



THE ULTIMATE GUIDE TO

RED LIGHT THERAPY

**What Is Red
Light Therapy?**

A R I W H I T T E N

What Is Red Light Therapy?



If red light therapy could be put into a pill, it would be a billion-dollar blockbuster drug. Hundreds of millions of people would be told to start taking it by their doctors every day. And doctors all over the world would call it a “miracle drug.”

Here’s the crazy part: That drug exists.

But it’s not a pill. It’s red and near-infrared light.

Near-infrared and red light therapy are one of the biggest breakthrough discoveries in health in the last half century. Scientists have quietly accumulated over two thousand studies on the power of red and near-infrared light to enhance human health for the last several decades. And yet, most people have never even heard of it.

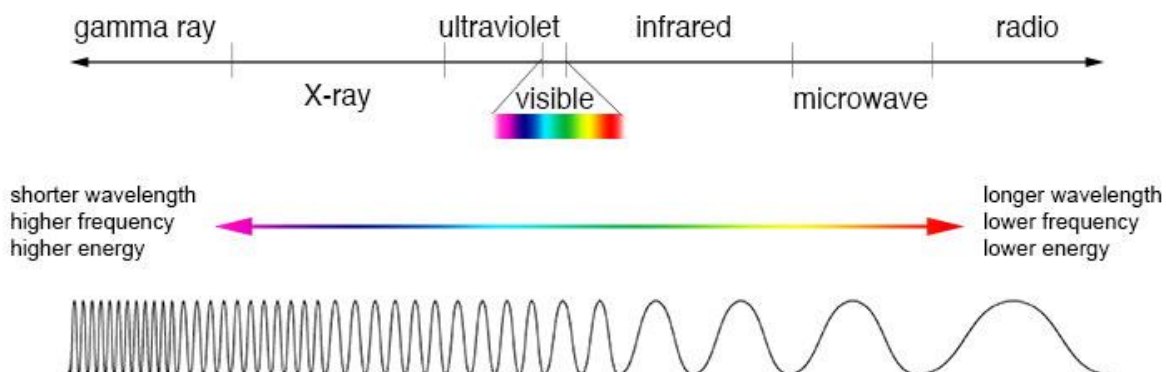
Most people think of light simply as the opposite of darkness. Darkness is the absence of light, and light is what illuminates and allows us to see things. That’s the typical way most of us think about light. Thus, the idea that light is getting into our cells and affecting human cell function is often met with blank

stares or even people laughing at such a “crazy” thought. Indeed, most of us are completely unaware that light (very specific types of light) have a profound impact on our health, and are actually necessary nutrients, similar to nutrients from food. Unbeknownst to most people, there are literally over ten thousand studies that have been done on the relationship of different kinds of light to human health. Of these, it is red and near-infrared light that are perhaps the most interesting and powerful in their effects on human health.

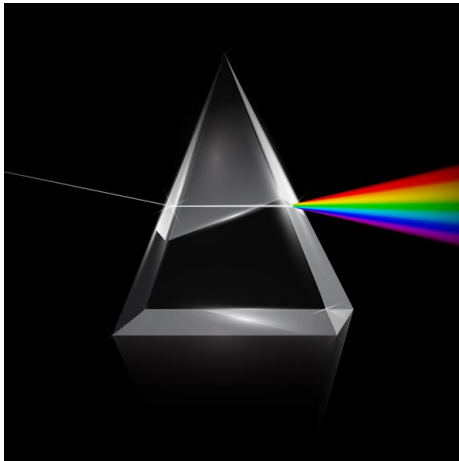
But let’s back up for a moment: What exactly *are* red and near-infrared light?

Red and near-infrared light are part of the electromagnetic spectrum, and more specifically, part of the spectrum of light emitted by the sun (and also fire light). These wavelengths of light are “bioactive” in humans. That means that these types of light literally affect the function of our cells.

So what’s all this talk of “electromagnetic spectrum” and “spectrum of light”? Let’s take a look at the electromagnetic spectrum so I can show you more clearly what I’m talking about...

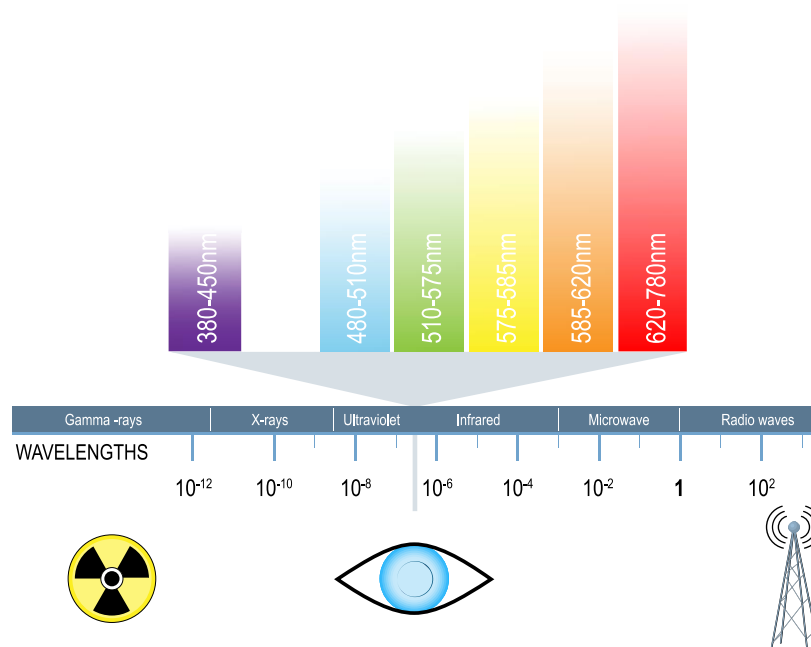


Electromagnetic waves range from 0.0001 nanometer (gamma rays and x-rays are very small waves) all the way to over centimeters and meters (radar and radio waves).



If you pass white light (like sunlight) through a prism, it will separate out the different colors based on their wavelengths. This is how we get rainbows as well, and you might remember this from school with the acronym ROY. G. BIV, which stands for red, orange, yellow, green, blue, indigo, violet.

VISIBLE SPECTRUM



A tiny part of this spectrum – from roughly 400nm to 700nm – is visible to the human eye.

At the highest end of the visible light spectrum is red light, which goes from a little over 600nm to approximately 700nm. Above the visible light spectrum is near-infrared, from about 700nm to a little over 1,100nm.

It is the red and near-infrared wavelengths specifically that have these amazing effects on our bodies. (Interestingly, even within that range, not all the red and near-infrared wavelengths seem to be created

equal. Specifically, most research showing benefits of red light and near-infrared light have used wavelengths in the narrow ranges of 630-680nm and 800-880nm. More on this later.)

Over 3,000 studies have now clearly shown that light in these red and near-infrared wavelengths can have amazing effects on human health. That is the subject of this book.

In this book, you'll discover the incredible power of red and near-infrared light therapy and how it can help:

- Increase your energy
- Combat aging and make your skin healthier, reduce wrinkles, and help get rid of cellulite
- Speed up fat loss
- Improve muscle recovery and athletic performance
- Improve mood and cognitive function
- Speed healing from injury
- Improve metabolism and hormonal health

Sound too good to be true? Think again!

Red and near-infrared light have already been proven in over 3,000 scientific studies to do all that and more!

The Discovery of How Red and Near-Infrared Light Affect Human Cells

Within documented human history, it is now known that humans have been aware of the power of light to heal for literally thousands of years. Many ancient tribes worshipped the sun or gave massive importance to it as a giver of life, for likely tens of thousands of years. But as far as the use of light for therapeutic purposes ("photomedicine" or "photobiomodulation"), one could say that it goes back over three thousand years to India – it has been documented in the Hindu text Atharva Veda, written in 1400 BCE.

In the 18th century, reports started to appear in medical literature about the power of sunlight to treat an array of different diseases. In the 2018 textbook "Low-Level Light Therapy: Photobiomodulation," Hamblin et al. gives a detailed account of the history of how it came to be recognized that light influences human health. If you're interested in all the nuances of the history of the use of light therapy, I highly recommend getting Hamblin's textbook, but let me give some highlights from their book of this amazingly detailed accounting of the history of photomedicine:

- "In 1735, Fiennius described a case in which he cured a cancerous growth on the lip using a sunbath. In 1774, Faure reported that he successfully treated skin ulcers with sunlight, and in 1776, LePeyre and LeConte found that sunlight concentrated through a lens accelerated wound healing and destroyed tumors. There were also reports that sunlight had beneficial effects on internal maladies. In 1782, Harris used sunlight-exposed mollusk shells to improve a case of rickets (fragile bones due to vitamin D deficiency), In 1845, Bonnet first reported that sunlight could be used to treat tuberculous arthritis (a bacterial infection of the joints).
- In the second half of the 19th century, the therapeutic application of sunlight, known as heliotherapy, gradually became popular. In 1855, Rikli from Switzerland opened a clinic in Veldes (now called Bled), Slovenia for the provision of heliotherapy. ...
- Theobald Adrian Palm (1848–1928) discovered the role of sunlight in the prevention of rickets. ... Many years later, the role of sunlight exposure to the skin, in mediating the biosynthesis of vitamin D, eventually explained these observations.

- Nils Ryberg Finsen (1860–1904)... suffered from an illness that would later be known as Niemann–Pick’s disease, which is characterized by progressive thickening of the connective tissue of the liver, heart, and spleen. His discovery that sun exposure improved his own symptoms encouraged him to treat his patients with light. He had particular success in 1893 when treating smallpox with red light and in 1895 when treating lupus vulgaris (also known as scrofula or cutaneous tuberculosis) with what he thought was ultraviolet light from an arc lamp (but was in fact probably blue light). ...
- Two pioneering Swiss physicians, Oskar Bernhard (1861–1939) at St. Moritz and Auguste Rollier (1874–1954) at Leysin, were responsible for extending the use of heliotherapy. Solar therapy as practiced by these practitioners included increasing graduated exposures of parts of the body to sunlight, and the beneficial effects were considered to be enhanced by the fresh and cold mountain air in the Alps.
- Bernhard obtained an impressive initial success treating a large nonhealing abdominal wound (from a knife attack) that had resisted all other accepted healing approaches and which he decided to expose to the sun as a last desperate measure. Thereafter, he treated all nonhealing and infected wounds with sunlight. ... In 1905, Bernhard had established his own small private clinic for sunlight therapy at St. Moritz that could accommodate some 33 patients and had south-facing balconies on two of the upper floors for convenient sun exposure.
- Rollier ... became disillusioned with the poor results obtained by surgery for the treatment of skeletal tuberculosis and went into a rural general practice ... where he began to treat non-pulmonary tuberculosis with sunshine and fresh air. Over the next forty years, the technique Rollier devised for exposing the body to sunlight (Rollier’s Sunlight Therapy or Heliotherapy) came to be broadly accepted in Europe. His clinic, called “Les Frênes,” was the first large, purpose-built sunlight-therapy facility to be constructed in the world.”¹

Thus, the general concept that sunlight was a powerful form of medicine (and even necessary for human health and the prevention of diseases like rickets) became general knowledge.

Then in the 1900s, the discovery of quantum physics and the shifting focus of many physicists during the World Wars led to the development of laser technology. In the 1960s, the theme of photomedicine (which prior to that, was purely focused on using natural sunlight as therapy) began to merge with laser technology, which ultimately led to people experimenting with laser technology on the human body.

So where do red and near-infrared light come into all this? The story of the discovery of the effect of red and near-infrared (NIR) light on human health is a fascinating one.

In the 1960s, a Hungarian researcher named Endre Mester was using red light lasers to kill tumor cells that were implanted into hamsters. (Note: This is often how researchers study models of cancer in animals – they implant a tumor and then attempt to treat it). He was trying to repeat the earlier research of Paul McGuff in Boston, who had successfully been using laser light to kill tumor cells. Interestingly, Mester’s laser only had a small fraction of the power output of McGuff’s light, and thus was insufficient to kill the tumor cells.

But Mester did observe a fascinating phenomenon: He noticed that the skin wounds made during the implantation of the tumors healed dramatically faster in the animals being treated with the red light compared to the animals not being treated with light. The light actually caused damaged cells to heal faster!

Indeed, this discovery of the power of red light to speed up healing and regeneration of human cells has now been confirmed by hundreds of studies. In the 1990s, even NASA started using it. They were initially using red light LED technology for the purposes of growing plants during shuttle missions. But once it was discovered that these lights also affected human cells, NASA started testing and refining the technology with the idea to use it to help astronauts maintain muscle and bone mass, as well as to treat chronic wounds.²

It turns out these effects are just scratching the surface of the power of red light and near-infrared light to improve human health.

Since these early days, photobiomodulation (PBM) and low-level laser/light therapy (LLLT) have grown into entire fields of research, the body of scientific evidence has grown to several *thousand* studies over the last few decades, and these light treatment technologies have begun to work their way into the offices of doctors and health practitioners, and into the homes of thousands of people.

There have now been literally *thousands* of studies conducted upon both animals and humans. Overall, red light has been repeatedly shown to have positive effects on cell function in animal and human studies and aid in improving a wide range of conditions, improving health in numerous ways. Near-infrared (NIR) and red light therapy devices have been FDA-approved for several purposes so far, including anti-aging, hair-loss reversal, acne treatment, pain relief, slow to heal wounds, fat loss, among other purposes. (This is worth noting because this proves the abundance of research showing benefits – the therapy has to be proven safe and effective in numerous trials to gain FDA approval.)

That said, there have been a few of big barriers to the widespread adoption (or even just the awareness) of red and near-infrared light technologies among some physicians:

1. Some of the cellular mechanisms of how red/NIR light therapy works in human cells are still being elucidated, and some physicians have difficulty adopting something without fully understanding the cellular mechanisms by which it works.
2. There is a wide variety of light dosing parameters and devices used in the many thousands of studies done, so some physicians and medical practitioners feel confused about what the correct dosing actually is.
3. Insurance reimbursements are higher with many other types of therapy, so many practitioners choose other forms of treatment that give them higher payouts.

Two big barriers specifically have hindered the widespread adoption of this technology by the general public:

1. Until recently, it was thought that you needed an expensive laser device to obtain these benefits. This technology has been in use in doctor's offices for many years now and goes by the name of either "low-level laser therapy" (LLLT) or "cold laser." These red/NIR light laser devices often cost \$5,000-\$30,000. This is precisely why this technology hasn't gone mainstream and why most people still haven't heard of it – because most people are under the impression that you can only get near-infrared and red light therapy from these incredibly expensive laser devices.
2. Red and near-infrared LED panels are also being used in anti-aging clinics, where people are being charged \$75-\$300 per single session to use these lights. This is one of the other barriers – most people believe not only that these lights cost many thousands of dollars, but also that they can only use them by paying hundreds of dollars for a single treatment in a fancy clinic.

Shockingly, new research has shown that it is not necessary to use these expensive laser devices, and most experts now agree that it's possible to get the same benefits from near-infrared and red light therapy LED panels at a fraction of the cost.

Here's what Harvard researcher Michael Hamblin, PhD (widely regarded as the world's top authority on near-infrared and red light therapy) has to say on this subject:

*"Most of the early work in this field was carried out with various kinds of lasers, and it was thought that laser light had some special characteristics not possessed by light from other light sources such as sunlight, fluorescent or incandescent lamps and now LEDs. **However all the studies that have been done comparing lasers to equivalent light sources with similar wavelength and power density of their emission, have found essentially no difference between them.**"¹³*

So you don't need a \$5,000-\$30,000 medical laser device to get these amazing health benefits. You can get these effects with a device that costs just a few hundred dollars.

You don't have to go to a clinic and pay \$75-\$300 *per treatment*. Once you buy one of these devices, you can do unlimited treatments at home for free (or for just the cost of a few minutes of electricity)! **You can do light sessions at home with your own light and get all the same benefits while saving yourself the thousands of dollars you would spend at an anti-aging or medical clinic.**

I'll give you my recommendations for the best devices at the end of this book but for now, please be aware that there are a lot of cheap, underpowered and ineffective devices on the market that are being sold for hundreds or even thousands of dollars. It's very important that you get a superior quality, high-power device. Don't worry, I'll show you how to evaluate which devices work and which don't, so you don't get hoodwinked.

Right now, this technology is on the cusp of exploding in popularity.

As people come to realize that you can get all the amazing benefits of near-infrared and red light therapy without spending \$5,000-\$30,000 on a laser device or \$75-\$300 for a single treatment session in an anti-aging clinic, I believe this therapy will go mainstream and nearly *everyone* will have a red/NIR light therapy device in their home.

After all, who wouldn't want to have a simple-to-use device in their home that can dramatically speed healing, improve hormonal health, accelerate fat loss, increase energy, and combat skin aging?

The Five "Bioactive" Types of Light: Why Humans Need Sunlight to Be Healthy

"LLLT/PBM (photobiomodulation) is more than an alternative kind of medical treatment; it is a whole new method to control cellular processes and modulate living organisms by precise alterations in the chemistry of biomolecules. PBM enables the contemporary clinician or therapist who holds a modern and multidisciplinary outlook to fight against diseases and other disorders in both humans and other animals. Moreover, it is a possible way to stimulate or inhibit many different biological processes that occur in most (if not all) different living creatures. It could even be suggested that the photobiomodulation phenomenon is as old as life itself!"⁴

– Michael Hamblin

Just as human cells need nutrients from food, light is also a necessary nutrient for our cells to function well. Certain wavelengths of light can help power up our cells, affect hormones and neurotransmitters, balance our mood, enhance physical performance, hasten recovery from stress, increase alertness, improve sleep, and positively affect the expression of our genes.

Most importantly, you need to grasp that **the human body needs light to be healthy.**

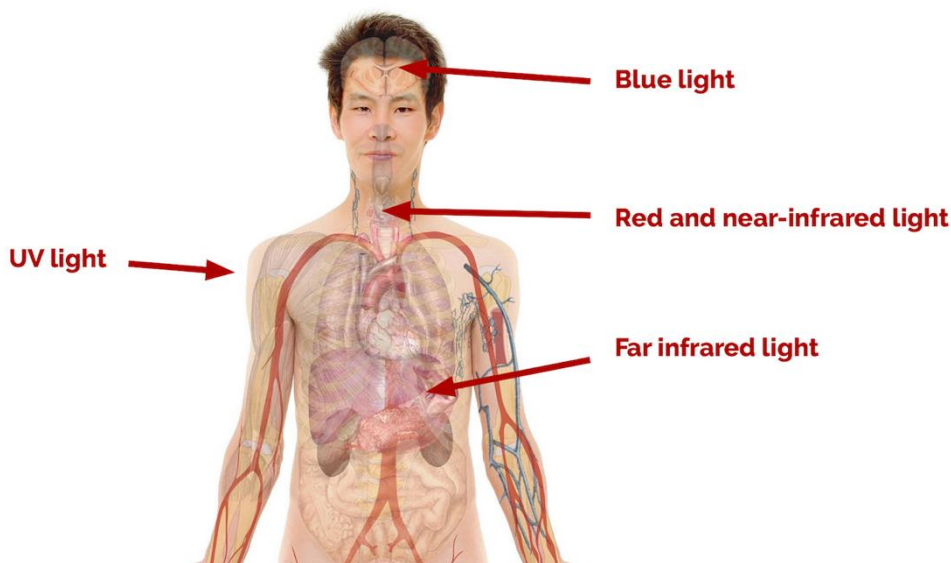
This may seem like a strange idea at first, as we're generally not used to thinking of light as playing an important role in our health. We're used to thinking of light as what we turn on in our house so we can see, or the headlights of our car that allow us to drive at night.

Most of us are deeply unaware of the fact that many different types of light are "bioactive" in humans (which means they affect the functioning of human cells), and that our health is hugely influenced by the dosage of these different types of light that we get each day.

These are the five types of bioactive light in humans:

1. **Blue light** – sets the circadian rhythm in our brain, which in turn regulates numerous different neurotransmitters and hormones
2. **UV light** – allows us to synthesize vitamin D from the sun
3. **Far-infrared** – acts to heat up our cells (this is the part of the sun's spectrum that you feel as heat) which stimulates changes in cell function, as well as circulation changes
4. **Red light** – acts on the mitochondria in our cells to stimulate increased cellular energy (ATP) production (among other mechanisms discussed in this book)
5. **Near-infrared (NIR)** – acts on the same pathways as red light – particularly in the mitochondria in our cells to stimulate increased cellular energy (ATP) production (among other mechanisms discussed in this book)

THE 5 TYPES OF BIOACTIVE LIGHT IN HUMANS



It turns out that *light* is in fact an essential nutrient for humans and our health depends on getting the right dose of these five types of light.

Our ancestors didn't have to worry about all this, because living outdoors in the sun, they were able to get exactly what the body needed at the right dose.

But in the last few generations, modern humans have made the switch to living indoor lives with electricity, man-made artificial lighting systems and limited sun exposure. Therefore, we have developed light deficiencies and toxicities that are having a massive impact on our health and well-being.

Some people have made calculations on the difference between living outside vs inside houses, and have suggested that the difference in light exposure is roughly a 1000-fold difference, and in many cases even more! And that is just one point about light intensity – it says nothing of the huge deficiencies in exposure to specific wavelengths of light, like red/NIR, far-infrared, and UV light.

The point is that modern humans are deficient in the benefits of all of these five wavelengths of light, and there are health consequences when we don't get enough.

What kind of health consequences?

The most common light-related health problems that most people are already familiar with are vitamin D deficiency (from too little UV light) and circadian rhythm disruption (from too little blue light in the morning, and too much artificial light at night). Just these two light-related health issues alone are

responsible for a massive burden of disease in the modern world. These two issues caused by inadequate and improper light exposure are linked with dozens of types of cancer, as well as heart disease, obesity, diabetes, neurodegenerative disease, and multiple other conditions.

Just as the modern world of processed food leads to chronic malnutrition, our modern light environment (of too much of the wrong kinds of light and too little of the right kinds, and with poor timing) is called mal-illumination. The vast majority of people living in the modern world are suffering from chronic mal-illumination and don't even realize it. And it has widespread effects on our brain and organ function, immune system, energy levels, mood, neurotransmitter balance, and hormone levels.

Sunlight deficiency has been linked with numerous diseases, such as:

- Neurodegenerative diseases like Alzheimer's, dementia, Multiple Sclerosis, and Parkinson's^{5,6,7,8}
- Dozens of types of cancer^{9,10,11,12}
- Obesity^{13,14}
- Diabetes¹⁵
- Metabolic syndrome¹⁶
- Heart disease¹⁷

There is even research that suggests that low levels of sun exposure are a risk factor for human health equivalent to that of being a cigarette smoker!¹⁸ A Swedish study looked at nearly 30,000 women for 20 years (note: studies with this many people that are this long-term are exceedingly rare) and found that **women with the lowest sun exposure had a twofold higher rate of death compared to the women with the most sun exposure!**¹⁹

As another example of mal-illumination, artificial light exposure at night (from electronic devices like phones, TVs, computers, indoor lighting, etc.) have been linked with numerous diseases, like:

- Numerous types of cancer^{20,21}
- Depression²²
- Fat gain, obesity, diabetes and metabolic syndrome^{23,24,25}
- Insomnia and poor sleep²⁶
- Mood disorders²⁷

And this is just a few of the dozens of health problems linked to mal-illumination.

But what if I told you that there is another kind of light deficiency that most people are totally unaware of, and that is likely even more problematic?

Near-infrared (NIR) and red light deficiency.

With respect to human health, I believe the most interesting and powerful of all the different wavelengths of light are the red and near-infrared parts of the spectrum. When you learn what these forms of light can do inside our bodies – and specifically how our cells use them to produce more energy – you'll be blown away, as it revolutionizes the way we think about how our cells produce energy, and has the potential to massively improve our health.

We need the sun to be healthy. And red and near-infrared light are a big part of the reason why. Just as our body requires the intake of certain vitamins and minerals (e.g. vitamin C, magnesium, zinc, etc.) from the diet to function normally, our cells also require certain "light nutrients" (adequate amounts of certain wavelengths of light) to be healthy. In short, **the human body needs near-infrared and red light to function optimally.**

Just as we can have malnutrition from a poor diet, we can have mal-illumination from poor light exposure.

Put bluntly, most peoples' light exposure habits are the equivalent of eating an all-McDonald's diet all day, every day. Like I said, mal-illumination.

We used to be exposed to far more light and of the right wavelengths because our ancestors spent hours each day working under the sun and spent evenings around the fire, both of which emit ample red and near-infrared light. Thus, humans never had to think about this subject for hundreds of thousands of years – our outdoor lives in the sun took care of our daily red and near-infrared light needs.

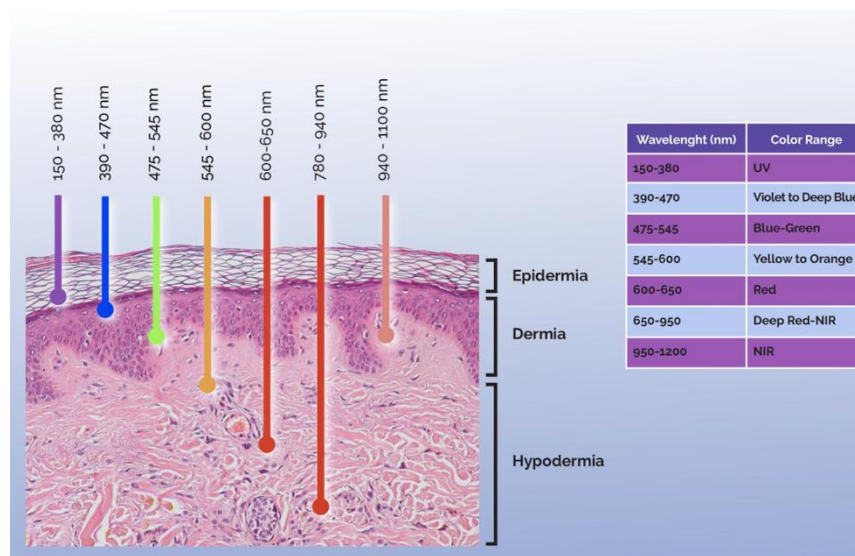
In fact, this book really wouldn't even be necessary if we still spent hours in the sun each day. There would be no need to have a book on red and near-infrared light therapy or to create red and near-infrared light therapy devices, because if we all spent several hours a day with sunlight on our bodies, we'd be getting all the red and near-infrared light that our bodies need to thrive.

Red and near-infrared light have profound effects on our cellular and hormonal health. And we're designed to *need* ample amounts of those types of light to have optimal health.

Given that virtually all modern humans now spend almost all their time indoors, we are massively deficient in sun exposure. Thus, we are massively deficient in red and near-infrared light exposure. And, as you're about to read in this book, this causes big problems for our health. I personally believe that much of the positive literature around the benefits of red and near-infrared light devices is largely due to how it *corrects the deficiency in red and near-infrared light*. In other words, if you took a group of hunter gatherers (who spend hours in the sun each day) and another group of Westerners spending most of the day indoors and gave them both a red/near-infrared light treatment, you'd probably find that it's much more beneficial to the Westerners. Why? Because they are deficient in red/near-infrared exposure from the sun. (Of course, this hasn't actually been tested and is just my speculation of what I think they'd find if it were tested.)

The fundamental reason that red and near-infrared light have so many incredible benefits on our health is because they are correcting a deficiency. We should be getting plenty of red and near-infrared light from the sun, but since we're not, we can apply a device in a targeted way to give us that light "nutrient," and get profound benefits from it. (We'll go over what those benefits are in detail later.)

There is another interesting twist to this story of how red and near-infrared light impact our health, and that has to do with the ability of different wavelengths of light to penetrate into the human body. While most other wavelengths of light (such as UV, blue, green, and yellow light, etc.) are mostly unable to penetrate into the body and stay in the layers of the skin, near-infrared light and red light are able to reach deep into the human body (several centimeters, and close to 2 inches, in some cases) and are able to directly penetrate into the cells, tissues, blood, nerves, rods and cones of the eyes, the brain, and into the bones.



Once in those deeper tissues, red light and near-infrared (NIR) light have incredible healing effects on the cells where they can increase energy production, modulate inflammation, relieve pain, help cells regenerate faster, and much more.

The key point is this: Red/NIR light are not some weird technology that benefits us for some random reason. These wavelengths of light come from the sun, and it turns out that our body has evolved over millions of years to be capable of utilizing red and near-infrared light from the sun to help power up our cells – literally enhancing the function of our mitochondria, our cellular energy generators – among many other beneficial effects.

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