

# NEAR-INFRARED: THE SCIENCE EXPLAINED

The Modern Science Behind  
Near-Infrared Sauna Therapy



by Brian Richards





**OVER THE COURSE OF THE PAST FEW YEARS, NEAR-INFRARED SAUNA OPPONENTS, NAMELY FAR-INFRARED SAUNA MANUFACTURERS, HAVE CLAIMED THAT NEAR-INFRARED SAUNA USE MIGHT CAUSE MORE HARM THAN GOOD.**

**From skin aging to DNA damage and cancer — the far-infrared proponents' claims against near-infrared couldn't be farther from the truth.**

While some statements are being taken out of context, others are based on research that is misinterpreted in their own favor.

The reasons for far-infrared manufacturers to lash out against NIR technology are obvious; over the last decades, the vast majority of infrared saunas were far-infrared emitter saunas.

Now that near-infrared technology (NIR) has been studied with positive results, far-infrared marketing is attempting to regain market share by relying on negative press.

In this article, we will shine light on the truth about NIR technology and give you a rundown of :

- **The top 10 near-infrared myths vs. what science says**
- **The major differences between far- and near-infrared sauna**
- **Why near-infrared is superior to far-infrared and**
- **Why it is the **safest and most effective** therapy for full-body detox, skin rejuvenation, and deep, cellular healing**



MYTH NO. 1:

# NEAR- INFRARED EXPOSURE CAUSES PHOTOAGING OF THE SKIN

**Most studies<sup>1</sup> reporting the damaging effects of NIR on human skin used artificial radiation emitting light in unnaturally high intensities, much greater than found in sunlight and beyond levels of average daily sun exposure.**

The authors mention that doses were chosen because they correspond to doses of NIR radiation which can be achieved in a few hours on a summer day in central Europe. To get such a total dose of sun, one would have to be exposed to direct sun from 6 am to 6 pm in the summer in tropical areas—a scenario far from real life conditions.

The same principle applies to light therapy. We don't want an unlimited amount of NIR light. Exposing the body to a natural, low level of irradiance while gently raising its core temperature by just a few degrees activates deep, cellular healing systems.

Not only does raising the body's core temperature activate parasympathetic sweating—the most effective, least energetic means of detoxification available—but sauna heat therapy also stimulates the production of heat shock proteins (HSPs) as a beneficial bodily stress response. These proteins are dormant at resting body temperature and once induced, HSPs help repair and maintain mis-folded protein structure and dramatically improve cellular detoxification as they eliminate viruses and pathogens.

Considering that the referenced studies were conducted in unrealistic conditions using artificial light sources far from what natural sunlight is capable, the assumption that NIR has damaging effects on human skin, is untenable.

It is chronic repetitive exposure to extraordinarily high irradiance that causes photoaging, similar to the effect of exposure to ultraviolet light.

**It has been shown that a natural, low measured dose of near-infrared light does not only provide an antidote to the photoaging effect, but it can also improve skin texture, tone and and even reduce sun damage.<sup>2</sup>**

1 Infrared-A radiation-induced matrix metalloproteinase 1 expression is mediated through extracellular signal-regulated kinase 1/2 activation in human dermal fibroblasts, <https://www.ncbi.nlm.nih.gov/pubmed/12485435/>; Effects of infrared radiation and heat on human skin aging in vivo, <https://www.ncbi.nlm.nih.gov/pubmed/19675547/>; Effects of water-filtered infrared-A and of heat on cell death, inflammation, antioxidative potential and of free radical formation in viable skin--first results, <https://www.ncbi.nlm.nih.gov/pubmed/25038541/>; Schroeder P, Schieke S, Morita A. Premature skin aging by infrared radiation, tobacco smoke and ozone. In: Gilchrest B, Krutmann J, eds. Skin Aging. Berlin/Heidelberg, Germany: Springer-Verlag; 2006:45-54; Kligman LH. Intensification of ultraviolet-induced dermal damage by infrared radiation. Arch Dermatol Res. 1982; 272:229-238; Augmentation of UV-induced skin wrinkling by infrared irradiation in hairless mice, <https://www.sciencedirect.com/science/article/pii/S0047637405001454?via%3Dihub>; Infrared-A Radiation-Induced Matrix Metalloproteinase 1 Expression is Mediated Through Extracellular Signal-regulated Kinase 1/2 Activation in Human Dermal Fibroblasts, [https://www.jidonline.org/article/S0022-202X\(15\)30108-1/fulltext](https://www.jidonline.org/article/S0022-202X(15)30108-1/fulltext); Regulation of type I procollagen and MMP-1 expression after single or repeated exposure to infrared radiation in human skin, <https://www.sciencedirect.com/science/article/pii/S004763740600217X?via%3Dihub>; Infrared plus visible light and heat from natural sunlight participate in the expression of MMPs and type I procollagen as well as infiltration of inflammatory cell in human skin in vivo, [https://www.jdsjournal.com/article/S0923-1811\(07\)00407-0/fulltext](https://www.jdsjournal.com/article/S0923-1811(07)00407-0/fulltext).

2 Effects of radiofrequency, electroacupuncture, and low-level laser therapy on the wrinkles and moisture content of the forehead, eyes, and cheek, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5332991/>. A prospective study of the safety and efficacy of a combined bipolar radiofrequency, intense pulsed light, and infrared diode laser treatment for global facial photoaging, <https://www.ncbi.nlm.nih.gov/pubmed/28434049>; Low-level laser (light) therapy (LLLT) in skin: stimulating, healing, restoring, <https://www.ncbi.nlm.nih.gov/pubmed/24049929>; A Controlled Trial to Determine the Efficacy of Red and Near-Infrared Light Treatment in Patient Satisfaction, Reduction of Fine Lines, Wrinkles, Skin Roughness, and Intradermal Collagen Density Increase, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3926176/>; Photobiomodulation in Dermatology: Harnessing Light from Visible to Near Infrared, <https://journals.ke-i.org/index.php/mra/article/view/1610>; Long-term histological comparison between near-infrared irradiated skin and scar tissues, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3047939/>; Effects of infrared radiation on skin photo-aging and pigmentation, <https://www.ncbi.nlm.nih.gov/pubmed/16941737/>.



# NIR THERAPY SKIN REJUVENATION FACTS:

## 1

### Instant boost in circulation

When the skin is exposed to NIR light and heat, circulation is increased which helps form new capillaries that transport more oxygen and nutrients to each skin cell every day.

The result is an immediate healthy glow to the skin and a more youthful, supple and healthier appearance.

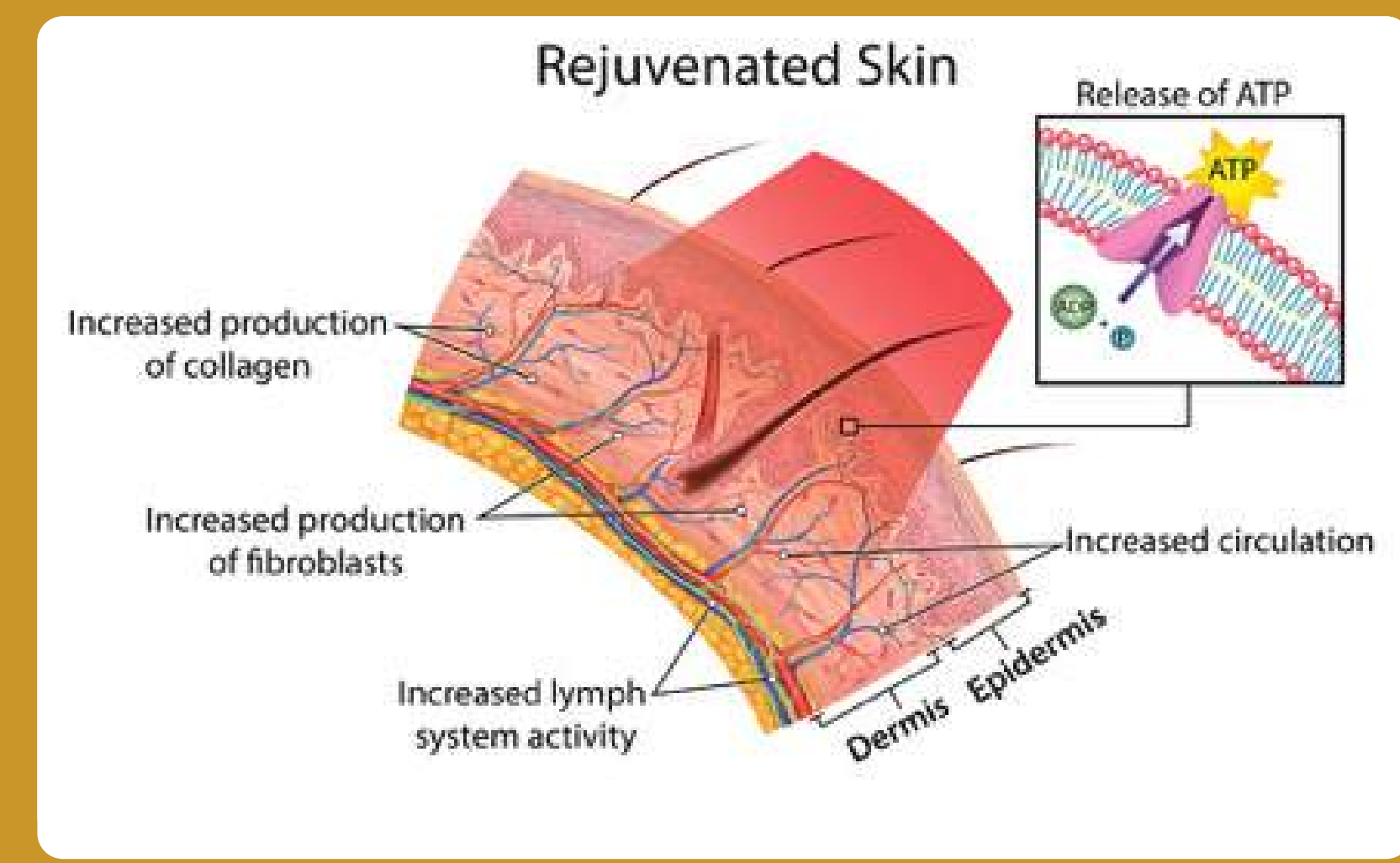
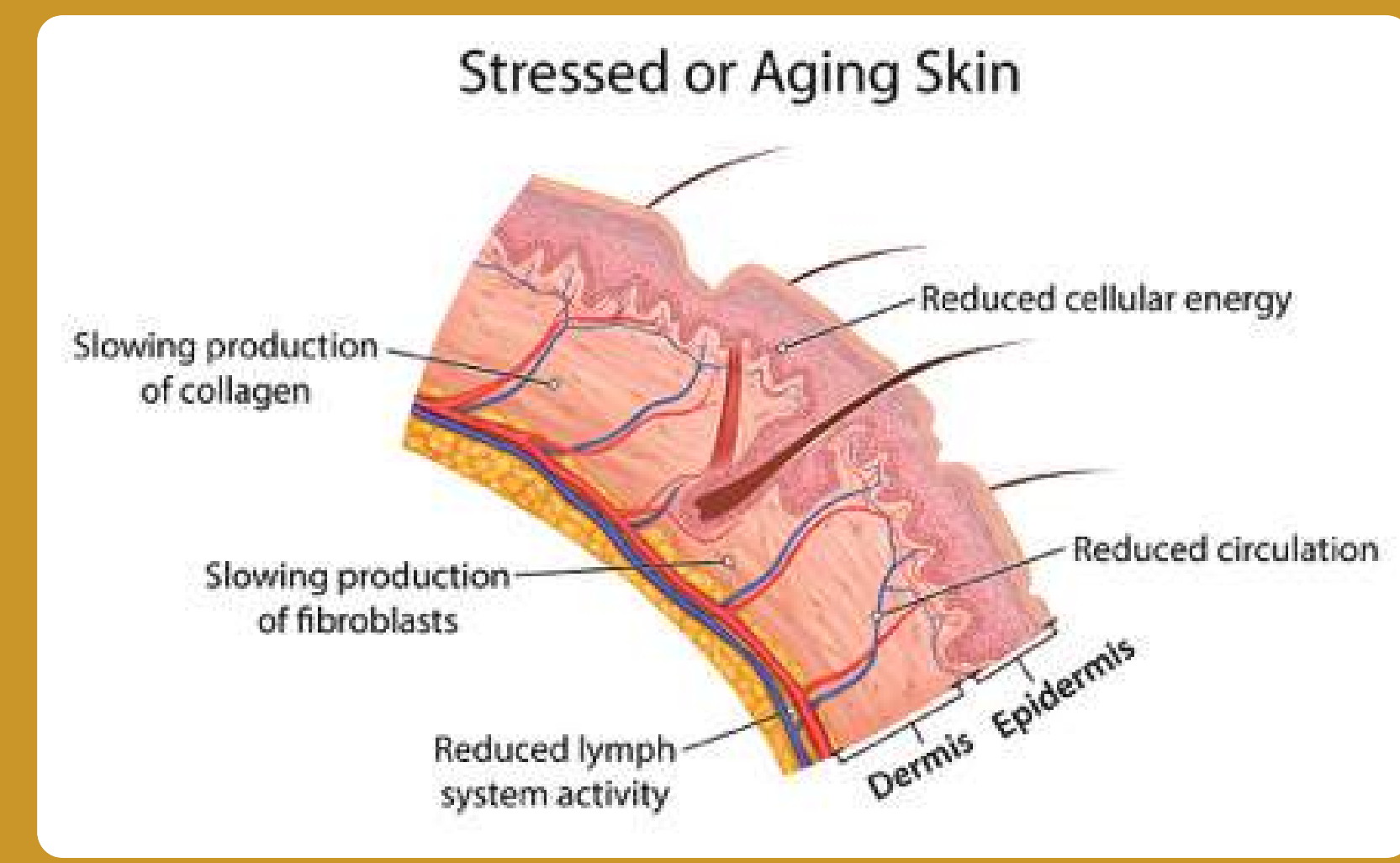
## 2

### Fibroblast and collagen production

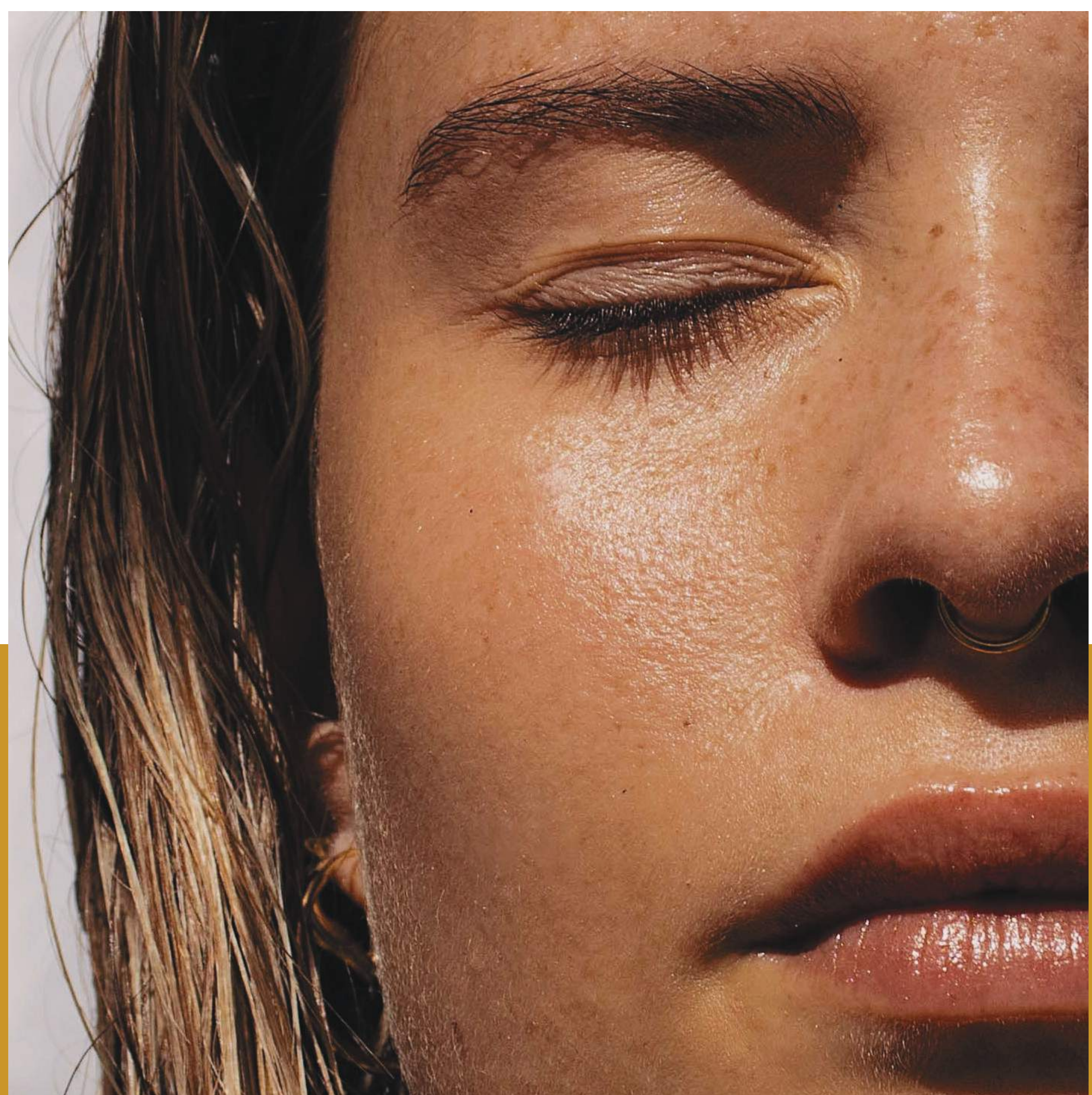
Near-infrared light exposure has shown to increase fibroblast production. Fibroblasts are cells within the dermis, the thickest layer of the skin, and form the main cellular component of the skin's connective tissue.

They produce and control the composition and structure of key structural proteins such as collagen and elastin, which are responsible for the elasticity, firmness, and fullness of your skin.

Collagen is the most abundant protein in our body and makes up 70% of the protein within our skin. When fibroblasts are exposed to near-infrared light, they create more collagen which is helping smooth out fine lines and wrinkles as well as the entire texture of the skin.



(source: <https://redlighttherapy.lighttherapyoptions.com/red-light-therapy-for-skin-anti-aging/>)



## 3

### Release of ATP, or raw cellular energy

NIR light causes mitochondria, the powerhouses of our cells, to produce more of the molecule adenosine triphosphate (ATP) which is a compound that provides energy to the cells. Since we have mitochondria in every cell of our body, with the exception of red blood cells, it's a core restorative healing system.

Mitochondria produce ATP by a process called the "electron transport chain." Scientists have discovered that during this process, the 4th and last step of the chain generates additional ATP when exposed to NIR light.

This additional amount of ATP energizes the facial muscles, similar to how physical exercise stimulates and strengthens the muscles of our bodies. Unlike anywhere else on the body, the facial muscles are directly connected to the skin, so the result of energizing the facial muscles is a toned, lifted appearance.

Given an appropriate, therapeutic dose of NIR light and heat, it provides safe and lasting effects of skin rejuvenation.

3 Photobiomodulation of human dermal fibroblasts in vitro: decisive role of cell culture conditions and treatment protocols on experimental outcome, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5459822/>; A Controlled Trial to Determine the Efficacy of Red and Near-Infrared Light Treatment in Patient Satisfaction, Reduction of Fine Lines, Wrinkles, Skin Roughness, and Intradermal Collagen Density Increase, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3926176/>; Effects of infrared radiation on skin photo-aging and pigmentation, <https://www.ncbi.nlm.nih.gov/pubmed/16941737/>.

4 Low-level laser (light) therapy (LLLT) in skin: stimulating, healing, restoring, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4126803/>.  
5 Low-Intensity Light Therapy: Exploring the Role of Redox Mechanisms, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2996814/>.



MYTH NO. 2:

## SAUNA DOESN'T DETOXIFY YOU

**In response to recent assertions that sauna doesn't detoxify because sweat itself is not a mechanism for toxin excretion, there is research supporting the theory that sweat serves an important excretory function for toxic elements such as arsenic, cadmium, lead and mercury.**

The results showed that the excretion rates of heavy metals through the skin match or exceed excretion via blood and urine after exercising or sauna use:

Almost all participants had arsenic in their sweat, blood, and urine samples (toxins in blood and urine come from what our kidneys and liver excrete), the great majority of participants had mercury in their sweat, blood, and urine samples which have been shown to normalize after regular sauna use,

3 of 20 participants had cadmium in their sweat, blood, and urine samples — the amount of sweat recorded more cadmium than what was collected via blood or urine; and

A high amount of lead was also found in the sweat of participants, and a Russian study recommended sauna use for removing lead from the body



NEED HIGH RES  
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6 Arsenic, Cadmium, Lead, and Mercury in Sweat: A Systematic Review, <https://www.hindawi.com/journals/jep/2012/184745/>; Blood, urine, and sweat (BUS) study: monitoring and elimination of bioaccumulated toxic elements, <https://www.ncbi.nlm.nih.gov/pubmed/21057782/>.

7 The use of the sauna for disease prevention in the workers of enterprises with chemical and physical occupational hazards, <https://www.ncbi.nlm.nih.gov/pubmed/1866932/>.



# SAUNA DETOX FACTS:

## 1

### Increased lymphatic system activity

Lymph is a protein-rich fluid that is moving throughout your body in lymph vessels where it scoops up bacteria, viruses, and toxins, and transports them to your lymph nodes.

If this fluid gets stagnant due to waste and toxin buildup, the body tries to get rid of the excess protein by separating this area as a protective mechanism. Over time, this can cause changes in skin texture and appearance such as swelling, puffiness, cellulitis, as well as bloating, fatigue, brain fog, water retention and weight gain.

Stagnant lymph fluid can affect internal organs and lead to chronic inflammation and increase the risk of infections.

Sauna heat works by increasing sweat production and improving blood flow so more toxins are removed from tissue. Once the lymphatic system is moving again, it allows the body to flush out pathogens and toxins from your system.

## 2

### Structured water for deeper detox

Cell detoxification also happens when NIR light converts inactive water into structured water.

Structured water is intracellular water that is inside of our mitochondria, the powerhouses of our cells. Intracellular water has been shown to consist nearly entirely of structured water. It is creating the negative charge that our cells need to function properly and helps our cells create energy, allows toxins to be removed from the cells and aids in cellular detoxification, among many other functions.

It has been demonstrated that infrared light from sunlight transforms regular, inactive water into more biologically active, structured water.

As the incandescent light bulbs’ spectrum mimics the natural spectrum of sunlight, exposure to near-infrared light wavelengths helps restructure inactive intracellular water into structured water, and can eventually reverse intracellular damage caused by toxins.

## 3

### Improved circulation

Exposure to NIR light causes vasodilation, the veins and arteries expand and circulation is improved. This helps oxygen to reach tissues and cells, including the liver and kidneys, leading to an overall boost in toxin elimination so more toxins can be flushed out. Improved oxygen circulation also helps stop or decrease the spreading of pathogens and viruses as they can’t survive in a high-oxygen environment.

## 4

### Sauna vs. exercise sweating

When it comes to eliminating these toxins out of our systems, it’s been shown that passive sauna sweating is more effective than active exercise sweating as the toxin concentration in sweat during high-intensity exercise is quite low.

Sweat samples taken during sauna therapy reveal high amounts of toxins are being released in the sweat.

The reason for this has to do with sympathetic versus parasympathetic nervous system activation.

During physical exertion, the body is entering the “fight or flight” state, allocating blood flow away from the vitals and toward your muscles, lungs and heart. All of our cellular energy is prioritized toward survival from the threatening environmental stress.

In that state, the cells are not geared toward repair, regeneration and detoxification. The toxin concentration of sweat excreted during sympathetic dominance won’t have many toxins—the cells are not detoxing.

During passive sauna sweating, however, the body is entering the parasympathetic state where blood flow is directed to the internal organs and cellular energy is available for repair, rejuvenation, and detoxification. The body is able to use the energy from the incandescent lights to release toxins through the sweat. In a nutshell, active exercise sweating is only cooling, whereas passive sauna sweating is providing full-body detox.



8 Inflammation and Lymphatic Function, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6399417/>; Lymphatic Function and Immune Regulation in Health and Disease, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3780287/>; Cardiovascular and Other Health Benefits of Sauna Bathing: A Review of the Evidence, [https://www.mayoclinicproceedings.org/article/S0025-6196\(18\)30275-1/fulltext](https://www.mayoclinicproceedings.org/article/S0025-6196(18)30275-1/fulltext).  
9 Clinical Effects of Regular Dry Sauna Bathing: A Systematic Review, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5941775/>.  
10 Cellular Detoxification and Regeneration Through Incandescent Sauna Therapy, <https://nutritionaltherapy.com/cellular-detoxification-and-regeneration-through-incandescent-sauna-therapy/>.  
11Gerald H. Pollack, The Fourth Phase of Water: Beyond Solid, Liquid, and Vapor, <https://ecee.colorado.edu/~ecen5555/SourceMaterial/Pollack13.pdf>; Review: Illuminating Water and Life, <https://www.mdpi.com/1099-4300/16/9/4874/htm>.  
12 Gerald H. Pollack, Molecules, Water, and Radiant Energy: New Clues for the Origin of Life, <https://www.mdpi.com/1422-0067/10/4/1419/htm>.  
13 Michael R Hamblin, Mechanisms and applications of the anti-inflammatory effects of photobiomodulation, <http://www.aimspress.com/fileOther/PDF/biophysics/biophys-04-00337.pdf>.

14 Red/Near Infrared Light Stimulates Release of an Endothelium Dependent Vasodilator and Rescues Vascular Dysfunction in a Diabetes Model, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5699925/>.  
15 Cellular Detoxification and Regeneration Through Incandescent Sauna Therapy, <https://nutritionaltherapy.com/cellular-detoxification-and-regeneration-through-incandescent-sauna-therapy/>.  
16 Arsenic, Cadmium, Lead, and Mercury in Sweat: A Systematic Review <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3312275/>.



MYTH NO. 3:

## NEAR INFRARED OVER TIME PROMOTES CATARACT FORMATION, A CLOUDING OF THE LENS OF THE EYE

**In 1984, glassblowers in old unregulated factories with no modern safety standards were exposed to tremendous amounts of radiation and developed cataracts that thought to be caused by NIR light exposure. That exposure included extraordinarily high infrared light irradiance as well as ultraviolet exposure and even more ionizing radiation.**

The workers also toiled in an extremely hot environment exposing their eyes to thermal injury. The total effect could be similar to staring at the sun. Additionally, these workers were exposed to a variety of toxic chemicals and particulate substances.

Although the proportion of heat transmitted by radiation is unknown, it can be estimated as far from negligible, at least for people sitting by fires or for bakers. Most importantly, the distinct effects of NIR were not measured independently from the effects of heat through hot air flow and/or direct contact with heat.

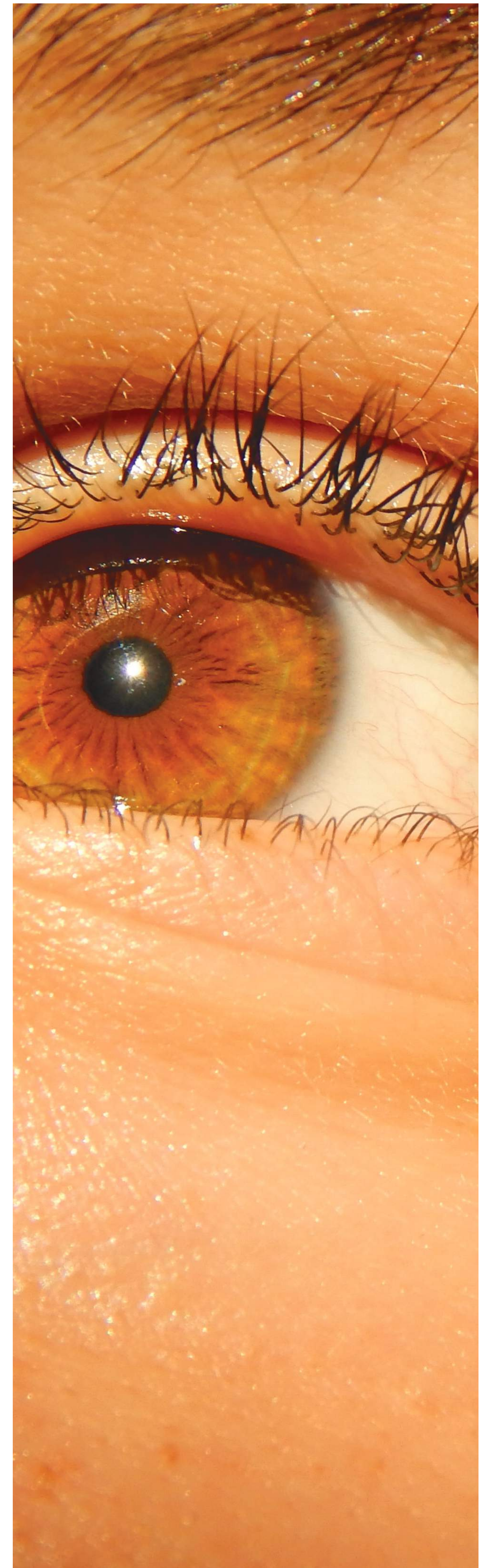
Comparing the conditions of a glass factory to a NIR sauna is not tenable in practice considering that incandescent light bulbs used in NIR saunas emit extremely low levels of infrared energy while raising the body's core temperature gently and steadily.

## NIR LIGHT TO TREAT EYE DISORDERS

NIR light has been known for treating eye disorders of different kinds. Studies have successfully demonstrated recovery of vision cells in the retina following NIR treatment, even when applied after damage was sustained.

NIR light therapy became a low-cost and painless eye treatment – including patients affected by dry macular degeneration, the leading cause of blindness in developed countries.

Besides treating eye disorders, NIR light has also been linked to showing beneficial effects on brain conditions such as parkinson's disease and stroke.





MYTH NO. 4:

# NEAR-INFRARED HAS THE POTENTIAL FOR PROMOTING CANCER

According to a paper published in 2009, NIR light exposure suppresses a process called apoptosis which is the programmed cell death of cells that become damaged by UVB rays, and is related to the development of skin cancer.

But the same paper also shows that infrared exposure caused a reduction of UV-induced DNA damage.

Nowhere in this study is evidence that NIR exposure increased or accelerated the growth of cancerous cells, only that the NIR exposure reduced cell death.

We know from several LLLT (Low Level Light Therapy) studies that photobiomodulation has DNA repair effects. In fact, NIR has been shown to induce cell killing of cancer cells.

Latest research has developed a new cancer treatment called near-infrared immunotherapy that has the potential to kill cancer cells in record time.

When near-infrared light is applied, the cells swell and then burst, causing the cancer cell to die. This cell death occurs as early as 1 minute after exposure to near-infrared light. Unlike conventional chemotherapy, this method doesn't damage healthy cells, while also guarding against any future cancer relapse and distant metastasis.

MYTH NO. 5:

# NEAR-INFRARED CAUSES PRODUCTION OF HARMFUL REACTIVE OXYGEN SPECIES (ROS) AND OXIDATIVE STRESS IN THE SKIN

The energy in NIR light stimulates reactive oxygen species (ROS). ROS are generated as by-products during mitochondrial electron transport. Depending on their level, ROS can be detrimental leading to cellular damage, oxidative stress and DNA damage, or can be beneficial participating in cell regulation.

Most studies reporting an excess production of ROS in the skin have exposed skin tissue to extremely high frequencies of NIR, far from low levels of NIR during sauna use.

ROS are not categorically bad. Only when the skin is exposed to extraordinarily high irradiance, excess amounts of ROS are being generated, which then have to be detoxified out of the body, requiring the body to use its antioxidants for detoxification that then are not available to fight against other toxins.

Numerous studies have shown that low levels of infrared light (the same irradiance used in NIR sauna) in induced ROS can activate protective responses of the skin, leading to improved skin texture and visible reduction of wrinkles, spots, discoloration, fine lines and even sun damage.

21 Low-level light therapy of the eye and brain, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5436183/>.  
22 Low-level light therapy of the eye and brain, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5436183/>.  
23 Infrared Radiation Confers Resistance to UV-Induced Apoptosis Via Reduction of DNA Damage and Upregulation of Antiapoptotic Proteins, [https://www.jidonline.org/article/S0022-202X\(15\)34338-4/fulltext](https://www.jidonline.org/article/S0022-202X(15)34338-4/fulltext).  
24 Infrared Radiation Confers Resistance to UV-Induced Apoptosis Via Reduction of DNA Damage and Upregulation of Antiapoptotic Proteins, [https://www.jidonline.org/article/S0022-202X\(15\)34338-4/fulltext](https://www.jidonline.org/article/S0022-202X(15)34338-4/fulltext).  
25 The effects of low level laser therapy on irradiated cells: a systematic review, <https://pdfs.semanticscholar.org/f639/ba0111373ef46e3054a0ea427b59f667b057.pdf>; Assessing the impact of low level laser therapy (LLLT) on biological systems: a review, <https://www.ncbi.nlm.nih.gov/pubmed/30614743>; Effects of Low Level Laser Therapy on Functional Capacity and DNA Damage of Patients With Chronic Kidney Failure, <https://clinicaltrials.gov/ct2/show/NCT03250715>; Biological Function of Low Reactive Level Laser Therapy (LLLT), <https://www.intechopen.com/books/photomedicine-advances-in-clinical-practice/biological-function-of-low-reactive-level-laser-therapy-lllt->; Low level laser therapy: An effective tool to enhance quality of life in head and neck cancer survivors, <https://www.ejmanager.com/mnstemp/179/179-1513835125.pdf?t=1568811070>.  
26 Near-infrared photoimmunotherapy of pancreatic cancer using an indocyanine green-labeled anti-tissue factor antibody, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6319132/>; Non-thermal DNA damage of cancer cells using near-infrared irradiation, <https://www.ncbi.nlm.nih.gov/pubmed/22515193/>.

27 Near Infrared Photoimmunotherapy for Cancer, <https://www.ncbi.nlm.nih.gov/pubmed/30765637>; Killing Cancer Cells with the Help of Infrared Light - Photoimmunotherapy, <https://www.youtube.com/watch?v=3yuVw90AEhs>; Near-infrared photoimmunotherapy of pancreatic cancer using an indocyanine green-labeled anti-tissue factor antibody, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6319132/>; Non-thermal DNA damage of cancer cells using near-infrared irradiation, <https://www.ncbi.nlm.nih.gov/pubmed/22515193/>.  
28 An Introduction to Reactive Oxygen Species - Measurement of ROS in Cells, <https://www.biotek.com/resources/white-papers/an-introduction-to-reactive-oxygen-species-measurement-of-ros-in-cells/>; Mitochondrial ROS and Apoptosis, [https://link.springer.com/chapter/10.1007/978-3-319-42139-1\\_1](https://link.springer.com/chapter/10.1007/978-3-319-42139-1_1).  
29 Changes of MMP-1 and collagen type I 1 by UVA, UVB and IRA are differentially regulated by Trx-1, <https://www.sciencedirect.com/science/article/pii/S0531556508001204?via%3Dihub>.  
30 Biological effects and medical applications of infrared radiation, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5505738/>.



MYTH NO. 6:

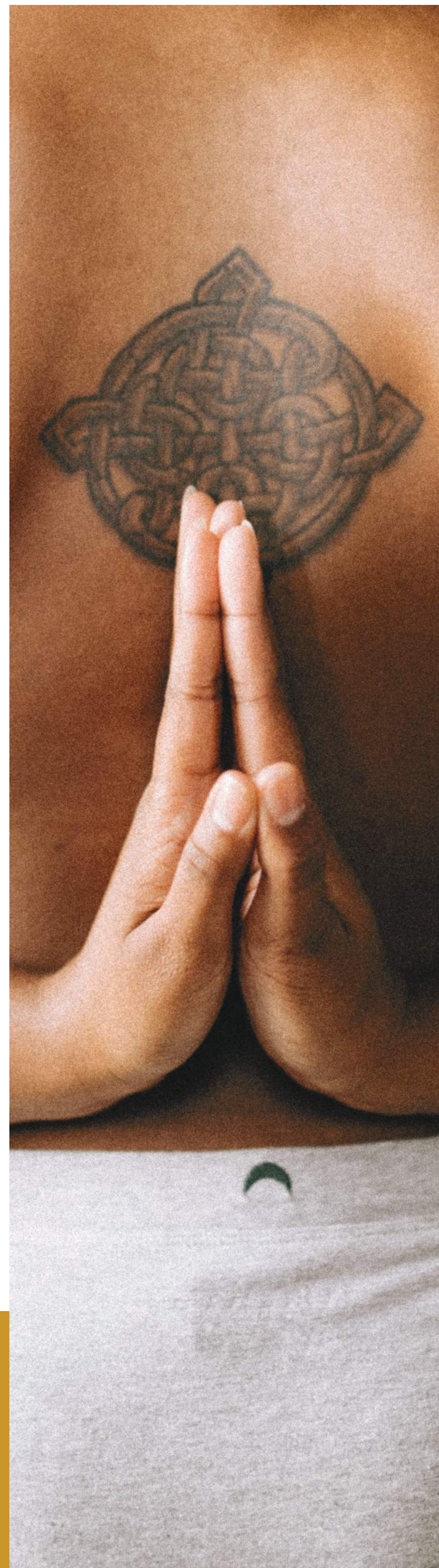
# THERE IS NO RESEARCH AT THIS TIME SUPPORTING THE IDEA THAT RESULTS FROM USING LLLT OR PBM COULD APPLY TO NEAR INFRARED EMITTERS IN SAUNAS

For almost half a decade, it has been known that low energy exposure to NIR wavelengths is beneficial to humans via the promotion of healing processes. This low level light therapy (so called LLLT or PBM) has been reported in thousands of peer reviewed articles since 1968.

Most of the early studies in the field of LLLT used various kinds of lasers, comparing them to equivalent light sources with similar wavelengths and power densities and have found essentially no difference between them.

Otherwise, LLLT with LED, fluorescent lamps and incandescent lamps would not be possible and only sunlight could deliver PBM.

All the PBM research of over 5000 pubmed articles, seen collectively, supports a 1-to-1 relationship between wavelength and biological effect, assuming an appropriate dose, the source itself doesn't matter.





MYTH NO. 7:

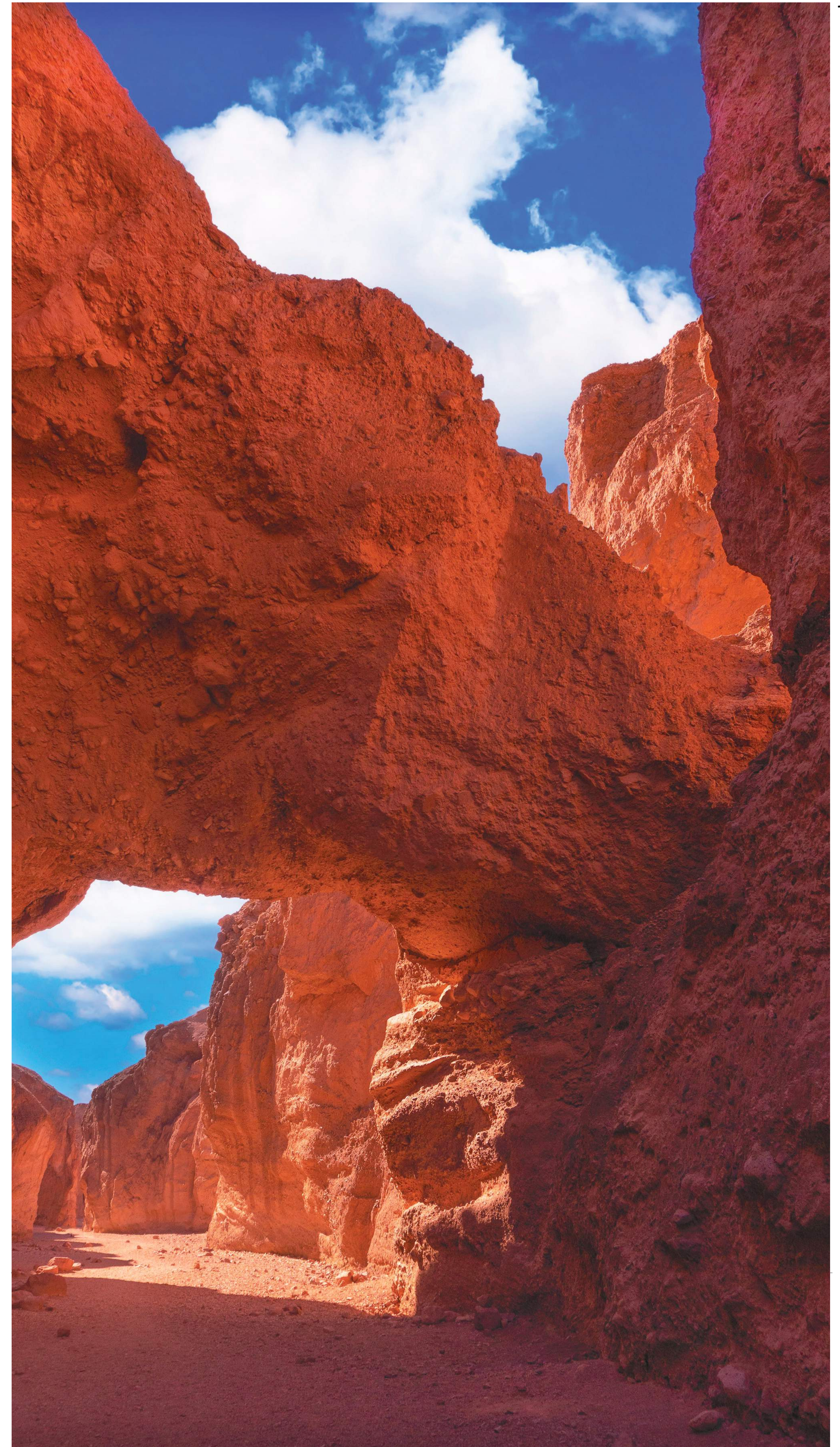
# IF THERE IS A “HORMETIC ZONE” FOR NEAR INFRARED, WE DO NOT KNOW IF A LOW- ENOUGH LEVEL COULD BE USED TO TRIGGER BENEFITS

Hormesis describes the process of cellular response to a low dose of an external stressor. The most common hormesis triggers are intermittent fasting, cryotherapy, oxygen deprivation, sun exposure, and infrared sauna. In other words, hormesis is the good kind of stress that helps the body enhance resilience.

NIR light and heat stimulate the production of heat shock proteins (HSPs) as a beneficial bodily stress response.

It's been shown that exposure to heat can make these proteins in your cells more resilient to stress and slows down cellular aging.

We also know that the relevant bandwidth for cellular stimulation is 600-1000 nm and that the optical window of biological tissue is ~600-1400 nm.





MYTH NO. 8:

## NEAR- INFRARED HEATERS CANNOT ACCURATELY CONTROL THE AMOUNT OF POWER HITTING THE SKIN

**As incandescent light bulbs used in NIR sauna are significantly higher in power than far-infrared heaters, NIR opponents often claim that NIR heaters cannot control the intensity of heat hitting the skin.**

In order to determine the dose or amount of light we get, we measure its irradiance. If we sit a certain amount of time at a certain distance from a light source of known irradiance, we can figure out exactly how much energy we receive per unit time. In the scientific world, this is described as irradiance, meaning power over an area.

There are inexpensive meters that can objectively measure irradiance, called irradiance meters. Solar panel installers use them to measure the irradiance received by the solar panel, for example. The typical consumer meter will measure irradiance between 400 and 1,100 nm. In essence, they measure visible light — including the photobiomodulation (PBM) section of near-infrared.

The average solar IR-A irradiance is around 20 mW/cm<sup>2</sup> during the day with a peak irradiance reaching 40 mW/cm<sup>2</sup>.

The irradiance received in an incandescent NIR sauna at 24 inches from the four 250W lamps is about 30 mW/cm<sup>2</sup>, closely mimicking the near-infrared irradiance we get from sunlight.

The known dose for proper PBM with NIR wavelengths lies between 10 mW/cm<sup>2</sup> and 100 mW/cm<sup>2</sup>. Considering that during NIR sauna therapy, the user rotates every 2-8 minutes to ensure even irradiation, the emitted irradiance of incandescent bulbs is right within the recommended PBM range.



MYTH NO. 9:

## SAUNAS ARE NOT FOR WOUND HEALING

**The wound healing effects of LLLT exposure have been successfully demonstrated in numerous clinical studies.**

In these studies, the same irradiance of NIR light as it is used during NIR sauna therapy, induced cell regeneration, reduction in inflammation and tissue growth, supporting the body's own wound healing abilities.

Additionally, reports have indicated that NIR radiation can have a stimulatory effect on the proliferation of fibroblasts and collagen synthesis which speeds up wound healing.

MYTH NO. 10:

## NIR CAN CAUSE OVERHEATING

**While more effective, NIR technology provides deep, cellular detox and healing in a gentler environment using dry air and lower 110 °F air temperature compared to 150 °F far-infrared sauna air temperature or even higher 180 °F used in Finnish sauna. As NIR sauna effectively operates at a lower temperature, chances of overheating during NIR sauna use are lower compared to other types of saunas.**

The ambient air temperature in NIR sauna is not too hot or humid — and therefore tolerable for even the most sensitive users.

Anyone new to sauna use should start off with 10 minutes and gradually increase the duration of sauna use. We recommend a 20-30 minute session once a day.

33 Laser photobiomodulation of wound healing: a review of experimental studies in mouse and rat animal models, <https://www.ncbi.nlm.nih.gov/pubmed/19995230/>; Biostimulatory windows in low-intensity laser activation: lasers, scanners, and NASA's light-emitting diode array system, <https://www.ncbi.nlm.nih.gov/pubmed/11547815/>; Noninvasive red and near-infrared wavelength-induced photobiomodulation: promoting impaired cutaneous wound healing, <https://www.ncbi.nlm.nih.gov/pubmed/27943458/>; Efficacy of Low Level Laser Therapy on Wound Healing in Patients with Chronic Diabetic Foot Ulcers—A Randomised Control Trial, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3477409/>; Effects of Infrared Radiation on Skin Photo-Aging and Pigmentation, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2687728/>.  
34 Biological effects and medical applications of infrared radiation, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5505738/>; Skin tightening effects of the ultrapulse CO2 laser, <https://www.ncbi.nlm.nih.gov/pubmed/9727458/>; The biomedical effects of laser application, <https://www.ncbi.nlm.nih.gov/pubmed/3982191/>; Intradermally focused infrared laser pulses: thermal effects at defined tissue depths, <https://www.ncbi.nlm.nih.gov/pubmed/15719420/>.



# DIFFERENCES BETWEEN NEAR- AND FAR-INFRARED LIGHT

There's a great deal of confusion on this issue, and many sauna makers take advantage of that confusion. Often far-infrared manufacturers advertise NIR benefits, promote their sauna as doing exactly what NIR does, but far-infrared saunas are not providing the same healing benefits as NIR.

## 1

### Near- vs. far-Infrared: heat

Far-infrared sauna heats your body, but it's a superficial heating, reaching only a few mm into your body. Much of the far-infrared sauna advertising you see is really referring to the benefits associated with NIR, which is only a very small portion of the light emitted by those types of saunas.

It's the ability of NIR to penetrate so deeply into tissues that makes it so effective for detoxification and physical healing.

## 2

### Near- vs. far-infrared: tissue penetration

If we're comparing near-infrared to far-infrared, the major difference has to do with penetration into biological tissue.

There's no photobiomodulation (mitochondrial stimulation) from far-infrared wavelengths. They're only heating the body.

Even though many far-infrared saunas are being claimed to offer detox on a cellular level, they only provide superficial heating and penetration of only a few mm deep.

But in order for infrared wavelengths to eliminate biotoxins and activate a cellular response, they have to penetrate on a much deeper level.

Far-infrared light only penetrates about 1.5 inches into the body. In contrast, NIR wavelengths have been shown to penetrate up to 100 millimeters (3.9 inches). NASA has confirmed NIR light tissue penetration up to 9 inches (23 cm).

That's where it unlocks powerful full-body anti-aging and regeneration. On a cellular level.

## 3

### Near- vs. far-infrared: full-spectrum claims

Another common problems with far-infrared saunas is that they claim to be "full-spectrum," when in fact they emit virtually no near-infrared.

It's becoming more popular for far-infrared companies to install far-infrared emitters for heat, but adding in LEDs that emit only one monochromatic near-infrared wavelength.

They'll add a few of those to be able to claim that there's near-infrared, therefore it's full-spectrum, when it's not. It's two different technologies that they're trying to bring together and create a composite full-spectrum. But it still doesn't emit the same natural light as an incandescent bulb, as the sunlight.

## 4

### Incandescent vs. LED

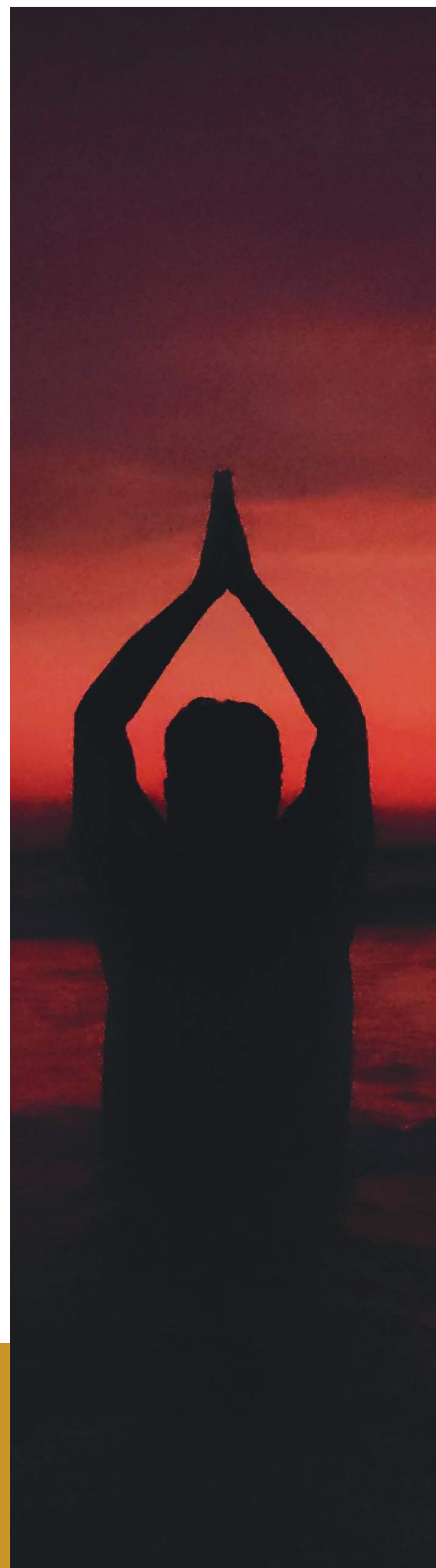
Far-infrared sauna uses LEDs as a light source, compared to incandescent bulbs found in near-infrared sauna. LEDs are not only less effective than near-infrared light, but can be severely damaging to our health.

LEDs emit monochromatic, primarily blue light wavelengths that have the highest energy in the visible spectrum and cause oxidative stress in our cells. This stress is related to numerous age-related conditions and accelerates aging of the skin. Most full-spectrum LEDs lack the essential, counterbalancing healing and regenerative red and NIR frequencies.

NIR light, on the other hand, is contained in sunlight. In fact, over 50% of sunlight that reaches the surface of the earth is NIR light — a primal heat source that our bodies have adapted to over millions of years.

Of all man-made light emitting technologies, the spectrum of the incandescent bulb — which is the light source that produces NIR light — most closely imitates the natural spectrum of sunlight.

**Every single cell in our bodies has photo-receptors called chromophores that are designed to absorb NIR light. Interestingly, the cells in our bodies do not contain any chromophores that absorb far infrared light.**





# 5

## Near- vs. far-infrared: EMF exposure

The old far-infrared technology uses electric heating pads that give off unhealthy levels of EMF that can do more harm than good.

EMF describes electric fields and magnetic fields. All electronic devices radiate EMF, the most obvious being cellphones, computers, television and microwave ovens, but also hidden sources of EMF such as electrical wiring, dimmer switches, radiant electrical heating and not to forget your neighbor—as EMF travels, you’re most likely surrounded by other people’s EMF emissions.

As the effects of EMF are not immediately as obvious as other toxins, it’s the most dangerous pollution affecting the human body. And we are all bathing in EMF on a daily basis.

Multiple studies have been demonstrating that our cells are affected by all types of EMF, and man-made EMF are found to be the cause for severe health issues.

As EMF are a nervous system stressor that will prevent the body from eliminating toxins, it’s essential to break this cycle and detoxify in an EMF-free space.

**The SaunaSpace® technology is guaranteeing zero EMF stress on your body and our Faraday™ Shielding System** option is designed to fully mitigate both electric field and magnetic field radiation to aid detoxification in a 100% EMF-free environment.



# CONCLUSION

You rarely come across a therapy that stimulates every single cell of the body towards repair and healing. But that’s exactly what NIR sauna can do.

It’s important to note that the effects of NIR wavelengths are dose-dependent, meaning the benefit can disappear by using too much light and heat.

This can be compared to the positive long-term health benefits of moderate daily exercise as opposed to the effects of over-exercise.

When the skin is exposed to the appropriate dose of NIR, it activates incredibly beneficial regenerative, anti-aging, wound-healing and other cellular rejuvenative benefits to all tissue types, including retinas and organs. And NIR is the single most effective approach available.

This is the environment we were designed to be in for maximum healing: therapeutic light, gentle infrared heat, and free from toxic EMF exposure.

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