

# The Role of Free Radicals and Related Cell Repair

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DNA damage to the skin's cells accumulates with cancer treatment making skin cells vulnerable to free radical damage. In one study, it was found that cellular DNA damage was between 2-4% in young adult cells. The damage was 6 times that amount in the elderly. Elderly skin cells have less capacity to repair themselves than those of young adults and this may explain some of the decline in the skin's immune function associated with aging. The treatments associated with cancer, chemotherapy and radiation will damage skin cells and without regard to age, everything that can be done to help these cells heal will be beneficial in the short and long run.

DNA damage is caused by a reduced ability of the body to defend itself from free radicals. Our body needs oxygen to create "fuel" used for cellular energy. Unfortunately, the byproducts of the chemical reactions that produce that fuel are often toxic. These byproducts are called reactive oxygen species, of which some are referred to as free radicals. Free radicals are "oxidants" that damage our cells' proteins and DNA. Chemotherapy and radiation treatments create free radicals in the process of treating cancer in tissue and other organs of the body. Skin, unless the treatments are for skin cancer, is an organ that can be treated and repaired without interfering with the cancer treatments that are being administered.

Environmental oxidation is seen as rusting metal, an apple turning brown or meat going bad. Oxidation in our bodies, like the rusting of a car, is believed to be responsible for premature aging, wrinkling of the skin, hardening of arteries, stiffening of joints and diseases like cancer. The goal of antioxidants is to stop this cellular "rusting" and to create cellular homeostasis. Antioxidants are among the most important chemical combatants known to science and are fundamental in the damaged skin repair compendium.

Oxygen atoms consist of a nucleus, neutrons, protons and electrons. The electrons are negatively charged particles that orbit an atom in one or more rings (shells). It is the rings of electrons that give the atom its stability. Because a free radical will always try to ensure its stability it will either bond with another atom or it will take an electron from a neighbor by attacking that atom. It is the taking of the electrons from one molecule, to satisfy another, that results in the creation of a new free radical. Oxidative damage has a cascade effect that results in the disruption of all living cells.

Normally, the body can handle free radicals, but if the body's natural antioxidants are unavailable, or if the free radical production becomes excessive, cellular damage can occur. It is most important to remember that free radical damage is cumulative. As we age or undergo cancer treatment, not only are our cells less able to defend themselves, they also show the resultant damage from previous years.

Hydroxytyrosol is found in olives and has been found to be the most potent free radical scavenger available today. Compounds found in hydroxytyrosol are potent antioxidants. These

compounds scavenge superoxide radicals and inhibits neutrophil respiratory bursts. Additionally antioxidants have anti-inflammatory activity. Hydroxytyrosol is a reducing agent and together with other reducing agents such as vitamins protect the body's tissues against oxidative stress.

In the field of skin repair it is known that oxidative damage weakens cells making the repair process arduous. Repair that would normally take place in adults is lost due to the cumulative damage caused by excessive free radical production. Cell walls loose their structure and the cellular organells (cellular organs) are expressed causing cell death. Tea phenols can reverse the cumulative effects of oxidative stress. Antioxidants repair the cells' membranes and restore cells to a healthy state making skin repair possible. These activities should result in skin that is vital and healthy.