THE COMPLETE GUIDE TO

RED LIGHT THERAPY

Optimal Health, Healthy Skin, and Other Benefits of Red Light



← 630 nm · RED

850 nm · NEAR-INFRARED →

SUSAN MCDOWELL

Thinking School

COMPLETE GUIDE TO

Red Light Therapy

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Complete Guide to Red Light Therapy: Optimal Health, Healthy Skin, and Other Benefits of Red Light

Susan McDowell

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The information in this book is for educational purposes only and is not intended as a substitute for professional medical advice, diagnosis, or treatment. Always consult a qualified healthcare provider before beginning any new treatment.

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A Word of Caution

It is important to follow general guidelines and protocols to ensure safe and effective application of red light therapy. Some practical tips include:

- **Consult a healthcare professional:** Before beginning any red light therapy treatment, it is advisable to consult a healthcare professional, such as a physician or therapist, especially if you have any pre-existing medical conditions.
- **Follow the manufacturer's instructions:** Each red light therapy device has its own instructions for use. It is important to read and follow these instructions carefully to ensure proper and safe use.
- **Establish a routine and be consistent:** Red light therapy may require regular sessions for optimal results. Establishing a routine and being consistent in the application of the therapy is important to maximize its benefits.
- **Maintain an adequate distance:** It is important to maintain an adequate distance between the red light device and the skin to ensure optimal exposure and avoid damage. By following the manufacturer's recommendations, the optimal distance can be determined for each device.
- **Protect the eyes:** Red light can be intense and potentially harmful to the eyes. It is important to wear appropriate eye protection goggles when necessary and to avoid looking directly at the light source during therapy.
- **Be patient and realistic:** Red light therapy can provide benefits, but results may vary depending on the individual and

the condition being treated. It is important to be patient and realistic, and to maintain reasonable expectations for results.

By following these guidelines and practical tips, those who wish to explore red light therapy for themselves can do so safely and effectively, maximizing the benefits this therapy can offer. However, it is important to remember that each individual is unique, and it is advisable to seek the advice of a healthcare professional before beginning any new treatment.

It is important to note that red light therapy does not seek to replace conventional medical treatments, but rather to complement them. It is considered a non-invasive and generally safe therapy, although it is advisable to follow specific guidelines and recommendations for proper use.

Medical consultation and thorough research are strongly recommended, as the effects of treatment may vary with each condition and each individual.

CHAPTER ONE

Introduction to Red Light Therapy

IN THIS CHAPTER

- What red light therapy is, in plain language
- How light "talks" to our cells
- A short history, from sunlight cures to modern LEDs
- The physical, emotional and aesthetic benefits being studied
- How therapy is delivered, and the precautions that matter

The application of red and near-infrared light produces a chain reaction, stimulating collagen production and improving blood circulation. Superficially, this can accelerate the healing of wounds, such as burns or ulcers, and reduce signs of aging, such as wrinkles and dark spots.

Although the skin is the largest and most visible organ of the body, theoretically all cells can benefit from red or near-infrared light therapy.

In general, the tissues that benefit the most are those in a state of depletion or alteration, such as skin damaged by the sun. Although phototherapy is not a miracle solution for treating skin or any other condition, it does offer numerous advantages that make it, if not an ideal complement to other treatments, a valuable form of prevention and care in its own right.

“It looks great—and I’ve seen it all over social media—but does red light therapy really work?” It is the question I hear most often, and the honest answer has three parts: for some uses, yes; for others, not yet; and for a few, almost certainly not. I came to this subject the way I come to every subject, with a question and a stack of original studies. I read the trials rather than the headlines about them, checked who paid for the research, and paid as much attention to what the studies left out as to what they found. By the end of this book you will know which uses of red light are backed by good evidence, how to choose a device without overpaying, and how to run an eight-week routine that tells you whether it is working for you.

The Purpose of This Book

The purpose of this book is to provide an accessible and understandable guide to red light therapy, an innovative therapeutic approach that has gained recognition and popularity in recent years. Our goal is to provide clear and concise information on the fundamentals of red light therapy, its potential benefits and its various applications in the health and wellness field.

In a world where health and well-being are constantly evolving, it is essential that information about therapeutic approaches such as red light therapy be accessible to all. This book aims to fill that gap, presenting the subject in a clear and understandable way to a wide audience.

In controlled studies, red light therapy has shown benefits for several conditions, but the strength of that evidence varies a great deal from one use to the next, and there is still much confusion about how it works and how to apply it. That is why this book explains the basics clearly enough for both health professionals and the general public to judge the therapy for themselves.

This book seeks to be a reliable and comprehensive source of information about red light therapy: its scientific foundations, its history, its current applications and its future potential. Throughout, I present the research together with its limits, so that you can weigh red light therapy as one option among others rather than take it on trust.

By addressing red light therapy in an informative format, we hope this book will inspire readers to explore this therapeutic approach, either as health professionals seeking new therapeutic tools or as individuals interested in improving their health and well-being. We are convinced that clear and accessible information can empower people to make informed decisions about their well-being, and we are committed to providing them with the tools they need to do so.

Red Light Therapy at a Glance

Red light therapy is a therapeutic approach that uses light in the red spectrum to promote health and well-being. This form of therapy is based on the idea that exposure to low-intensity red light can have beneficial effects on biological tissues and trigger positive responses in the body.

Red light used in red light therapy has a specific wavelength, usually in the range of 600 to 700 nanometers. This wavelength reaches the deeper layers of the skin and the tissue just beneath it, where it can interact with cells and biological systems.

One of the main benefits of red light therapy is its ability to stimulate energy production in cells through mitochondrial activation, known as photobiomodulation. This process triggers a series of biochemical and bioelectric responses that can have positive effects on different systems of the body.

KEY CONCEPT

Photobiomodulation

Photobiomodulation (PBM) is the scientific name for what happens when red and near-infrared light is absorbed by our cells and changes how they work. The light used is gentle—it does not burn or damage tissue. Instead, it acts as a signal that encourages cells, and especially their mitochondria, to produce more energy and switch on repair processes.

Common benefits associated with red light therapy include:

- **Improving wound healing and tissue regeneration:** Studies suggest that red light can speed up wound healing, support collagen production and help damaged tissue regenerate.
- **Pain relief and reduction of inflammation:** Red light therapy can have analgesic and anti-inflammatory effects, helping to reduce pain and inflammation in various conditions, such as muscle injuries, arthritis, and chronic pain.
- **Stimulation of blood circulation:** Red light can improve blood circulation by dilating blood vessels and increasing blood flow to tissues, which favors the delivery of oxygen and nutrients needed for optimal cellular health.
- **Improving skin health:** Red light therapy is widely used in skin care. Controlled trials show improvements in skin texture and fine lines, and red light combined with blue light can help with mild acne.
- **Effects on the immune system:** Laboratory studies show that red light can influence the activity of immune cells. Whether this strengthens the immune system in people has not been established.

Red light therapy has gained relevance in the therapeutic and wellness field because it is non-invasive and, used as directed,

carries a low risk of side effects. Its applications range from medicine and physiotherapy to dermatology and personal care.

The ability of red light to interact with cells has sparked great interest in the scientific community, and a growing number of studies have tested it in medical and aesthetic conditions, with results that range from strong to inconclusive. As research continues, red light therapy is expected to keep evolving into new areas of application.

In short, red light therapy is a promising approach that uses low-intensity red and near-infrared light to support health and well-being. The best evidence so far is for wound healing, skin rejuvenation, some kinds of pain and the prevention of mouth sores during cancer treatment. Its appeal lies in being non-invasive and low risk when used as directed, but it complements medical care rather than replacing it.

Separating Science from Myth

Educating and raising awareness about red light therapy is a crucial aspect to promote an accurate and objective understanding of this form of therapy. In the following pages, we explain the scientific foundations and mechanisms of action of red light therapy, and we demystify some common misconceptions or misunderstandings related to this therapy.

Red light therapy rests on a well-studied biological process known as photobiomodulation, in which low-intensity red and near-infrared light interacts with cells and tissues and triggers biochemical responses. The mechanism is well described in the laboratory; how much it achieves in a given condition is a question each clinical trial has to answer.

The red light used in this therapy has a specific wavelength in the range of 600 to 700 nanometers, which penetrates the skin well and reaches the cells and tissues just below it. When cells are

exposed to red light, light-sensitive molecules in the mitochondria, the structures responsible for producing cellular energy, absorb it.

One of the main mechanisms of action of red light therapy is the stimulation of the production of adenosine triphosphate (ATP), the main source of energy in cells. Red light increases the activity of the electron transport chain in mitochondria, leading to increased generation of ATP. This additional energy promotes cellular function and promotes a number of beneficial responses in the body.

In addition to ATP production, red light appears to trigger other effects. Laboratory studies suggest that it can reduce oxidative stress in cells and stimulate the release of growth factors involved in tissue repair. How far these effects translate into results in people depends on the condition and the dose.

It is important to address some common misconceptions or misunderstandings related to red light therapy. One is the idea that red light therapy is similar to excessive exposure to ultraviolet (UV) radiation from the sun or tanning beds. It is noteworthy that red light therapy uses a specific wavelength that does not cause thermal damage or skin burns. In addition, a low, controlled intensity is used to prevent adverse effects.

Another common misunderstanding is that red light therapy is just a “placebo” with no scientific backing. That is not true: there are many peer-reviewed studies, including sham-controlled trials, for uses such as skin rejuvenation, pain and hair loss. But the evidence is uneven, and for some popular claims it is thin, which is why Chapter 3 rates each use separately.

In later chapters, we describe the methods and devices used to administer red light therapy, as well as general guidelines and protocols for their safe and effective application. In addition, practical advice will be offered for those who wish to begin their experience with red light therapy themselves.

Different methods and devices are available to administer red light therapy, and the choice will depend on the area of application and individual preferences.

This book also summarizes relevant scientific research supporting the benefits of red light therapy, as well as illustrative case stories. These stories are composite examples: each one combines experiences commonly reported by people who use red light therapy, and the names and personal details are invented. They show how the therapy may be used in everyday life; they are not evidence that it works.

What Is Red Light Therapy?

Red light therapy is a therapeutic modality that uses light in the red spectrum range to promote health and well-being benefits. This form of therapy is based on the idea that exposure to red light can stimulate biological processes in the body, which in turn can have positive effects in various physiological conditions and functions.

The main goal of red light therapy is to harness the specific properties of light in the red range to trigger beneficial biological responses in the human body. Through controlled exposure to red light, we seek to stimulate different systems and tissues to promote healing, improve physical and mental performance, and optimize overall health.

The red light used in this therapy usually has a wavelength between about 600 and 700 nanometers, which corresponds to the visible portion of the electromagnetic spectrum. At this wavelength, red light acts mainly on the skin and the tissue just beneath it. Near-infrared light, which lies just beyond the visible spectrum, travels further and can reach muscles and joints.

KEY CONCEPT

Wavelength and nanometers

Light travels in waves, and the distance between two wave peaks is called the wavelength. It is measured in nanometers (nm)—billionths of a meter. Our eyes see red light between roughly 620 and 750 nm. Just beyond it lies near-infrared light, which we cannot see. Most therapy devices use red light around 630–670 nm and near-infrared light around 810–850 nm.

Red light therapy has been used in various applications, including mood disorders such as depression and anxiety, sleep disorders, dermatological conditions, muscle and joint injuries, and wound healing processes, among others.

Red light used in red light therapy is a form of electromagnetic radiation that is at the visible end of the light spectrum. It has a longer wavelength compared to blue or ultraviolet light, which gives it particular properties and specific effects on biological tissues.

The properties of red light

Red light has several defining properties:

- **Wavelength:** Red light has a wavelength of approximately 600 to 700 nanometers, making it longer than other parts of the visible spectrum.
- **Penetration:** Red light penetrates biological tissue more deeply than blue or ultraviolet light, reaching the full thickness of the skin and the tissue just below it. Near-infrared light penetrates further still, which is why many devices combine the two.
- **Energy:** Red light has a lower energy than ultraviolet light, which makes it less harmful to skin and tissues.

How red light interacts with the body

When red light meets the body, three main things happen:

- **Absorption:** When red light reaches biological tissues, some of it is absorbed by molecules present in cells, such as cytochrome c oxidase and mitochondrial chromophores. These molecules have a high affinity for red light and can absorb it, triggering specific biological responses.
- **Metabolic stimulation:** Absorption of red light by molecules in cells can increase production of adenosine triphosphate (ATP), the cellular energy source. This can stimulate cell metabolism and promote enzyme activity.
- **Improved blood circulation:** Red light can stimulate the release of nitric oxide into blood vessels, which causes vasodilation and improves local blood circulation. This can facilitate the delivery of oxygen and nutrients to tissues and promote the disposal of waste products.

KEY CONCEPT

ATP: the cell's fuel

Adenosine triphosphate (ATP) is the molecule every cell uses to power its work, from repairing tissue to sending nerve signals. It is produced inside the mitochondria, the "power plants" of the cell. An enzyme there, cytochrome c oxidase, readily absorbs red and near-infrared light—which is why light can influence how much energy a cell produces.

Mechanisms of action involved in red light therapy include modulation of gene expression, reduction of inflammation, promotion of collagen and elastin synthesis, regulation of the circadian cycle, and improvement of mitochondrial function.