

Effective Oxygen Therapy

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Hyperbaric Oxygen Therapy is well established as a treatment to improve the healing of wounds, burns, skin graft and flaps, soft tissue infections, radiation damage. Some physicians are now treating cosmetic surgery and laser patients with Hyperbaric Oxygen to substantially reduce inflammation and speed up the healing process. A hydrogen peroxide cream has been shown to produce a local hyperbaric oxygen condition and have many and significant benefits on the skin (1,2)

Hydrogen Peroxide is manufactured by the body naturally and is maintained at a constant level throughout our life. It helps to regulate cell membranes and hormones. It is vital for the regulation of blood sugar and the production of energy in **ALL** body cells. It has a stimulatory and regulatory effect on the immune system and may either directly, or indirectly, kill viruses, bacteria and fungi (3).

Commercially produced Hydrogen Peroxide has been used for medical purposes since 1920. Yet, because Hydrogen Peroxide manufactured by the body is an activated Oxygen Species, that *Can* be an “intermediate” for the formation of free radicals like Hydroxyl, the issue has been raised that commercially produced Hydrogen Peroxide may be undesirable to use in medical therapy and skin care. However, a much closer look at recent findings in the field of free radical production is needed before reaching such a conclusion (4).

Whilst the formation of the Hydroxyl radical is essential for fighting off disease, it is the **UNCONTROLLED** production of **EXCESSIVE** hydroxyl that is harmful (4,5). There has been some concern about the ability of superoxide to react with Hydrogen Peroxide, to form the hydroxyl radical. However, studies have shown that the direct interaction of Hydrogen Peroxide and superoxide is **extremely slow**, compared to the dismutation or destruction of superoxide, making it **very unlikely** that this reaction takes place under biological conditions (5,6).

Dr Charles Farr, the physician nominated for the Nobel Prize in Medicine in 1993 for his work and research into Hydrogen Peroxide, found that Hydrogen Peroxide leads to the formation of hydroxyl radicals **only under special circumstances**, primarily when ferrous (iron) oxide is present (4). In normal cells iron exists primarily in the ferric (Fe³⁺) state, and thus **Hydrogen Peroxide IS NOT reduced to the hydroxyl radical**. It instead is converted to molecular Oxygen and PURE water, therefore **rendering Hydrogen Peroxide very beneficial to the body**.

When applied on the skin in a cream, Hydrogen Peroxide comes in contact IMMEDIATELY with CATALASE, which is particularly abundant in the epidermis, as well as the dermis. The catalase enzyme is very rapid and very potent (7). One molecule of catalase can convert millions of molecules of Hydrogen Peroxide into oxygen and water within seconds (8). On the surface of the epidermis, Hydrogen Peroxide present in the liquid phase within the cream is converted to **molecular oxygen, a gas which creates pressure**. In certain correctly formulated Hydrogen Peroxide creams, this pressure is able to force the Oxygen and Pure Water deep down into the epidermis and dermis, where it is effective and can be measured.

Even in the uncommon situation when iron is present in the ferrous state in the skin, formation of the hydroxyl radical from the Hydrogen Peroxide cream is still unlikely because of several factors (7). Any detectable iron in the epidermis is present in such exceedingly low amounts, that the overwhelming abundance and potent activity of the catalase is **DOMINANT**. Furthermore, even in the presence of iron, the chemical reaction of catalase on the Hydrogen Peroxide is far more rapid than the conversion of Hydrogen Peroxide to the hydroxyl radical. In fact, it is because of their ability to produce **INCREASED TISSUE OXYGEN TENSIONS, WITHOUT CREATING THE PROBLEM OF FREE RADICAL DAMAGE**, that certain Hydrogen Peroxide emulsions have been shown to improve and speed the healing of wounds, burns and surgical incisions, and ischemic skin flaps (5).

There now exists a wealth of documented evidence that attests to the value of Hydrogen Peroxide in many aspects of medical therapy. Because of its **UNIQUE** properties and ability to liberate Oxygen, Hydrogen Peroxide has been used in medicine to **oxidize sick, weak and devitalized cells, whilst making healthy cells stronger and more resistant to oxidation**. It also aids healing by permitting the formation of new, healthy cells that are better able to resist disease. Additionally, when diluted to therapeutic levels for medical use, Hydrogen Peroxide has not only been found to be **safe** and **effective** but also to have **one of the lowest rates of adverse side effects of any type of medical therapy (4)**.

When used in skin care, creams containing Hydrogen Peroxide utilize a very dilute but effective concentration, generally within the range of one to three percent. When used on a regular daily basis, certain correctly formulated Hydrogen Peroxide creams have been shown to affect collagen deposition such that the integrity AND APPEARANCE OF THE SKIN IMPROVES CLINICALLY AND MICROSCOPICALLY (5). Although merely putting Hydrogen Peroxide into a cream **DOES NOT** mean that the cream will be able to effectively deliver oxygen into the tissues, certain creams containing Hydrogen Peroxide have been found to deliver incredibly high pressures of oxygen into the epidermis and the dermis. These measurements are easily obtained using a transcutaneous oxygen monitor. This medical device is generally used in intensive care units and is considered the medically definitive, noninvasive method to measure oxygen in the skin. Measurements with this monitor demonstrate that certain Hydrogen Peroxide creams are able to increase the oxygen in the dermis, to levels of 400 to 800 millimeters of mercury, a task once thought by physicians, only possible using an enclosed hyperbaric chamber. It has also been shown that Hydrogen Peroxide is an essential ingredient to render a cream capable of delivering additional oxygen. There have NEVER been any creams which do not contain Hydrogen Peroxide and which have demonstrated their ability to show any measurable increase in oxygen whatsoever. It must be emphasized, however, that just incorporating Hydrogen Peroxide into a cream does not automatically mean it will be effective (5). The cream must be able to sustain an elevated level of oxygenation in the tissues for a period of time, which is easily proved by a Clark's electrode transcutaneous oxygen monitor (5,13).

Due to the ability of certain Hydrogen Peroxide creams to deliver oxygen to the skin, the question has also been raised whether it would create excess free radical production and damage caused by elevated levels of oxygen. However, it is well documented that oxygen radicals are generated principally in *ischemic* (low oxygen) or inflamed tissues. Xanthine Oxidase, the best documented biologic source of oxygen free radicals, is capable of generating these radicals only in low oxygen tissues. Additionally, because of the ability of Hydrogen Peroxide to oxygenate tissues, numerous studies have demonstrated that it can increase the efficiency of the antioxidant enzyme system, which scavenges free radicals in the body (4,5).

With age, the oxygen in the skin decreases such that even by the age of 25, the skin's oxygen is substantially lower than that of a healthy teenager. This is because the blood vessels that deliver oxygen become narrower and their walls become less permeable. Furthermore, the skin of the face shows an even greater drop in measurable oxygen than the skin on the body (10). Damaged skin due to low oxygen is very easily observed in the skin of a smoker. The nicotine in a cigarette constricts the blood vessels even further, allowing less oxygen into the tissues.

It is well established in the medical literature that only by correctly and substantially increasing the measurable amount of oxygen in the dermis, can oxygen increase collagen synthesis and enhance angiogenesis (new blood vessel formation) (1,2,12,13). In order to gain these benefits, the oxygen must be elevated for a period of 90 to 120 minutes at a time. An increase of oxygen for periods of less than 60 minutes at a time are of little benefit (1,2,13). It is also important that these elevations of oxygen occur no more than twice in 24 hours, in a person with normal blood supply. With very frequent or more prolonged elevation, the skin's metabolism has been found to adjust, so there is no increase in collagen synthesis or angiogenesis (13). It should be emphasized that the actual amount of oxygen must be increased, not just the utilization of oxygen.

Although extremely difficult, certain Hydrogen Peroxide creams have accomplished this task correctly, elevating oxygen tension in the dermis. Without including Hydrogen Peroxide in this cream, however, this feat is to date impossible!

References

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Please Note: When Dr. C. Farr researched and analysed Hydrogen Peroxide based creams for the Nobel Institute, it was the Karin Herzog products that were used.