

LIGHT AS A HEALING MECHANISM

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Over the centuries, various human populations have made use of sunlight's reputed healing qualities. The ancient Greeks built healing temples in which the incoming sunlight would hit various colored jewels such as emeralds and rubies on the temple's roof, sending colored beams throughout the interior of the temple. The Romans color-diagnosed their patients and placed them into rooms that radiated a specific color. Even the Chinese used color as a manifestation of cosmic energy that could be used to heal internal organs (Day, 2008). But why is it that different colors of light have diverse physiological effects, increasing heart rate and speeding up skin cell regeneration, on the body?

It was not until an accident in 1876 that extensive phototherapy research began. A doctor named Dinshah Ghadiali was astonished when he encountered a woman that was dying from intractable dysentery that no medication would cure. Out of other options, Ghadiali shined a violet light on the patient's body as a final effort to save her, and the curative effect of the light was so drastic that she was up and walking after only three days. This incident prompted him to research the applications of phototherapy and subsequently develop the Spectro-Chrome Theory, which postulates that the body contained different concentrations of various minerals which all absorbed light differently. As a result, different areas of the body

absorb different wavelengths of light at various intensities, yielding diverse physiological responses. By studying these varying physiological effects, doctors can then learn how to manipulate a patient's body with the strategic exposure to light (Cocilovo and Rosen, 1999).

Over time, the literature on phototherapy continued to grow as various researches sought to explain how and why it worked. While Ghadiali's initial Spectro-Chrome Theory was widely accepted as an explanation for phototherapy's effectiveness, another intriguing postulate was presented through research. The human eye contains a large concentration of light-sensitive molecules called flavins that have long been known to play a part in light absorption, and thus color perception. Research soon unveiled that these flavins also existed in various parts of our body including our skin, organs, blood and bones. This distribution of flavins throughout our entire body may be the mechanism through which we are able to absorb light and have varying physiological responses to it (Starwynn, 2009). A similar theory stems from the fact that certain nerve clusters, often targeted by acupuncturists, also seem to be involved in light absorption. Since these nerve clusters can be manipulated to influence human

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stress levels, there is potential to use them as the locus of phototherapy. In fact, they are one of the body's oldest evolutionary mechanisms to help the body cope with light and environmental changes by allowing the body to adapt to demands such as need for thicker skin (increased skin cell production) in a colder climate (Pankatov, 1991). A more recent theory is that light shined on various parts of the body induced cell death and immunosuppression which aids the body in isolating a problem such as cancerous cells and removing them so they cannot spread the disease to the rest of the body (Weichental and Schwarz, 2005).

One of the most effective modern-day implementations of phototherapy is its use in curing psoriasis, a very common skin disease that affects about 2% of the population. Thick red skin and flaky white patches that spread throughout the body's surface characterize this disease. Although this disease is not dangerous, it carries a debilitating stigma amongst pervasive cultural obsessions with physical beauty. As a result, people diagnosed with psoriasis have a greater chance of being unemployed and being diagnosed with depression, both of which contribute to a lower quality of life. Although treatment options such as external lotions and injections are available, these prove to be very expensive and time-consuming. Phototherapy is a quick, efficient alternative treatment that consists of shining ultraviolet light on the body, sometimes with an accompanying drug that ensures the body absorbs more of the light. Although this treatment method is very effective in most cases, there is some risk of skin cancer due to over-exposure of the body to ultraviolet rays. However, this can be avoided as more precise equipment is developed that can direct the beam of light to within a millimeter or less beyond the affected area and thus reduce the risk of healthy skin cells becoming infected (Nestle et al, 2009).

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Another key medical ailment that phototherapy effectively treats is neonatal jaundice, a disease that poses a serious threat to health if not removed at the infant stage. Jaundice is a common and usually temporary disease that is prevalent in babies due to a buildup of bilirubin, due to the breakdown of red blood cells. The bilirubin accumulates as deposits under fatty tissues and makes both the eyes and skin of the baby appear yellow. Since the liver cannot process bilirubin, specific wavelengths of light are shined on an affected baby to break down the bilirubin buildup, allowing it to pass through the excretory system as a greenish substance (UMHS Newborn Care Committee, 2005). As distance between the baby and the light source increases, the amount of energy transmitted by the light (and thus the light's effectiveness) decreases, therefore the baby must be no more than 50 cm away from the light source. Phototherapy for neonatal jaundice faces restrictions in terms of convenience, as it is very hard to keep a baby still enough to ensure



Figure 1. An infant undergoing treatment for neonatal jaundice

a constant rate of exposure to every part of its body. Thereby, portable methods for phototherapy such as the billiblanket have been developed to provide the same light emissions at a close enough distance to the baby such that it can be absorbed and effective (Hansen, 2012).

Phototherapy can also be used to treat mental issues such as depression and insomnia, which are dependent on physiological functions of the body such as hormone production and secretion. Melatonin is a hormone whose high levels have been known to bring about depression. Phototherapy can be used to suppress the production of melatonin and its release into the blood stream so that it is unable to cause the symptoms of depression. Mood can otherwise be improved by exposure to white light because mood has been found to correlate with the circadian rhythm, the body's internal time-keeping system. Exposure to three hours of white light both in the morning and evening simulates the effects of sunlight, and tricks the body into believing that it is day. This causes an increased secretion of hormones and energy into the body, which then improves mood. This same method is also used to enhance sleep, as the body is able to use up latent energy when stimulated with light and enter the calm of sleep (Gadit, 2012).

Phototherapy is an efficient and often effective method for treating diseases that would otherwise require extensive medical intervention. However, phototherapy is ultimately an imperfect treatment, as it carries certain disadvantages. For example, in the treatment of psoriasis, overexposure during phototherapy can lead to skin cancer. Given that phototherapy deals with different wavelengths of light, some risk always exists that mutating body cells will become cancerous when exposed to the ultraviolet range of light. However, this can be greatly minimized through the use of precise equipment that is able to exactly pinpoint the location where therapy is necessary and deliver beams of light with a very small margin of error. Over time phototherapy research will also determine the most effective wavelengths for each disease and thus reduce the side effects associated with the current procedures. Phototherapy research presents a new horizon in non-invasive medical treatment procedures and a return to the natural ways of healing used by our ancestors.

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IMAGE SOURCE

http://john-edwin-tobey.org/images/JanetEmily/Alien_Baby.jpg