

Next time you're on R&R, don't end up in the ER

Travel and vacations can be hazardous to your health.

Sleep deprivation, dehydration, increased eating and drinking, as well as participation in rarely engaged-in activities can quickly boost your oxidative stress and elevate the risk of a heart attack, stroke, and pulmonary emboli. In fact, an acute cardiac emergency has been reported to be the most common cause of death for vacationers.^{1, 2}

We wanted to delve into that topic, and so we sat down with Dr. Eric Freedland, an experienced emergency physician and Pruvix user.

Q: Dr. Freedland, start us off by elaborating on *oxidative stress*. Exactly what is it, and why should we be concerned?

A: Our cells use oxygen to produce energy by burning fuels such as fat or glucose in a process known as “oxidation.” This takes place in the mitochondria—the tiny furnaces within each cell. In the process of making energy, neighboring molecules can become unstable and highly reactive “free radicals.” If not quickly neutralized, these free radicals can attack and damage DNA, lipids or fat in cell membranes, and fat circulating in the bloodstream. For example, they can lead to life-threatening atherosclerosis or plaques that can rupture, block off the supply of blood to the heart or brain, and lead to a heart attack or stroke.^{3, 4}

Oxidative stress is the imbalance between the generation of free radicals which cause oxidative damage, and our ability to neutralize them.⁵

Q: Okay, you've got our attention. How do our bodies deal with *Oxidative Stress*?

A: The ability of a human cell to resist oxidative damage is determined by a balance between the generation of free radicals, which cause oxidative damage, and the defensive capacity to produce antioxidants, which neutralize free radicals. Glutathione or GSH is the most important and abundant antioxidant in our cells and plays a central role in antioxidant defenses.⁶

Q: How serious a danger is oxidative stress?

A: Oxidative stress is very serious, and very real. Before they even leave the house, many travelers are already at risk. Numerous health conditions are associated with significant oxidative stress, including aging, type 2 diabetes, pre-diabetes, obesity, hypertension, and heart disease.⁶ Add sleep deprivation, jet lag, dehydration, overeating, and drinking too much alcohol, and vacationers have the potential for a medical catastrophe.

Q: That's sobering, but let me ask you: do healthy people need to worry about oxidative stress?

A: Definitely. Any number of things can come into play. One doesn't need a pre-existing health condition to experience the fall-out. For example, sleep deprivation and jet lag are associated with oxidative stress,^{8,9} and, in fact, are real stage-setters. According to a Gallup national survey of 1000 people, a majority of Americans return from vacation more tired than when they left.⁷ Poor planning, later bedtimes and unfamiliar or uncomfortable accommodations were identified as key reasons why people arrive home tired from their trips. Many go to bed later the night before and wake up earlier. Working longer hours to take care of business prior to a vacation is common as is staying up worrying about work. Then there can be the exhaustion that comes from crossing time zones with resulting jet lag, staying up later than usual while on vacation, and not sleeping well in strange surroundings.

Q: Let's look at some specifics, and then come back to prevention. Talk to me about risk factors or behavior I should be aware of.

A: Beyond the sleep deprivation and jet lag that most of us experience during travel and vacations, there are four major categories of risk to beware of: prolonged air travel, over-eating, increased alcohol consumption and rarely engaged-in physical activities.

Air travel is associated with health risks. The average age of passengers with an in-flight medical emergency is 44 years for men and 49 years for women. The air in the cabin contains less oxygen than the air on the ground, which reduces the amount of oxygen in the blood.² A lower-oxygen environment can be a problem for people who experience a heart attack while abroad. Reduced oxygen can also compromise travelers with chronic obstructive pulmonary disease, or COPD, as well as heart disease and congestive heart failure. Another problem is clotting. Prolonged sitting can cause blood to pool in the legs, which can increase the risk of forming blood clots there, especially in individuals who already have clotting or vein disorders.² Individuals with diabetes, pre-diabetes or obesity show oxidative stress^{10, 11} which is associated with blood coagulation.¹²

In addition, dehydration from the dry air and decreased fluids, along with drinking alcohol can all enhance oxidative stress and cause clots in veins. When a clot breaks off, it can travel through the venous system and become life threatening. Pregnant women and those who have recently given birth are also at greater risk of clotting.

Research into the consumption of gluttonous portions of fast foods revealed significant and rapid decline in normal blood-vessel tone and blood flow. One study suggested the effects were due to oxidative stress induced by the gluttonous meals, which may not be different nutritionally than typical vacation meals.¹³ A second study showed

that diets high in fat and/or just high in calories also are associated with increasing oxidative stress and inflammation, which are risks for a heart attack and stroke.¹⁴ Gaining a few pounds only adds to the stress. If you already have diabetes, you may be at even greater risk.

Just as high calorie meals and jet lag may predispose the liver to oxidative stress,⁸ adding a few cocktails, wine or beers can add gasoline to the fire. Alcohol promotes the generation of free radicals and can interfere with the body's normal defenses, particularly those in the liver.^{15, 16} Alcohol depletes the body's stores of antioxidants, including glutathione or GSH, and can cause oxidative stress and cell injury.¹⁶ The first step in alcohol metabolism produces acetaldehyde, a highly toxic substance (much more toxic than alcohol) that reacts with proteins, DNA, and lipids as well as with glutathione or cysteine and depletes them.¹⁶ Restoring healthy glutathione levels within our cells protects against oxidative stress, offsets the effects of acetaldehyde, and possibly protects against hangover.^{17, 18 19}

When the usually sedentary vacationer decides to partake in vigorous exercise, the outcome can be deadly. A single bout of exercise, especially in an individual who is not used to such exertion can lead to oxidative stress²⁰ and the sudden rupture of an arterial plaque that can obstruct blood flow to the heart and brain causing a heart attack or stroke. This can also occur even in the veteran "fit" endurance athlete who is over 45 years of age, and engages in a strenuous endurance competition.²⁰⁻²³

Q: You've given us a great list of things to avoid to minimize the risk of experiencing oxidative stress, but is there anything we can do to actively neutralize that risk?

A: Yes there is, and this is significant. There's a new product, Pruvion, that has just become commercially available that increases glutathione (GSH) levels inside our cells and, therefore, can provide some added "insurance" against oxidative stress. GSH is the most abundant antioxidant in our cells and plays a central role in neutralizing free radicals and preventing or combating oxidative stress.

GSH is synthesized from three amino acids: glutamate, cysteine, and glycine. Glutamate concentrations are known to be adequate in both young and elderly humans. However, recent studies from Baylor College of Medicine found that older humans were not able to make GSH as well as younger humans because they had very low levels of the other two building-block amino acids, cysteine and glycine.

Both animal and human studies further demonstrated that supplementing diets orally with cysteine and glycine in the right form and formula effectively corrects GSH deficiency and could provide significant metabolic benefits in mature adults.

Technique is important to achieving the correct balance between GSH and free radicals. For example, directly supplying GSH in the diet may not be effective because it will be degraded in the stomach. Additionally, certain free radicals are necessary for health and

the normal function of insulin²⁵ as well as cell signaling and turning genes on or off. Hence, the indiscriminate use of antioxidants could actually be harmful.

Providing the precursors (cysteine and glycine) of GSH protects and preserves the mitochondria—the cell's furnace that burns fat and glucose for energy. This allows the cells to use what they need to make GSH, which acts efficiently and in close proximity to where free radicals are produced—close to the mitochondria inside the cells. The body needs some free radicals to ensure normal health. For example, they help insulin and genes function and allow cells to talk to each other.²⁵ This is a reason why simply taking antioxidant vitamins often doesn't work and may be harmful. Providing cysteine and glycine in the correct amount and ratio, as Pruviv does, improves metabolic functions and the cells appear to make and use precisely the amount of GSH that they need.

PharmaPlan LLC entered into an exclusive license agreement with Baylor College of Medicine to develop a product based on these patented research discoveries. Vitavis Laboratories, a subsidiary of PharmaPlan, recently announced its new dietary supplement, Pruviv™, which brings these discoveries to consumers. Pruviv's patented composition could protect from and reduce oxidative stress, especially in those 45 and older. Pruviv may provide the necessary insurance against oxidative stress that could threaten travelers and vacationers. Research at Baylor College of Medicine (published in four top tier medical journals)²⁴⁻²⁷ upon which Pruviv was developed indicates a new approach to reduce the production of free radicals, lower oxidative stress and tissue damage, increase fat burning, reduce insulin resistance, reduce risk factors for heart disease, reduce body fat and increase muscle mass.^{24-26, 28}

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