

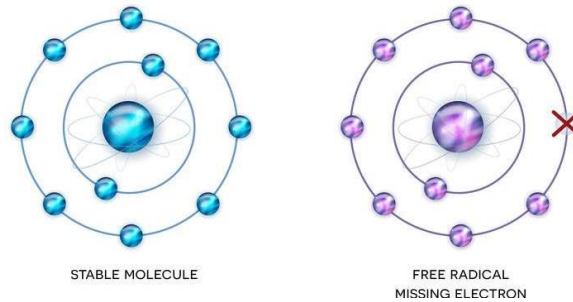


Free Radicals & Anti-Oxidants (Part 1)

In part 1 of this 2-part upskill, we will firstly look at free radicals, the sources thereof and the damage that it can cause on the skin.

FREE RADICALS

Free radicals are described as any molecular species capable of independent existence that contains an unpaired electron in an atomic orbital. Simply put, they are molecules or atoms that have lost or gained an electron, becoming unstable, highly reactive and creating more free radicals.



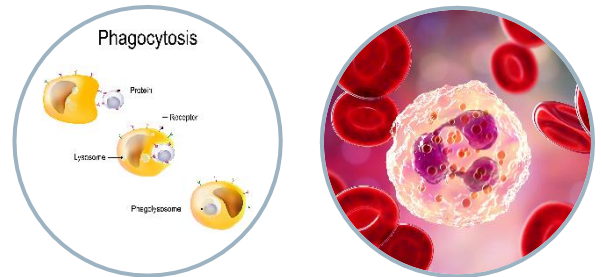
SOURCES OF FREE RADICALS

Free radicals are derived from normal essential metabolic processes in the body or from external sources.

Internal Sources

Internal sources of free radicals are the result of many cellular processes and the by-products of various body functions. These may include the following:

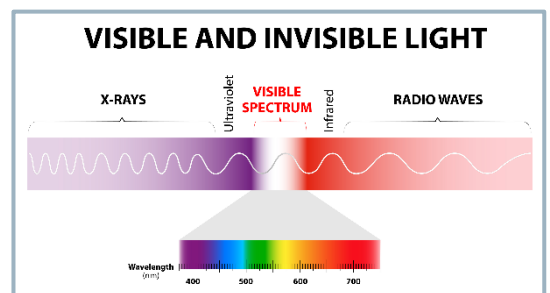
- Inflammation
- Phagocytosis
- Mitochondria metabolism
- Exercise
- Respiration



External Sources

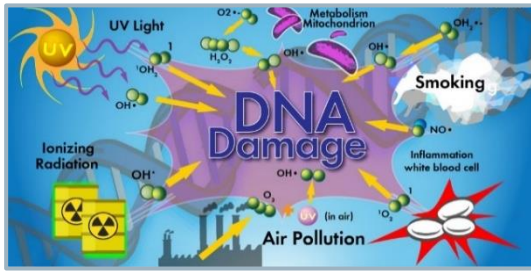
External sources of free radicals are linked to the environment in which we live and lifestyle choices that we make. These are typically oxygen-based free radicals and include the following:

- Cigarette smoke
- Environmental pollutants
- Radiation
- Drugs
- Pesticides
- UVR
- Diet



FORMS OF FREE RADICALS

1. Reactive Oxygen Species (ROS)



- Most common form of free radicals
- Oxygen-containing free radicals
- Caused by air we breathe, UV radiation, stress, cigarette smoke and pollution
- Damages DNA, destroys the skin barrier, breaks down collagen and elastin within the dermis
- Results in cellular damage

Up until recently, we have mostly addressed the effects on the skin caused by ROS, however, there has been more research and studies that have pointed to two additional free radical families. These are Reactive Carbonyl Species and Reactive Nitrogen Species. It is important to remember that nitrogen forms about 80% of the earth's atmosphere and carbon is the 4th most abundant element in the universe, representing 20% of the weight of living organisms.

2. Reactive Carbonyl Species (RCS)

- Carbon-containing free radicals
- Found in a diet rich in simple carbohydrates eg. white flour, white rice and pasta as well as alcohol
- Causes glycation which leads to AGEs (Advanced Glycation End Products)
- Results in sagging, fine lines and wrinkles, inflammation



3. Reactive Nitrogen Species (RNS)



- Nitrogen-containing free radicals
- Produced by nitrogen-rich soil such as fertilizers
- Also found in car exhaust fumes and “exhalation” of certain trees such as conifers (pine trees)
- Involved in all forms of inflammation
- Worsens the damage caused by ROS and RCS

GENERAL IMPACT OF FREE RADICALS ON THE SKIN

- Excessive cell proliferation = increase in senescent cells and apoptosis
- Reduction in the natural anti-oxidant potential within the skin = stress on the skin
- Skin inflammation
- Fine lines and wrinkles caused by matrix breakdown and the increase in MMP's (particularly MMP-1, fibroblast collagenase)
- Age spots and hyperpigmentation
- Dehydration and dryness
- Redness and acne



In the upskill next month, we will look at the solutions that Nimue provides in the fight against these free radical families.