

REGULAR EXERCISE AND RECOVERY FROM THE RAVAGES OF SECOND HAND SMOKE

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This article is addressed to nonsmokers who are, because of their work or their living environment, unwillingly exposed to second hand smoke. Smokers may also find motivation here to quit pulling smoke into the very vascular, reactive, and sensitive environment of their lungs. We will first review the terms, problem, resolution, and lastly, the damage done by second hand smoke, not only to the lungs, but also to the heart – every breath, every beat.

General physical stress, when in the close presence of a smoking smoker is caused by the damage done by *free radicals* without enough *antioxidants* to neutralize them.

Oxidative Stress from Second Hand Smoke

Oxidative stress exists when *oxidants* are being produced at elevated rates and there are not enough antioxidants to disarm them. This occurs when our cells are exposed to harmful conditions, such as second hand smoke, intense endurance exercise, and dietary factors. The oxidants are a normal product of aerobic metabolism; under stress they carry an over abundance of oxygen molecules that can produce **free radicals**, explained below. Thus, the oxidative stress occurrence is first of all, caused by the exposure of our cells to second hand smoke and other harmful conditions and secondly to an imbalance between oxidants and antioxidant defense.

Exercise can protect. The authors emphasized that exercise protocols of *moderate* intensity increase the body's antioxidant defenses and tissue resistance to oxidative organ damage.^{1 2} Key factors in evaluating the response of the heart and other organs to the oxidative stress of exercise are the type, intensity, frequency, and duration of the exercise.³ This is an important consideration for anyone who is engaging in intense endurance exercise, which inactivates vital enzymes present in the cell membranes of the heart⁴ and elevates lipid markers for oxidative stress in that organ.

Your heart first and foremost. The results of their study may indicate high levels of oxidative stress in cardiac tissue when exposed to cigarette smoke. Additionally, they have shown the efficiency of exercise to mitigate this dastardly consequence, suggesting that moderate regular exercise provides a protective effect against oxidative stress induced by smoke.

Several recent studies have also demonstrated that chronic cigarette exposure can result in significant damage to the heart, characterized by the progressive and irreversible deterioration of cardiac function because of myocardial scarring, thickening, and remodeling. At the cellular level studies have shown damage to

ATP — those power house intracellular organelles in charge of energy production, calcium storage, the mitochondria.^{5 6 7 8}

Free radicals are molecules that contain *unpaired electrons*. Electrons usually come in pairs. When unpaired, they are highly reactive because of their physiological need to be paired with another electron. In an effort to find an electron to be paired with, they start a chain reaction that can damage or kill the cell under attack. This damage extends to all components of the cell, including proteins, lipids, DNA, and *cell signaling*.

Cell signaling is a cell function that enables the cell to perceive and correctly respond to their micro-environmental needs, such as tissue repair, normal development, immunity and homeostasis. When cell signaling is disturbed or inactivated, diseases, such as cancer, autoimmunity, and diabetes may be the result. We need enough antioxidants to detoxify oxidative stress.

Antioxidants terminate the damaging chain reactions initiated by the free radicals by pairing with the unpaired electron and neutralizing it. They actually give up one of their own electrons to the unpaired electron. Both are then electrophysiologically "satisfied" – the free radical because it now has its missing electron and the antioxidant because it can give up the electron without damage to itself. Thus the importance of the antioxidants generated from the food you eat and the regular exercise you do. Many good foods provide antioxidants for our system. References abound literally "at your finger tips."

Velosco, Rovani, et al⁹ have recently published their studies on cardiac oxidative stress from second hand smoke in rats and found compelling evidence that "*moderate regular exercise*" provides a protective effect against the oxidative stress experienced in the toxic environment of smokers. If you have difficulties accepting the use of rats to track human pathphysiological reactions to environmental threats, please read the footnote.[‡]

Carolina Veloso's entire 2013 article is available on line and will supply all the details of the study, including the cardiac tissue lipoperoxidation, which was elevated in the "smoked" rats and the enzymatic antioxidant defense, which was measured by catalase activity and found to be elevated in the exercised rats and rats not exposed to smoke. <http://www.asep.org/journals/JEPonline>

[‡] **Carefully bred rats** with documented genetic histories and genetic consistency are used in animal testing because of their short life span (2-5 years), frequent reproduction, large litters, and similarities to human biology. Researchers do not have to wait long to evaluate test results across several generations of a rat family. The FDA requires this level of proof before even *considering* human clinical trials and rats are the best bet for reliable results. In fact, these rats volunteered once they spotted the treadmill.

References

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