

International Online Breast Cancer Rehabilitation Summit

Presenter: Shira Litwack

OXIDATIVE STRESS and recovery after cancer.

Hi Im Shira, A bit of background about me - help you understand my passion for this topic of oxidative stress.

My original degree was in chemistry. Life can be explained through chemistry
But, I have always had a passion for health and fitness. I always had this gut feel that exercise holds the key to our inner magic kingdom. When I first got into fitness, the focus was much more on our outer being, but I was convinced that exercise was even more crucial to what I called our cell being ..my fixation for chemistry hooking up with my fitness fetish.

As I got into medical fitness, and constantly learning, researching - I realized there truly was this connection between my two passions, exercise and chemistry, the undeniable chemistry that exists between exercise and our cell being.

When we study oxidative stress - it gives new meaning to cliches like- you are what you eat.

People don't want any more long lists of dos and don'ts. There is such conflicting info out there. But if we understand the underlying principles our health, it's much more empowering and much less frustrating than a long list of shoulds and should nots.

When we think of health from the cell, we have to think of minimizing damage to the cell, which starts with oxidative stress.

We can have all the very best intentions of living a healthy lifestyle, but the truth is we could be causing molecular mayhem, leading to many diseases, and yes, cancer

The Dangers of Oxidative Stress in Cancer Rehabilitation

- Increase mutagenesis & DNA mutation rate Increases angiogenesis - greater likelihood of metastases
- Increases resistance to radiation and chemotherapy
- Increases damage to other organs with treatment (heart, liver, kidneys..)
- Disrupts mitochondrial functioning
- Causes weakness, inactivity, muscle wasting

Oxidative Stress: The imbalance between the production of free radicals in the body and the ability of the body to neutralize / detoxify their harmful effects with antioxidants. free radicals are a necessary part of life.

Free radicals are natural by-product of aerobic cell metabolism. They are produced by a number of actions including infections, diseases and lifestyle. The generation can be endogenous (within the body) or exogenous (outside the body).

Antioxidants: neutralize free radicals either by providing the extra electron needed to make the pair, or by breaking down the free radical molecule to render it harmless.

Acute inflammation is a short-lived, expected immune response to the injured tissue. Inflammation is induced by chemical mediators produced by damaged host cells.....**Cytokines.** Inflammation is normally controlled and self- limited.

Chronic Inflammation: Prolonged inflammation

Cytokines are regulators of host (that's us) responses to infection, immune responses, inflammation, and trauma. Some cytokines act to make disease worse (**proinflammatory**), whereas others serve to reduce inflammation and promote healing (**anti-inflammatory**).

Some cytokines are thought to have pro inflammatory and Anti inflammatory properties

Inflammation is an important and vital aspect of the immune system - however chronic inflammation is at the root of most of our chronic illnesses.

Among the many factors influencing development, progression, and metastasis, oxidative stress has an important role in the initiation and preservation of breast cancer progression.

- Recent studies show that in the breast cancer microenvironment, oxidative stress causes mitochondrial dysfunction.
- Oxidative stress may also increase the blood supply to breast carcinoma by triggering vasodilatation.
- Oxygen radicals may also augment tumour cell migration, increasing the risk of invasion and metastasis.

Free Radicals do not only affect DNA...They can also damage the endothelial cells that line blood vessels making it easier for tumor cells to enter/exit the blood stream.promote angiogenesis.

Breast cancer study: those women with the highest blood levels of oxidatively damaged fat molecules were twice as likely to develop a recurrence as women with the lowest levels

Women with metastatic breast cancer had twice as much free radical damage to the DNA in their breast tissue as women with localized cancer

Clear correlations have been found between the growth of metastatic tumors and the extent of free radical induced damage

This is why we must educate people for cancer prevention, and most certainly in rehabilitation - about the threat of oxidative stress.

Ok - so we had a very brief intro to oxidative stress - so we have to be able to help of clients/patients minimize oxidative stress in their lives

Now we are going to discuss how these contribute to oxidative stress

Alcohol	Cigarette Smoke - 1,2,3	Body fat	Hydrogenated fats	Pollution
Heating oils beyond Smoke point	Dehydration	medications	endocrine disruptors	radiation exposure
uncontrolled stress responses	Microbial Imbalance	Too much sugar	Over exercise	exposure to a number of chemicals
sedentary lifestyle	Excess levels of Iron	Be very careful of supplements	Reduce total fat content of diet	Muscle loss

Antioxidant Supplements

Taking large doses of a single antioxidant can turn antioxidants into pro oxidants.

- Not all supplement are created equally
- There is a great deal of body chemistry that must be considered
- Get our antioxidants in food unless prescribed by a health care professional that understands the supplement and the body chemistry

It is especially important for people undergoing treatment not to take supplements. The mechanisms are still being questioned - some can actually generate intra cellular free radicals!

Body Fat as an Oxidative Stressor

As body fat increases, there is more inflammation and free radical damage

As body fat increases so can blood sugar and deadly insulin levels. Insulin acts as a growth factor for cancer.

Body fat stores estrogen.....fuelling cancer

Cigarette smoke is loaded with free radicals.....but also...

- can change antioxidants into pro-oxidants
- studies: Taking Beta Carotene supplements in smokers was linked with an *increased* risk of dying from lung cancer
- Other studies have shown that *smokers who smoke during treatment* beta carotene increased cancer recurrence, but those who quit smoking during treatment had no ill effect from beta carotene

Endocrine disruptors are chemicals that interfere with the body's endocrine system and produce adverse developmental, reproductive, neurological, and immune effects in both humans and wildlife

EDCs act as hormone agonists or antagonists, interfere with signalling mechanisms, disrupting hormonal homeostasis and developmental processes. Importantly, in utero exposure to EDCs have the potential to alter developmental trajectories of offspring, thus influencing health and disease status later in life,

Endocrine Disruptor BPA Increases Fetal Oxidative Stress

Avoiding EDCs

- 1.Wash hands thoroughly and regularly
- 2.Dust and vacuum - wear a mask when emptying canisters
- 3.Avoid fragrances
- 4.Avoid plastics
- 5.Can the cans
- 6.Eat real vs. processed
- 7.kids cosmetics...really?
- 8.chemical cleaners - dryer sheets!
- 9.Research.....

A glass of wine a day is NOT good for us

Alcohol has been proven as a cause of breast cancer in a number of ways...here relating to oxidative stress:

- Alcohol can increase levels of estrogen and other hormones associated with hormone-receptor-positive breast cancer.
- Alcohol (ethanol) is converted into a toxic chemical called acetaldehyde in our body, damaging the DNA, in a number of possible ways and preventing cells from repairing this damage
- Alcohol causes rapid regrowth of liver cells, which frequently have altered DNA
- Alcohol is a cause of oxidative stress, producing ROS - Reactive Oxygen Species which alter the DNA
- Alcohol encourages the body to store fat. We know body fat cells can be thought of as active endocrine glands, secreting hormones upsetting hormonal balance. Hormonal balance is critical in disease prevention.
- Destroys muscle mass & dehydrates

Sugar

- contributes to obesity
- insulin production
- preferred fuel of cancer cells oncogenesis
- Excess sugar goes to the liver, which and metabolized. When there is an overload of sugar in the liver, it is converted to fat. This causes a buildup of belly fat and **cytokines**, which can increase your risk for cancer.

University of Texas MD Anderson Cancer Center reveals diets that are high in sugar are a major risk factor for certain types of cancers, especially breast cancer.

Fatty Diet

A study of breast cancer patients found a 16% increase in the risk of mutated DNA for every additional gram of fat in the daily diet.

For every gram of saturated fat a 30% increase

High-fat diets increase the amount of estrogens in the blood. It is known that many breast tumors are "fueled" by estrogens

saturated fat should not exceed 10 percent of a person's daily diet.

Dioxins & other environmental pollutants are stored in fat

Dehydration

Dehydration is a source of oxidative stress. Cancer cells thrive in a dehydrated environment, healthy cells can not function. Dehydration is a major cause of oxidative DNA damage.

Water plays a vital role along with nutrients in the oxidant/antioxidant ratio.

Dehydration creates an inner biology favorable to cancer also by:

- pH balance
- DNA damage from toxins not flushed out of body
- enzymatic changes that cause poor cellular communication
- suppresses the immune system
- Histamine production

Over exercising

Some researchers believe that long, intense exercise (especially endurance training) may cause more oxidative stress than humans can handle.

However, long-term studies, as opposed to short-term, have shown that extreme training can increase your body's antioxidant levels which can help prevent and repair oxidative damage.....There are risks in trusting in this over the short term gains.

Muscle loss

Immune Function is key in breast cancer rehab....imperative for the reduction of oxidative stress.

Muscles are imperative for metabolism, sugar control, prevention of body fat storage, hormone balance

Microbiom

I believe this to be the most overlooked aspect of health....This is an area where we have so much power to help people.

This is also where I say everybody needs a good doctor and Naturopath.

A healthy gut microbiome greatly improves our immune system, often considered the first step of our immune system. Helps control our hormonal levels, helping us maintain healthy cortisol levels and improved ability to handle stress.

Bad: interacts with the immune system in the gut to cause the release of inflammatory cytokines and stress steroidsassociated with chronic inflammation. We feed bad bacteria by eating refined sugars, processed foods, ingesting toxins in our food

Good: Housekeepers of the gut, crucial to health and should dominate and control all other microbes. The beneficial bacteria provide a natural barrier and protect us against disease, free radicals, hostile bacteria, parasites, fungi, viruses and toxins that are in our food and drink that we ingest every day.

Interventions improve the microbiome are now increasingly used in medicine to improve health. Probiotics, nutritional overhauls and, yes, fecal transplants from individuals with a healthy flora are being performed to treat chronic intestinal infections. Kind of a reverse colonoscopy, these transplants are 90 percent effective in healing the gut and eliminating the infection.

Emotional Stress

Studies do show us a link between oxidative status with anxiety, depression, schizophrenia and bipolar disorder. There is a high correlation between oxidative and emotional stress.

Immune System Suppression Caused by Stress Psychoneuroimmunology

PNI

Your Psyche (mind) manifests itself in patterns of neuronal activity that affect your immune system:

- Excessive Cortisol production
- Sleep issues
- hormonal imbalance
- pH balance
- muscle loss
- and directly as well...oxidative stress
- reduction in NK cell activity
- can stimulate production of more blood vessels to tumors.

Ways to increase our antioxidant intake through our diet:

- Eating a wide variety of colourful fruits and vegetables
- Eating organic: eliminate pesticides & contain higher antioxidants
- Choose grains with higher antioxidant capacity: barley, oats, millet
- Choose protein for antioxidant capacity: salmon, kidney beans, pinto beans
- Choose nuts, oils high in antioxidants & not easily oxidized: walnut, almond, coconut oil, pecan
- Spices: Oregano, dill, garlic, ginger root, rosemary, cumin, curcumin,

Steps to Reduce Oxidative Stress:

- 1.Sleep
 - 2.Keeping blood sugar balanced
 - 3.Prevent Infections
 - 4.Daily stress reduction
 - 5.The right exercise
 - 6.Balanced Digestive System
 - 7.Avoid endocrine disrupting
 - 8.Encourage the body to produce glutathione...walnuts, peaches, asparagus, onions, spinach, garlic, avocados, cruciferous
 9. Eat food/herbs high in antioxidants
- Education...research

How Can we get our patients/clients thinking about Oxidative Stress?

- 1.Help them understand - what is cancer...cancer is not just a tumor - that tumor was created by an inner biology that was conducive to the growth of cancer. We need to create an inner biology that is hostile to cancer.
 2. In terms of rehabilitation....we don't want to search and kill tumors - explaining we want to shut down the mechanism that caused the cancer is necessary, and looking at oxidative stress is front and center
- . We can't allow learned helplessness. Many people feel "life causes cancer" .
- Psychoneuroimmunology
- . We are often bombarded by "this causes cancer...that causes cancer"....understand underlying message - not discussed in the media. When we evaluate as a theme - we start to analyze many of our every day decisions.

"Cancer is not an isolated group of errant cells waiting passively to be annihilated by a wonder drug. Instead it is caused by a cascade of genetic and molecular glitches. That's why cancer does not present a single target for a magic bullet. A tumor is merely the most obvious symptom of an altered, unbalanced system. And that's why both the new targeted therapies and the older weapons of surgery, radiation and old line chemotherapy so often fail to prevent the spread or recurrence of the disease. They neither pick up renegade cancer cells, strengthen the body's biological balance, nor reach all the molecular accidents that initiated cancer in the first place. Even if the original tumor is gone, this biological imbalance creates an environment for cancer to

recur. Because cancer will try to use every bit of your body's biochemistry to proliferate, you must strengthen every biochemical defence possible to defeat it. "

Dr. Keith Block - Life Over Cancer