is through a blood test that measures lactate levels in the blood. Lactate is a natural by-product from the breakdown of glucose and fat in the mitochondria. The sore and tired feeling in the muscles following rigorous exercise are a result of the body shifting to "anaerobic respiration" that leads to a build-up of lactic acid. When the mitochondria are damaged, lactate levels rise in the bloodstream and lead to lactic acidosis. This increase in the acidity in the blood is life threatening and must be dealt with immediately.

Early symptoms of lactic acidosis are severe fatigue, nausea, vomiting, shortness of breath, abdominal pain, rapid weight loss, muscle cramps and aches, muscles numbness and tingling, and rapid and progressive muscle weakness. As the severity increases and lactate levels rise over 5mmol/liter, mitochondria lose their ability to produce energy, leading to potentially irreversible organ damage and death.

At present, there are no comprehensive studies presenting clear treatment strategies for dealing with mitochondrial damage associated with HIV. Extrapolation can, however, be made from the knowledge available about treatment of mitochondrial damage associated with other diseases. First and foremost is to identify and treat the cause. For many, however, this option may be limited. If it is true that the main associated factors are the NARTIs, then switching to another therapy might be suggested. Eliminating this entire class of HIV medication from treatment options leads to a whole host of medical and health-related issues. It does seem, at this time, that ddI, ddC, and d4T are the most potent inhibitors of poly gamma. This should be considered for those suffering from mitochondrial damage.

Finally, several nutrients have been studied for their ability to decrease damage to the mitochondria. In the current literature regarding mitochondrial damage and HIV therapies, some mention has been made about riboflavin (B2), coenzyme Q10, and acetyl-carnitine. Most of these are being studied in isolation and not in conjunction with one another. Although the approach is to determine whether or not each particular nutrient is beneficial in the treatment of mitochondrial damage, the flaw in this approach stems from the fact that each of the 5 complexes in the oxidative phosphorylation process requires different and varying nutrients *simultaneously*. Other nutrients that support mitochondrial function are alpha lipoic acid, NAC (N-acetyl-cysteine), glutathione, vitamin E, and essential fatty acids to name a few. In the next issue of the STEP Perspective, treatments involving the diet and use of these nutritional supplements will be explored.

STEP is moving…….

The Seattle Treatment Education Project is moving into the new LBGT Community Center. Our new mailing Address as of June 1st 2002 will be **PMB 998 1122 East Pike Street Seattle, WA 98122-3934**. The agencies physical address will be **1115 East Pike Seattle, WA 98122.** Our phone numbers, e-mail and toll free number will remain the same. If you would like any further information or have any more questions please call or e-mail Roberto Gonzalez 206-329-0064 ext 105, robertog@stepproject.org or call our toll free talk line at **1-877-597-7837.**

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- Please note that this is not a complete list of all HIV-related treatment information. STEP strives to provide the very latest in
- HIV treatment information, research and drug development information. The most current research directions and antiretroviral drug data are provided throughout the Ezine publications. You will find highlight reports as well as extensive follow-up reports from many of the AIDS research and science conferences on the Ezine. In addition, all STEP quarterly treatment journals are available on our Web site at http://www.thebody.com/step/steppage.html or by calling our Talkline at 1-877-597-STEP. STEP works hard to give unbiased treatment information to all interested parties. If you have comments, questions, suggestions or grievances, please contact robertog@stepproject.org or ezine@stepproject.org.

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