THE ULTIMATE GUIDE TO

RED LIGHT THERAPY

Frequently Asked Questions

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The Ultimate Guide to Red and Near-Infrared Light Therapy

Frequently Asked Questions

By Ari Whitten

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Q: My practitioner (chiropractor, naturopath, etc.) said that only his/her laser will work and not the LED lights. Who is right?

It is a myth that only lasers have these effects. It was thought by many people for many years that only lasers had these effects (because they were first discovered with laser devices), but more recently, it has been proven that non-laser light (like from LED devices of the appropriate wavelengths) essentially have the same effects.

There are over 250 studies using LED red and near-infrared light therapy that have been done in just the last few years. The studies that compare them have found basically the same benefits. And there is virtually nothing to indicate that one needs lasers to generate these effects. Even some companies (like Thor Laser) that have been producing laser technologies for years are now producing LED products.

According to Harvard researcher Michael Hamblin, PhD (widely regarded as the world's top authority on near-infrared and red light therapy),

> *"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****."*[381]

Q: You said that both red light and near-infrared light work through the same physiological mechanisms at the cellular level, so I'm confused on what exactly the difference is. Can you explain?

See the section earlier in the book titled "What Purpose Do You Want to Use Red Light Therapy For?" for a detailed explanation of differences.

Q: Are there any concerns of EMFs (electromagnetic fields) if the device is very close to the body?

All electronic devices emit EMFs (electromagnetic fields) and the health effects of EMFs are still debated. By the strictest safety standards from Europe, you don't want to regularly be exposed to more than 3mG (milligauss).

Just for comparable reference, please note that **your cell phone emits much more than this every few seconds**, and if it's in use, emits far more than 3mG (upwards of 50mG and even close to 100mG). A household blender emits upwards of 100mG.

I've measured EMF output of the Joovv, Red Rush360, and Platinum LED lights and EMF output is moderate (on par with a typical computer or laptop, and less than a cell phone) within 0-3 inches. As you move away by 5 inches or so, there are virtually no detectable EMFs. (Note: EMFs drop off dramatically as you move away from the source). So by using it at least 6" away from your body, you can get a strong dose of light without any concern at all over EMFs. Anywhere over roughly 3" away is going to be very safe, but if you want to be extremely cautious and have **no EMF exposure at all**, going over 6" is ideal. This will completely eliminate your exposure to EMFs. (Note: I have already figured this fact into my recommended treatment distances outlined in this book, so basically, there are no detectable EMFs at the treatment distances I recommend so EMF's are a non-issue here.)

One more important point: One must also consider not just the strength of the EMF emitted, but much more importantly, the frequency of the dose. What I mean is that sitting with your hands on your laptop or having a cellphone on your body for several ***hours*** each day (common practices for most people in the Western

world) is infinitely more of a concern for your health than a 3- or 15-minute exposure to the red/NIR light done once a day or every other day. So if you're going to worry over EMFs, then I suggest directing your attention to things like the cell phone you have on your body or in your hand for maybe hours each day, your use of laptops and iPads, etc. Those are much more real concerns.

Q: How far away should the light be for maximum effect?

The closer the light is, the stronger the dose. So "maximum effect" would be with the LED light basically on your body, as close as possible. However, because these electronic devices emit EMFs (electromagnetic fields) and the health effects of EMFs are still debated, I recommend minimizing EMF exposure by being at least 3" away from the device. As explained above, going at least 6" away is ideal.

All my treatment distances recommended in this book are 6", 12", 18" or 24".

As explained in the dosing section, for deeper tissues, treating from 6" or 12" is ideal. For skin and anti-aging effects, there is a benefit of moving the light further away to 12", 18", 24" or even 36", which is that since light spreads as you move away from the source, going further away allows you to treat much larger body areas all at once.

See the dosing section of this book for more specific instructions on the best distances and doses for different purposes.

Q: How long and how often should I do the red light sessions?

As far as how long to do the treatment, please see the section on dosing.

As for frequency of use, there is no universal agreement on the dosing frequency in the research, so I can only make a recommendation based on what is most common in the research and based on my experiences with thousands of people I've worked with. In general, I've found that more than once per day is too much. For most people, the optimal frequency is between 3-6x per week. (Daily or every other day.)

For an acute problem, like healing an injury, it may be ideal to do one treatment per day. (E.g. You just sprained your ankle and you want it to heal as fast as possible.)

I don't recommend doing more than one treatment per day. Remember the biphasic dose response explained earlier in this book. Doing too much will give less beneficial results than doing the right amount.

Q: How deeply do these lights penetrate into the tissues of the body?

See the section in the book "How Deep Does Red/NIR Light Penetrate Into Our Body?"

Q: Is there a best time of day to do it? Or are there certain recommended practices you have for using the light for specific issues?

There are few points worth making here:

- If you are using the light for cognitive enhancement, using it on your head prior to the period you need to focus or perform is likely the best approach. (E.g. In the morning before starting your work day).
- If you are using the light to enhance performance during physical activity, use the LED on the muscles that are going to be most active 5-60 minutes before the activity.
- If you are using the light to enhance fat loss or muscle gain in response to exercise, using it before or after exercise is ideal (whatever time of day that is). (Note: Some studies use it before and others after. I personally favor using it after, but there are some studies that have shown good results with applying it before exercise as well.)

- If you are using it to speed recovery after exercise, using it right after exercise or several hours later is ideal (whatever time of day that is).
- For most purposes – e.g. anti-aging effects, boosting immunity, decreasing inflammation – the time of day likely does not matter at all. (It is theoretically possible that certain times might be slightly better than others, but there is no research to indicate this.)
- If you are using it for cellulite reduction, it may be beneficial to use the light on the affected area right before doing exercise (whatever time of day that is).
- Even though red light doesn't affect the circadian rhythm nearly as much as other wavelengths (like blue or green light, or typical indoor white house lighting, etc.), very bright red light like these high power LED lights will suppress melatonin release and disrupt sleep if you use it too close to bedtime. So I would suggest not using it within an hour of sleep. (NIR is likely much less of a problem than visible red light in this regard.)

Q: Can you split into several small sessions for the same effect?

You can potentially do that, but I generally recommend that people stick with no more than one session per day. I suggest doing one longer treatment rather than multiple shorter treatments.

Q: I have the light and have done some treatments, but how do I know that it's actually working? How quickly will I see or feel the effects?

Much like supplements or prescription drugs, you can't always know just based on your subjective feelings if something is working or not. For example, consider a statin drug that lowers cholesterol. Can you feel that it is working to lower your cholesterol? No, of course not. But if you get your blood drawn and measure your blood lipids, you will see that it is lowering your cholesterol.

As another example, if using it for muscle gain or fat loss, the research says that, in general, red and near-infrared light therapy increase fat loss or muscle gain by 30% beyond just doing the exercise alone. (That's actually a very large effect by the way). However, what that means in practical terms is the difference between you losing 4 inches off your waist (without the light) vs. 5.2 inches (with the light). Unless you were measuring it and comparing your results to your identical twin doing the same exercise and diet plan as you, you have no way of knowing that the light caused you to lose an extra 1.2 inches of fat beyond what you would've lost without the light. You are totally unaware of the amplification effect of the light on your results. All you know is that you got results, but you don't know how much the light contributed to them, because it's not as though you apply the light and watch the fat melt off right before your eyes – it's an effect that is happening slowly over time, and is not something we can readily see or feel happening instantly after the light treatments.

So in many cases, there's no way of knowing with certainty whether it is working or not based on casual observations (i.e. without tightly controlling things and measuring things with vs. without the light).

But here's the good news: You don't really have to wonder if it is working, because the actual science has tested these things and already proved that *it does work!* In essence, trust the science! These scientists did far more rigorous and tightly controlled experiments than you could ever do in your own personal experience, so trust their work. What that means is this: Simply DO IT, and then trust that you're getting beneficial effects.

Now, there are of course, many instances where one will notice an effect.

For example:

- If you are using it for pain relief, you will notice that there is an immediate pain killing effect within 20 minutes.

- If you regularly get cut or injured in some way, and you observe how long it typically takes you to heal, and then you do it with the light, you will notice it heals much faster.
- If you are using it for hair loss and you take photos, you will likely notice that over weeks or months, your pictures show improvement.
- If you are using it for arthritis, you may notice after a few weeks or months of treatment that your joints hurt a lot less and move better, or you don't get pain the day after exercise, etc.
- If you are using it for cellulite reduction, take photos and observe changes over a few months, and you'll likely see significant reduction.
- If you are using it for wrinkle reduction and anti-aging purposes, you will likely notice effects within a few weeks (and may even have people complimenting you on how good you look).

Again, the key point is that you don't have to second guess this or wonder if it is doing anything, because the actual controlled research has already shown that it *does work.* So just do it and know that you are doing something which the science has already shown works. Trust the science, and just do it!

Q: How can we be sure we are replicating the conditions in the studies and what the key points we need to be mindful of during our sessions?

My recommended dosing ranges in this book are based on the research. These general dosing guidelines are based on the bulk of the data. So by following these dosing guidelines for your specific issues, you'll be in line with the research.

In essence, that's really all you need to know, so don't overthink it too much.

Q: What are the relative benefits of 660nm (red light) and 850nm (NIR) and the pros and cons of combining these in one unit?

As explained previously, red and near-infrared act through the same mechanism. The major difference is the penetration depth. But see the previous section on red vs. near-infrared for a more detailed discussion of the differences.

Since both red and near-infrared work through the same mechanisms, there really are no universal pros and cons – it's dependent on how you want to use it. If you want to use it to treat deeper tissues like glands, muscles, or the brain, go for pure near-infrared or a 50-50 mix. If you want to do anti-aging or heal things more in the surface tissues, red light may have an advantage. But please keep in mind that BOTH red light and near-infrared will work for both purposes. When we talk about these differences, it's just a matter of degrees of effectiveness, not that one works for a specific purpose and the other doesn't work at all. They both work for pretty much all of these purposes, so don't overthink it, or convince yourself that the red light won't work for treating muscles, glands, etc. The one exception might be the brain, where it has been shown that near-infrared penetrates much better through the skull than visible red light does. So if you want to use it to enhance brain health, near-infrared is a better choice.

Q: What is the risk to eyes? Any danger after cataract surgery? How best to protect the eyes as a precaution? Any differences between red vs. near-infrared here?

In general, the research indicates that red and near-infrared light are extremely beneficial for eye health. While there is no official consensus among researchers about this, I think it is likely that you do not need any special protective eyewear as you would with many other types of light, like UV light. Having said that, there is some research indicating that long-duration exposure in the eyes may not be a good idea, and you may want to keep the dose very low for the eyes (i.e. the eyes may not tolerate larger doses as well as other body parts.) One researcher commented:

"Eye safety: In a study by Merry et al (2016), 50-80 mW/cm^2 of visible red light appeared to improve vision, though in that study, subjects kept their eyes closed while looking at the Warp10 treatment device (670nm). Another scientific article on eye safety stated that 10 mW/cm^2 would be a safe upper limit for a near-infrared exposure of long duration."

If you have any specific condition or eye health issue (e.g. post cataract surgery), please talk to your doctor and make sure it's okay for you.

I will also mention, importantly, that lasers are very different from LEDs. **You should NEVER shine lasers into your eyes!**

But LEDs are much safer for light exposure in the eyes. Whether they are 100% perfectly safe for large doses is not yet clear. If you have any eye health problems and you want to err on the side of caution, you may want to:

1. Make sure that you only expose your eyes to low doses (less than 5 Joules is probably a good estimate). Much less than you would dose all the other areas of your body.
2. Close your eyes or wear fabric (e.g. towel, shirt, blindfold, etc.) around your eyes while using the light.

Until we have more conclusive data, it doesn't hurt to err on the side of caution.

(Remember to consult your doctor if you have any specific issues – these statements are not intended as medical advice or claims to treat or cure any specific eye condition).

The one other difference here is simply eye sensitivity. Some people find the brightness of a powerful red LED light to be hard on the eyes (in the sense that any bright light will be). So if you are sensitive to the light, feel free to close your eyes or use some sort of fabric or blindfold to cover your eyes. Note that the near-infrared light is not visible to the human eye, so you won't have any bright light that your eyes are sensitive to with near-infrared.

Q: What if you have certain problematic tissues like tumors or cysts? Are there any risk factors when shining it over an area where one has polycystic ovaries or perhaps a benign cyst on a breast etc.? Should these areas be covered when treating?

(Standard Disclaimer: As always, for any specific medical condition, please consult your doctor before using red or near-infrared light. Nothing I say here should be construed as medical advice or as a claim to treat or cure any condition.

In general, red and near-infrared light will be stimulating to tissues that you shine it on, so it is reasonable to speculate (even though we don't have much data to go on) that shining it on cancerous tumors would probably not be a good idea. Though Michael Hamblin said that overall, the research shows improved outcomes in cancer when red/NIR light is used on OTHER PARTS of the body (i.e. not the tumor itself).

Regarding benign cysts or polycystic ovaries, there is really no research on this. But as a precautionary principle, I would suggest not shining it on any tissues that you don't want to potentially stimulate.

I believe that I am being excessively cautious in my recommendations here, but I think it's smart to do so until we have more research to base recommendations on.

Q: Will it help decrease fat and cellulite and in what way does it help do so? Is it only by the way of losing fat or purely by shining on area of skin?

As far as cellulite is concerned, it reduces cellulite primarily by enhancing the structural integrity of the collagen networks. (It also may work by helping to stimulate fat loss.)

For fat loss, red/NIR light *by itself* (i.e. in the absence of nutrition and lifestyle interventions) likely won't do much to help you lose fat. Where it's really going to shine is if you are actually engaged in a nutrition

and lifestyle routine that is driving overall fat loss. In that scenario, it will amplify the effects and allow you to lose a lot more fat. But again, by itself, just doing the red/NIR light without nutrition and lifestyle changes, you will not notice much benefit on fat loss. It's not a magic pill, but rather a key lifestyle strategy that amplifies the benefits of other lifestyle strategies.

Q: What makes the red light therapeutic – is it the amount of nm? I found a different light that is 660nm and it's only $50 or $100 or $150. Do I really need to get the ones that are $400 and up?

It's not just the wavelength that matters. For example, I can give you a little LED device with 10 bulbs of 3 watts each that is a 660nm device and it might only cost $14, but it's basically worthless because it's way too underpowered, and it's not going to illuminate a significant portion of your body.

The dose (power of the light combined with the distance away from your body), along with being a sizable light, along with being at the right wavelength are all key factors.

Any light that you've found that is cheap is almost certainly missing one or more of those three factors.

If you don't have a light that can give an effective dose to your body (and the right amount of your body), you have a device that is mostly worthless.

Take my word for it, it is a HUGE mistake not to listen to my advice in this book about getting a device with adequate power. You can buy some of the devices on the market that are 30 watts or 60 watts for $100 or $300 or $400, but you will have just wasted your money, because those devices can't give you an effective dose. So do NOT buy the cheaper devices, and save your money to get one of the devices from the brands I am recommending here. It's the difference between getting results and not getting results.

And remember that the devices I recommend that are $449-$1,000 dollars are actually incredibly cheap compared to getting a laser ($5,000-$30,000) or going to a clinic to get treatments ($75+ per treatment).

Q: I am confused by all these different terms like photobiomodulation (PBM) and Low-Level Laser Therapy (LLLT). What are these and how do they differ from red/NIR light therapy?

In short, these are all basically interchangeable terms. So don't get confused by quotes or various people who use terms like "photobiomodulation" or LLLT? Even "LLLT" itself doesn't always mean the same thing – some people write it as "low-level laser therapy" and others as "low-level light therapy."

Historically speaking, it was thought that lasers (coherent light beams) had unique effects that were totally different from regular sources of light like lamps or LEDs. Thus, the bulk of the research has been done with lasers and uses the term "low-level laser therapy" or LLLT for short.

To make things even more complicated, many other terms have been put into use by some people like "cold laser," "therapeutic laser," "photobiotherapy," etc.

(Side note: There is also the broad term "light therapy" which people use to mean many different things unrelated to red/NIR light therapy, like therapy for the eyes, or sleep issues, or using a SAD light for seasonal affective disorder, and other uses.)

But back to red and near-infrared light therapy…

In recent years, it has become accepted that lasers don't have the unique effects once thought, and that it's just light at these wavelengths in the right intensity (not specifically laser beams) that produce these effects.

So now there have been hundreds of studies on red/NIR light therapy that use regular LED panels (not lasers). This is sometimes referred to specifically as LEDT (LED therapy) or more broadly as still LLLT, but now defined as "low-level *light* therapy" (rather than *laser* therapy).

Since it has been found that it's not only lasers that produce these effects, most researchers now use the broad and all-encompassing terms "low-level *light* therapy" (still with LLLT) or the better term, "photobiomodulation" (which means literally the changing of biology with light).

But again, don't get confused by these different terms. For our purposes here, all of these terms are interchangeable with "**red and near-infrared light therapy**."

Q: Do red light devices emit UV light?

No, they do not. UV light is another part of the light spectrum entirely separate from red and near-infrared. The light devices I recommend do not emit any UV light.

Q: Can I use any red light to get the benefits?

No. As I explained in the section on choosing a device, you need a device that has enough power (wattage), is of good size for what you want to use it for, and has the proper wavelengths of light.

Q: Does red light therapy tan you or burn the skin?

No. Tanning and sun burns come from UV rays. These devices do not emit UV light.

Q: Do you get Vitamin D from red light?

No. Our body synthesizes vitamin D from exposure to UVB light. These devices do not emit UV light.

If you are looking to synthesize vitamin D, you need exposure to either sunlight or a specialty UV lamp (I suggest the Sperti UVB lamp for this purpose.)

Q: Can I get the benefits of red/NIR light therapy by standing in the sun?

Yes and no. It's a bit of a nuanced answer…

First, the truth is that if you were spending hours every day outdoors with the sun on your skin (like our ancestors did), then you probably don't need a red/NIR light device.

But since most of us do not spend hours a day with the sun on our body, we end up deficient in the *nutrient* of red/NIR light. So getting a red/NIR light device is a very smart move.

I should mention that the sun has benefits that red/NIR light devices do not have. The sun emits UV light, which we use for several purposes, like synthesizing vitamin D. It's also going to be better for setting circadian rhythm in the morning.

But red/NIR lights also have some advantages over the sun…

One is convenience and access. Not everyone lives in a place that is sunny all year-round. And not everyone has the ability to get outdoors in the sun every day during the time of day where it's warm and sunny (and you'd want to have your skin exposed).

In addition, for very targeted treatments of specific issues, the sun is not going to give you the precision targeting of a light device that you can shine specifically on the thyroid gland or on a specific wound site with the precise light intensity and dose that will lead to the best effects.

Also, the spectrum differs in important ways that affect some goals. In particular, for skin anti-aging (on the face for example), many people would want to *avoid* getting lots of UV on their face from the sun (which may accelerate skin damage and skin aging), but get the benefits of red/NIR. The sun doesn't give you the ability to do this – with the sun, you get the whole spectrum of red, near-infrared, far-infrared, blue, and UV. But with a red/NIR light device, you can get the therapeutic benefits on your skin while avoiding the potentially counterproductive wavelengths entirely.

To be clear, red/NIR light devices are not a replacement for sunlight. We still need plenty of sun exposure to be healthy. But red/NIR light devices can make up for our lack of sun exposure and give us several targeted benefits in a way that we can't get from the sun.

Q: Does red/NIR light work as a light for treating Seasonal Affective Disorder (i.e. a "SAD light")?

No. SAD lights are used by people who live in places that have poor sunlight in the winter months to avoid/treat Seasonal Affective Disorder. They are meant to keep circadian rhythm strong during the periods where there is little sun. Red and near-infrared lights do not work for this purpose because it is specifically blue light (light in the blue wavelengths) that affects the circadian "clock" in our brain. Thus, you need specifically blue light of ample intensity to affect SAD.

Note that many of the SAD lights actually use "white light" which is a mixture of blue and many other colors (such that it appears "white").

One other thing to note here is that blue light in isolation may be harmful to the eyes – even while it benefits SAD or circadian rhythm. Some researchers believe that the red/NIR parts of the spectrum emitted by the sun help to counterbalance some of the potential harms of blue light. Yet with SAD lights, we get high power blue light separate from the red/NIR light that we'd normally get from the sun. So I personally think it's wise to also include some red/NIR light – using the red/NIR lights I recommend at a distance of 3-5ft away – while using the SAD light. This is what I advise to members of my Energy Blueprint program (who use SAD lights) to help protect their eyes.

Q: I see some people using blue lights in their devices, what are the differences between blue and red lights?

Companies that do this are misguided, in my opinion. Blue light does not have the same physiological effects as red/NIR light, and in fact, has some effects which *oppose* red/NIR light.

To be clear, blue light is necessary and vital to our health because blue light entering our eyes feeds into our circadian rhythm/clock in the brain, which regulates numerous hormones and neurotransmitters, and many vital functions. So I am *not* saying that blue light is bad – to the contrary, we need blue light to be healthy (especially blue light entering our eyes). There are also some other potential uses of blue light like whitening teeth or treating acne.

But blue light directly on the skin, or on wound/injury sites, muscle tissue (or anything where one might use red/NIR light) is a bad idea. The blue light isn't doing anything beneficial in that case, and may even be detracting from the benefits of red/NIR light. In the case of anti-aging treatments on the skin specifically, it is almost guaranteed to be counter-productive, as blue light can actually damage skin cells.

Moreover, we all spend huge amounts of time indoors under fluorescent or LED indoor lamps that have tons of blue light. Our personal devices like phones, computers, iPads, etc. also emit a lot of blue light.

So most of us are being bathed in blue light all the time, while being massively deficient in red/NIR. Again, blue light does *not* stimulate the same physiological benefits as red/NIR light.

Q: Does red/NIR light therapy work through clothes?

The short answer is no. But if the clothing is very thin and light can penetrate it well, then maybe to some extent. How do you know if red light can penetrate it? Simply hold the fabric up next to the light while it's on and see how much light gets through. You can literally observe it with your naked eye.

Now, with most clothes, they will block at least 50% and more like 80%+ of the light, so if that is the case, just realize that it is massively lowering the dose of the light.

In summary, I wouldn't recommend trying to do any light treatments through clothing. For best results, do it on bare skin.

Q: What about red/NIR light therapy with animals?

There are many companies who manufacture red/NIR light therapy devices specifically for animals. It is a common practice in some veterinary clinics, and among race horses in particular.

Q: Does red/NIR light therapy work through clear plastic or glass?

In general, I would say yes. While plastic or glass does block some parts of the light spectrum (like parts of the UV spectrum), it should not interfere too much with red or near-infrared. But it is possible that certain types of plastic or glass could block some wavelengths. To know for certain, you'd have to test it with and without a PAR meter (using the specific piece of plastic or glass you're referring to) to see if it blocks any of the light output.

Q: What is the difference between these red/NIR light devices and plant grow lights that some plant growers use, or lights on coral reef aquariums?

Plant and coral growing lights use lights with many different parts of the spectrum – blue, UV, green, red, orange, etc. (There are a few plant grow lights that are purely red, but they are generally extremely underpowered, and don't have optimal beam angles.) Red and near-infrared lights use LEDs that specifically emit only red and/or near-infrared light at the specific therapeutic wavelengths, and at the right power output for therapeutic effects.

So the short answer is no, you can't use plant growing lights or aquarium lights as red/NIR light therapy devices. They are totally different. If you want to do red/NIR light therapy, get the right kind of light device specifically designed for that purpose.

Q: Can it be used while pregnant?

There is no data on this, so we cannot say for sure. I will say that humans get red/NIR light exposure from the sun so this occurs all the time – whenever a pregnant woman is sunbathing. But it is feasible that red/NIR devices could differ in some way that has unexpected effects. Thus, since we do not have the data on this, I will stick with my precautionary recommendations and advise you to err on the side of caution and don't do anything which we don't know the effects of.

This article has more nuanced recommendations and speaks of some relevant research that suggests that using it on other parts of the body (away from the belly) is likely perfectly safe: https://www.chiroeco.com/lllt-not-recommended-during-pregnancy/

But again, consult your doctor first and always err on the side of caution.

Q: Can you clarify dosage on a particular area of the body compared to total session dosage? In other words, if max dosage is 20 mins can I do 20 mins on each area or 20 minutes max for all areas combined (i.e. if 2 areas 10 mins each)?

Max dosage is the maximum total treatment time for all areas treated. That means that you can either do 20 minutes (potentially) on one area of the body, or divide that 20 minutes over multiple areas. It does NOT mean 20 minutes on each area.

Note: 20 minutes is the maximum dosage (with the lights I recommend). Remember that doing the maximum isn't necessarily the best. Most people will notice better effects with lower doses than the maximum doses in the recommended dosing range. And especially people who are in very poor health will NEED to start with much smaller doses at the very bottom (or below) the recommended dosing range.

If you do a longer treatment time like 15-20 minutes, I strongly suggest doing it on more than one area of the body (e.g. 2-4 areas), rather than the whole 20 minutes just on one area. 20 minutes on one area will almost certainly be too strong of a dose on that area of the body.

- **Total Treatment Dose/Time:** To calculate the total dose more precisely, please see the earlier sections that went over on power density numbers (e.g. 100mW/cm^2) and how that relates to the amount of Joules. I suggest that total treatment dose for *all* areas of the body should be no more than roughly 120J. So assuming the light is 6" or 12" away from your body, that means **no more than roughly 15-20 total minutes of time with the light shining on your body**.

Q: Here is a study saying that near-infrared light could potentially be harmful to the eyes. What do you think?
https://www.researchgate.net/profile/Nikolaos_Kourkoumelis/publication/50291066_Eye_Safety_Related_to_Near_Infrared_Radiation_Exposure_to_Biometric_Devices/links/0fcfd50fefcdad89c3000000/Eye-Safety-Related-to-Near-Infrared-Radiation-Exposure-to-Biometric-Devices.pdf

They are mainly saying:

1. LASER light (coherent light) can damage eye health. I agree with that completely. You MUST always protect your eyes from laser light! So if you are using a laser device, then yes, it can damage your eyes.

2. They are speculating that it might be possible that VERY bright LEDs could potentially be hazardous to eye health, but more research is needed.

Keep in mind that there is actually research showing that it can BENEFIT eye health. See the many studies on this in the section of this book on eye health.

But if you have any eye health problems and you want to err on the side of caution, you may want to:

1. Make sure that you only expose your eyes to low doses (less than 5 Joules is probably a good estimate). Much lower doses than you would do for any other area of your body.

2. Close your eyes or wear fabric (e.g. towel, shirt, blindfold, etc.) around your eyes while using the light.

Until we have more conclusive data, it doesn't hurt to err on the side of caution.

Q: Is there a reliable way of calculating the appropriate duration for effective treatment with a LED device, if you know the power/wattage of the specific device, the size of the area being treated, and the distance between the light and the surface of the area being treated?

Yes, please see the section of the book titled "Guide to Red Light Therapy Dosing." But also note, that the calculations on paper (about the theoretical power output of a device based on their specifications) often do not match up with actual power output. Many devices emit 30-50% LESS light than they claim. So the only real way to know for sure is to actually get the light and measure the light output with a PAR meter.

Q: If you have weird and intense vision effects after your eyes are exposed to either the red or near-infrared LED lights, how can you determine if it is still safe to expose your eyes?

As a general rule, if you notice any negative effect, lower the dose. As far as this visual effect specifically, first, it's fairly normal to see spots after being exposed to any bright light. If you feel your vision is altered in some profound way or you don't like any visual effects that it causes, feel free to cover your eyes (or simple close them) while using the light.

Q: You gave significant ranges for treatment times, so how do I know whether I should do for example, 1 minute vs. 10 minutes?

There is no universal way of dosing here, because it differs between individuals. If you are in poor health or are severely fatigued, I always recommend starting with smaller doses, and some people in very poor health can feel fatigued from doing too much (in much the same way that they might from over exercising). So in the first few treatments, use times at the lower end of my recommended doses. If you ever feel fatigued after using it, that means you overdid the dose. Therefore, lower the dose on your next session.

To make it simple: I suggest starting with smaller doses, and then working up to the higher ends of my recommended treatment times over the course of a couple weeks. Then, if you feel fatigued, back off the dose a bit and you've found your ideal dose. Or feel free to continue using the doses at the higher end of my recommended doses if you have no adverse reaction to it and you feel good from it (as most healthy people will).

Q: How does this red light "heal" the body so well? My son had tried everything to get rid of plantar warts and within 2 weeks of consistent daily usage of the red light LED, they completely disappeared! Totally amazing and remarkable results!

It's hard to say why it helps get rid of plantar warts. Red/NIR light does seem to have differential effects in certain types of cells. And it may have an effect on cells infected with viruses (like wart tissues) that help to kill off the virus or kill the tissues, or activate the immune system cells in the area to help combat the virus. There is research to suggest red/NIR can help in combating other viral issues that affect the skin like herpes simplex virus[382], so it's not unreasonable that it would also benefit a condition like plantar warts.

Q: Can you explain the difference between the LED lights available to the general public and the more expensive laser devices only available to medical professionals? Is there solid research to demonstrate that they have comparable effects? How do you determine the parameters of treatment using an LED device that would be comparable to the parameters of treatment used in a study using a laser device?

Yes, there is plenty of research to show that they have comparable effects. Please see the quote from the world's foremost expert on this subject, Michael Hamblin, PhD, earlier in this book where he explicitly says that they have basically the same effects. It is also worth noting that he himself uses an LED device, not a laser device. (He uses it on his forehead in the mornings to enhance brain/cognitive function.)

As far as the parameters of treatment using a laser vs. an LED device, you do this by calculating the total dose they used and using the same dose with the LED. (Remember, it's just a function of total energy delivered, so it can be calculated with a laser or LED device just fine.) To simplify this, just follow my dosing guidelines.

Q: When using it for the brain, are there big differences between red vs. near-infrared light? And does the light penetrate through hair and skull?

NIR will get through the skull more effectively, so for the brain specifically, near-infrared is going to be superior.

Neither near-infrared nor red light will penetrate effectively through hair, so you don't want to shine it on the hairy parts of your head, but the forehead, back of the neck, and ear areas are all good.

Also, it's worth noting that certain devices are meant to target the brain specifically. VieLight is one company that makes these brain-specific devices. They sell intranasal devices that are claimed to target the brain, but Michael Hamblin, PhD does not believe these devices actually do reach the brain directly, but rather they work through irradiating the blood in the capillaries, which indirectly affects the brain (and other systems of the body). Assuming he is correct, it really does not make sense to use these low-power intranasal devices to treat the blood – it would be much better to use a high power (and much larger) LED device for that purpose.

Having said that, VieLight also makes a product called VieLight Neuro which is a much higher power device with multiple light points around the skull. (It can be placed to emit light through the hair follicles directly on the skin, so the hair doesn't block the light). The VieLight Neuro may very well be the best product for treating the brain specifically. We don't know for sure, as there are no studies comparing it to LED lights, but it looks to be a great product.

Q: Are there any recommendations on how to use the light differently during the different seasons?

This is an interesting question. We don't have any data on this, so my answer will be speculative. With UV lights, we know that this is pretty straightforward: Obviously you use UV light on your skin to help synthesize more vitamin D during the time of the year where you get less sun – the winter. In the case of red/NIR light, we are not concerned with vitamin D specifically, but I would say follow the same principle of doing much more in the winter (as with using a UV light) to make up for lack of sun exposure in winter. This is especially true for anyone who lives in a place where they don't get much sun exposure during the winter months.

Q: Are there any side effects of using a red/NIR light device? Can you do too much?

Remember that red/NIR light has a "biphasic dose response" (I wrote about this earlier in the book). That means that at very low doses, you will get little to no effect. At the right dose, you'll get good effects. And if you do much more than that, you will go back to having little to no effect.

So please do follow the recommended dosing guidelines and be aware that doing more than that can lead to counterproductive results.
As far as specific side effects, in most cases for most people, there is little to no risk of side effects. The main concern is simply doing too big of a dose, in which case, you would likely experience less benefits rather than terrible side effects.
In contrast to say, use of UV light (e.g. tanning beds) – where there is a huge risk of cell damage by overdoing it – red/NIR light is extraordinarily safe and has little risk of negative side effects.
Having said that, a small percentage of people will experience side effects from doing too much. The main side effects are headaches and fatigue/exhaustion (it can require a significant amount of energy to deal with the healing and mitochondria-stimulating properties of red/NIR light).
Also, potential source of side effects is from the EMFs from the device. Some people are extremely sensitive to EMFs (you know if you are, because your cell phone and laptop/tablet cause major symptoms for you). In the same way, the EMFs from a light can be problematic if you decide to put the light device right on your body and don't leave several inches of space between your body and the light. (See my recommendations on keeping the light at least 3" away, and I'd suggest at least 6" for anyone who is EMF sensitive. At 6" there will be little to no detectable EMFs.)
Another potential side effect is poor sleep in those who use the light right before bedtime. This is because even though red colored light doesn't generally suppress melatonin production (melatonin is necessary for good sleep), if the light is high enough intensity/power, it will still suppress melatonin – much like light from your TV or cell phone will. This is why it's best not to use the light within an hour of bedtime.
One more thing worth mentioning here is that certain people seem to be far more sensitive than others to the effects of red/NIR light. The dose that is optimal for one person may be far lower than that of another. In general, I've found that people with severe health problems are sometimes very sensitive to the effects of the light and need MUCH lower doses. Some people in this situation may experience fatigue/exhaustion or headaches even from relatively low doses. This is likely due to the differences in overall redox balance in cells. Specifically, people in poor health or those with various chronic diseases may have extremely elevated levels of oxidative stress (excess free radicals) in their body, and the hormetic effects of things like exercise or red light therapy may be tough for their cells to handle. So just as over-exercising can cause exhaustion/fatigue in these people, so too can overdoing the red/NIR light treatment.
The solution to this is relatively simple: If you are in poor health or are severely fatigued, I always recommend starting with smaller doses. In the beginning, use times at the very low end of (or below) my recommended doses. Then slowly increase the dose on subsequent treatment sessions (within my recommended dose range) to find your maximal dose below the threshold of any side effects. If you feel fatigued after using it, that means you overdid the dose. Therefore, lower the dose on your next session.

Q: I did my first treatment and felt very fatigued for hours after or even the next day. Why did this happen and what should I do?

If you ever feel fatigued after using it, that just means you overdid the dose. Similar to exercise or doing other healthy things like using a sauna, if you overdo it, you will feel fatigued. That doesn't mean exercise is bad, or that using a sauna is bad – in fact, research shows they are amazing for health! – it means that you overdid it and you need to decrease the dose.

Simply lower the dose on your next session to the very low end (or below) my recommended dose range, and then – assuming you don't have a negative reaction anymore, which you shouldn't – then slowly work up to within the recommended dose range and find the dose at the upper limit of what you can tolerate before you experience negative effects. Then simply lower the dose by 30 seconds or a couple minutes or so below that upper limit, and that's the right dose for you.

Be aware that people in poor health or with chronic fatigue can be very sensitive to the light (just the same as they will be sensitive to overdoing exercise and feel bad effects from that). So please be conservative

with the dosing and always err on the side of doing too little rather than too much. Start with low doses and build from there rather than trying to rush in to doing larger doses.

Q: I've heard of far-infrared saunas, so what's the difference between near-infrared and far-infrared?

Far-infrared are the higher wavelengths in the infrared region. There is a very big difference here, because far-infrared is felt by us as HEAT. It heats up our body. That's why it is used in saunas. The thing heating the sauna is the far-infrared energy. Near-infrared emits no heat and does not heat our body.

It is also unclear if far-infrared has any of the same effects at the cellular and mitochondrial level as red and near-infrared light. In general, think of far-infrared as HEAT, which can increase circulation and promote sweating (like in a sauna).

Basically, you can think of this as two categories:

1. Red/NIR light – emits no heat, and acts on the mitochondria
2. Far-infrared – heats up our body

These are not the same, and a far-infrared sauna (or far-infrared heater/mat of any type) does not give the same benefits as red/NIR light therapy.

Q: I've heard of NEAR-infrared saunas. What do you think of these?

This is a misnomer. There are some companies using this sort of misleading statement ("near-infrared sauna"). There is really no such thing as a purely near-infrared sauna – i.e. a sauna that only emits near-infrared and no far-infrared. If a sauna did that, it would not be a sauna at all, because it wouldn't be hot (it would be room temperature). All it would be is you sitting inside a box with an invisible light source (remember, near-infrared is not visible to the human eye) at room temperature. No sweating, no heat, and just an invisible light. In other words, a truly "near-infrared sauna" would not be a sauna at all.

What these companies who are selling "near-infrared saunas" are actually selling is far-infrared (i.e. heat) that also includes a source of near-infrared light (for example, the heat bulbs I discussed earlier in this book). There are also some wooden saunas that advertise themselves as "near-infrared saunas" that are also a mix of far-infrared and near-infrared.

There are sauna options which do include near-infrared and truly do act as sauna and get hot. Of these options, the top choices are Sunlighten's mPulse saunas, Clearlight's full spectrum saunas and the SaunaSpace Pocket Sauna. So if you have the money, this is a wonderful option, as you can get the benefits of far-infrared (sweating and benefits of heat hormesis) while also getting the benefits of near-infrared talked about in this book. In this case, you wouldn't need to buy a red/NIR light device separately, as you would be getting your near-infrared therapy in your sauna. Remember, it's quite a bit more expensive to get one of these saunas (roughly 10x more money) compared to just a red/NIR light device, so I generally don't push for people to go purchase a home sauna, let alone a higher priced home sauna (that generally costs $4,000-$10,000).

Q: What device do I personally use?

I have both a Red Rush360 and a Platinum BIO600. Both are excellent lights that I highly recommend.

I've also had many other light devices that I purchased and didn't realize that they were underpowered or not ideal wavelengths, so they sit unused in my garage.

Using these two powerful lights simultaneously, I can basically treat my entire body (or any area I want to treat) in less than 5 minutes.

Typically, I use these two lights while lying on the ground and have one on either side of me at 6”-24” away. I either lay on my back or my side, and this way, I can treat both sides of my body at once or the front and back of my body at once. I typically use it for anti-aging purposes on the skin, enhancing the effects of exercise (muscle gain, performance, and recovery), fat loss, preventing hair loss, as well as treating any injuries that I get from living a very active outdoor lifestyle.

Both are excellent, high-quality lights that I’ve had for a long time now and they still work perfectly well, while providing amazing therapeutic benefits.

Any of the lights I recommended are going to be excellent. But these are the two I personally think are best, which is why I bought them. And having bought close to a dozen different devices, these are by far the best I have seen and used (perhaps with the exception of Thor’s $100K light bed, which I have no plans of purchasing any time soon).

REFERENCES

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[382] Hamblin, M et al. (2013). Low-level laser (light) therapy (LLLT) in skin: stimulating, healing, restoring.