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RED/INFRARED/BLUE
LIGHT FOR ORAL HEALTH





Oral light therapy, in the form of low level lasers and LEDs, has been used in dentistry for decades now. As one of the most well studied branches of oral health, a quick search online (as of 2016) finds thousands of studies from countries all over the world^[1] with hundreds more every year.

The quality of the studies in this field vary, from preliminary trials to double blind placebo-controlled studies. Despite this breadth of scientific research and the widespread clinical use, at-home light therapy for oral issues is not yet pervasive, for a variety of reasons. Should people start doing oral light therapy at home?

Teeth Conditions that Benefit

Studies look at various oral issues, including but not limited to:

- Sensitive teeth (dentin hypersensitivity).^[8-12]
- Tooth^[1-7] & bone damage^[18-24]
- Bacteria counts (tooth decay causing bacteria)^[13-17]
- Oral thrush/candidiasis^[14, 36, 42]
- Orthodontic teeth movement^[28-33]
- Gum inflammation & oral wounds in soft tissue^[25-27]
- Recovery from surgery (gums and jaw bones)^[19, 24, 25, 29]
- Ulcers, cold sores, tonsillitis, other viral/bacterial infections^[5, 14, 27, 36-38]

Less than 10% of the studies show neutral or negative effects, although on critical inspection many of these use questionable doses and non-standard parameters^[35]

Oral Hygiene: Is Red Light Therapy Comparable With Toothbrushing?

One of the more surprising findings from examining the literature is that light therapy

at specific wavelengths reduces oral bacteria counts ^[13,14]

The studies done in this area are generally focused on the bacteria most commonly implicated in tooth decay/cavities (Streptococci, Lactobacilli) and biofilms. In some, but not all, cases to a greater extent than regular tooth-brushing/mouthwash ^[14-15] ^[16-17] and tooth infections (enterococci – a species of bacteria linked to abscesses, root canal infections and others).

Red light (or infrared, 600-1000nm range) even seems to help with white or coated tongue problems, which can be caused by several things including yeast^[42] and bacteria.

While the bacterial studies in this area are still preliminary, the evidence is interesting. Studies in other areas of the body also point to this function of red light in preventing infections. Is it time to add red light therapy to your oral hygiene routine?

User guide’.

About power source, you can use any device that accepts any of the connected adaptors. The main thing you want to be aware of is some devices have higher power output and will make the mouthguard quite warm or hot, if that happens you will want to find a different device to power your mouthguard. The Mouthguard should not get more than slightly warm, hardly noticeable while in your mouth. I run mine off an iPhone 11, an iPad Air, my Mac book pro, and have no issues. But every now and again we hear from customers that their device makes the Mouthguard hot. Again if this happens stop using the Mouthguard immediately, wait for it to cool down and try a different device.

How to use R32:

- 30 min. 2x/day if treating a condition.
- 30 min. 1x/day for wellness

With Red light there is no ‘too much’ if you feel it is helpful to use your R32 for longer than listed above you are welcome too.

How to use RB32:

- 20 min. 2x/day if treating a condition.
- 30 min. 1x/day if using for wellness

Unlike Red light, Blue light does have a maximum dose. We recommend saying under 30 min in a single session.

Be gentle with the connection of the wire to the mouthguard this is a delicate transition.

Gently rinse to clean, being mind full not to run water directly over the wire connection to mouthguard.

Tooth Sensitivity: Can Red Light Help?

Having a sensitive tooth is stressful and directly reduces quality of life – the afflicted person is no longer able to enjoy things like ice cream & coffee. Even just breathing through the mouth can cause pain. Most people afflicted have cold sensitivity, but a minority have hot sensitivity which is usually more serious.

There are dozens of studies on treating sensitive teeth (a.k.a. dentin hypersensitivity) with red and infrared light, with interesting ^[8-12] results. The reason researchers were originally interested in this is because unlike the enamel layer of teeth, the dentin layer actually regenerates throughout life via a process called dentinogenesis. Some believe that red light has potential to improve both the speed and effectiveness of this process, working to improve metabolism in odontoblasts – the cells in teeth responsible for dentinogenesis.

Assuming there is no filling or foreign object that may block or hamper dentin production, red light treatment is something interesting to look into in your battle with sensitive teeth.

Toothache: Red Light Comparable to Regular Painkillers?

Red light therapy is well studied for pain problems. This is true for teeth, just as much as anywhere else in the body. In fact, dentists use low level lasers in clinics for this ^[26]

The proponents claim that the light doesn't just help with the symptoms of the pain ^[31, 39] saying that it actually helps on various levels to treat the cause (as already mentioned – potentially killing bacteria & rebuilding teeth, etc.).

Dental Braces: Oral Light Therapy Useful?

The vast majority of total studies in the oral light therapy field focus on orthodontics. It's no surprise that researchers are interested in this, because ^[28-30, 32-33]

As mentioned above, red light from an appropriate device might help to reduce pain, which is the most significant and common side effect of orthodontic treatment.

Pretty much everyone who wears braces has moderate to severe pain in their mouth, on an almost daily basis. This can negatively affect which foods they are prepared to eat and can cause dependence on traditional painkillers such as ibuprofen and paracetamol.^[31]

The proponents claim that the light doesn't just help with the symptoms of pain there is evidence that tooth movement speed in people with braces can potentially increase when red light is applied means that by using an appropriate light therapy device, you might be able to get rid of your braces much sooner and get back to enjoying food and life.

Light therapy is an interesting and not commonly thought of idea to potentially help with the pain from braces.^[31]

Teeth, Gum And Bone Damage: Better Chance of Healing With Red Light?

Damage to teeth, gums, ligaments and bones supporting them, can happen for a variety of reasons, including natural decay, physical trauma, gum disease & implant surgery. We've talked above about red light potentially healing the dentin layer of teeth but it has also shown promise for these other areas of the mouth.

Several studies look at whether red light can speed up healing of wounds and reduce ^[25-27] inflammation in the gums. Some studies even look at the potential to strengthen the periodontal bones without the need for surgery. In fact, red and infrared light are both well studied elsewhere on the body for the purpose of improving bone





density (by supposedly interacting with osteoblast cells – the cells responsible for bone synthesis).^[18-24] The leading hypothesis explaining light therapy states that it ultimately leads to higher cellular ATP levels, allowing osteoblasts to perform their specialized primary functions (of building a collagen matrix and filling it with bone mineral).

How Does Red Light Work In The Body?

It might seem strange that light therapy is studied for practically all oral health problems, if you don't know the mechanism. Red and near infrared light are thought to act primarily on the mitochondria of cells, leading to greater energy (ATP) production. Any cell that has mitochondria will, in theory, see some benefit from appropriate light therapy.

Energy production is fundamental to life and to the structure/function of cells. Specifically, red light photodissociates nitric oxide from the cytochrome c oxidase metabolism molecules within mitochondria. Nitric oxide is a 'stress hormone' in that it limits energy production – red light negates this effect.

There are other levels on which red light is thought to work, such as by perhaps improving the surface tension of cell's cytoplasm, releasing small amounts of reactive oxygen species (ROS), etc., but the primary one is increasing ATP production via nitric oxide inhibition.

The Ideal Light For Oral Light Therapy?

Various wavelengths are shown to be effective, including 630nm, 685nm, 810nm, 830nm, etc. Several studies compare lasers to LEDs, which show equal^[40-41] (and in some cases superior^[16]) results for oral health. LEDs are much cheaper, being affordable for at-home use.

The key requirement for oral light therapy is the

ability of the light to penetrate the cheek tissue, and then to also penetrate the gums, enamel and bones. Skin and surface tissue blocks 90-95% of incoming light. Stronger sources of light are therefore necessary with regard to LEDs. Weaker light devices would only have an effect on surface issues; unable to eliminate deeper infections, treat gums, bones and harder to reach molar teeth.

Red light therapy – can it clean teeth?

If the light can penetrate the palm of your hand to some extent it will be suitable to penetrate your cheeks. Infrared light penetrates to a slightly greater depth than red light, although the power of the light is always the primary factor in penetration.

It would therefore seem appropriate to use red/infrared LED light from a concentrated source (50 – 200mW/cm² or more power density). Lower power devices can be used, but the effective application time would be exponentially higher.

Bottom Line

Red or infrared light is studied for various parts of the tooth and gum, and regarding bacteria counts.

The relevant wavelengths are 600-1000nm. LEDs and lasers are proven in studies.

Light therapy is worth looking into for things like; sensitive teeth, toothache, infections, oral hygiene in general, tooth/gum damage... People with braces would definitely be interested in some of the research.

Red and infrared LEDs are both studied for oral light therapy. Stronger lights are required for penetration of cheek/gums.

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