

# **Biostimulation Mechanism with Intranasal Light Therapy – What really happens under the surface**

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## **Introduction**

Intranasal Light Therapy uses low energy light of specific wavelengths to illuminate the inside of the nose (the nasal cavity). In this way, the light can effectively penetrate the thin layer of mucous membrane and reach the rich blood capillaries just below its surface, improving the blood properties. The light used can be low level laser or a non-laser. This stimulates the body to heal or restore its internal equilibrium (“homeostasis”).

Many scientific studies have been carried out to support the therapeutic effect of Intranasal Light Therapy, particularly at several Chinese universities.<sup>1</sup> This paper discusses the molecular mechanism as the result of Intranasal Light Therapy, putting together the most relevant scientific discoveries.

The intention here is to keep this article concise and accessible to the average reader that has some scientific education.

## **Theories on the Mechanisms**

Light therapy works because of “biostimulation”. A number of theories have been put forward on the mechanism of biostimulation at cellular level from light illumination (or irradiation) of various forms. Most of the literature have been focused on the more widely practices of applying the light from outside of the body targeting selected areas of the body. Very little have been proposed on the mechanism when blood in circulation is irradiated, either intravenously (injecting light into the vein - commonly practised in Russia, Germany and several European countries) or through the nasal cavity in our case.

An example of a common explanation on the mechanism of light therapy in general is that by Harvard researcher, Hamblin, that reveal the activity of the cells upon exposure to certain low energy red light.<sup>2</sup> He expounds the theory that tissues have photoreactive proteins that will eventually stimulate the production of adenosine triphosphate (ATP). ATP stores cellular energy, which is then released for biochemical processes occurring inside the cell. This explanation is shared by many researchers in the field.<sup>3</sup>

Hamblin also says that the absorption of the light packet, photon leads to the production of singlet oxygen, a reactive oxygen species (ROS), that is a “free radical”.

In discussing the mechanism of intranasal low intensity laser irradiation therapy, Chinese researchers suggest the mediation of biostimulation through three alternative pathways involving: 1) blood irradiation (hemotherapy), 2) acupuncture points and 3) autonomic nervous system.<sup>4</sup> In hemotherapy,

they mention that when diseases occur, the blood properties are not in homeostasis, and light-based biostimulation would restore that.

The theory based on the creation of singlet oxygen and ROS appears to have the most relevance for Intranasal Light Therapy.

### **Singlet oxygen and ROS**

When we are physically hurt or ill in some way, the cellular damage and inflammation create additional singlet oxygen. The homeostasis is unsettled and the body is signalled to restore the balance by stimulating the immune response system, increasing blood flow to the distressed areas, repair DNA and regenerate cells, etc . In other words it gets stimulated into the healing process. During this restoration, damaged cells die (“cell apoptosis”). This signalling process that stimulates the restoration is now recognised as “Redox Signalling”.

During this process, the ROS created act as Redox Signalling molecules. Eventually they create an antioxidative effect.<sup>5</sup> The body does not do anything differently than it normally does

Cells exposed to light in the red spectrum mimics this response (but at controlled output energy level to avoid cellular damage).<sup>6</sup>

The process also signals the body’s defence mechanism to activate the native antioxidants in the cells.<sup>7</sup> Meanwhile at this low energy level, the potential for oxidative damage by singlet oxygen is exceeded by the antioxidative therapy that it stimulates.

During the process of illuminating the blood cells through the capillary network in the nasal cavity, the Redox Signalling molecules are created and distributed in the circulatory system throughout the body, hence spreading the antioxidative effect systemically.

In the growing science of “photodynamic therapy” for cancer treatment, certain red light is used to generate singlet oxygen.<sup>8</sup> These singlet oxygen can be highly toxic (hence effective in attacking cancer tumour when combined with drugs), but at low doses, they are less excited and settle back into the original ground state relatively quickly.

Several researchers now adopt the view that the singlet oxygen influences the formation of ATP, which apart from contributing to the energy that drives activity, is also responsible for the healing of the body.<sup>9</sup>

### **As preventive medicine**

The biostimulative effect of Intranasal Light Therapy when used regularly will put the body’s mechanism continuously on alert. It is a preventive measure against viral infection because the immune system has been signalled to be on guard, stimulated by Redox Signalling.

### **Anti-aging**

As we age, damaged cells and tissues are not repaired as efficiently as when we are young. These damaged cells begin to outnumber healthy cells, manifesting in visible aging, and eventually leading to death.

On top of activating the immune system, regular Redox Signalling also stimulates the release of superoxide dismutase (SOD). This enzyme is antioxidative and neutralises the continuous free radical and oxidative activities in the body. The effect makes the repair and replace mechanism more efficient, delaying the aging process. Intranasal Light Therapy has been found to increase the SOD activity which helps to delay aging.<sup>10</sup>

## **Healing**

Numerous healing outcomes have been published with the use of low energy laser and non-laser light. Most of these relate to light therapy applied from outside of the body. The various regulatory bodies have approved a number of these for pain management. Many countries have approved them for accelerated wound healing. The older intravenous method of blood irradiation is supported by many Russian studies for cardiovascular conditions such as high blood pressure, high cholesterol and atherosclerosis that often leads to stroke and heart attacks.

The concept of Intranasal Light Therapy is still relatively new but the expected healing outcomes are supported by studies that mainly come out of China. As the result, this therapy is officially government sanctioned and private companies are certified to sell the devices. An estimated 10 million of these devices have now been sold to the Chinese public, and widely used by hospitals to support rehabilitation. A number of the outcome from these studies can be read on the website [www.mediclights.com](http://www.mediclights.com).

## **Conclusion**

In summary, the biomechanism for outside-the-body (extracorporeal) applications is well presented by several scientific works.<sup>11</sup> The combined roles of singlet oxygen, ROS, Redox Signalling and the activity of SOD best explains the mechanism behind the healing success of Intranasal Light Therapy. The key to the efficacy of the intranasal pathway is that it is essentially an in vivo (inside-the-body) method without the invasiveness of the older intravenous method. The rich vascular bed in the nasal cavity is an excellent starting point to carry and distribute Redox Signalling molecules throughout the body to stimulate the healing process.

It is safe to say that evidence by way of new discoveries is growing. Ultimately, of greatest importance is what has been observed in studies – the many positive outcomes from using one of these easy-to-use Intranasal Light Therapy devices.

## **References**

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<sup>1</sup> An internet search with the name of “Timon Cheng-Yi Liu” and the terms “Intranasal Low Intensity Laser Therapy” will yield a number of ailments that this therapy can potentially address.

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<sup>10</sup> Xu C, Lu C, Wang L, Li Q (2003). The effects of endonasal low energy He-Ne laser therapy on antioxidation of Parkinson's Disease. Prac J Med & Pharm. 20 (11): 816-817 (in Chinese).

<sup>11</sup> Hamblin M R and Demidova T N (2006). Mechanisms of Low Level Light Therapy. Mechanisms for Low-Light Therapy, edited by Michael R Hamblin, Ronald W Waynart, Juanita Anders, Proc. of SPIE Vol. 6410, 614001, (2006): 1605-7422.