

A practical, evidence-based protocol for using red and near-infrared light therapy. This guide accompanies the Calm Veritas article "Red Light Therapy: What the Evidence Actually Supports" and translates the research into a usable at-home protocol: wavelengths, dosing, distance, session timing, and device selection.

The Mechanism, Briefly

Photons between roughly 630 and 850 nanometers are absorbed by cytochrome c oxidase, the terminal enzyme in the mitochondrial electron transport chain. Under metabolic stress or inflammation, nitric oxide competitively inhibits this enzyme; red and near-infrared light displace that inhibition, restoring electron transport and increasing ATP output. This mechanism is well replicated in cell and animal studies — the open question is which downstream human outcomes are reliable enough to build a protocol around.

Two Wavelengths, Two Jobs

660nm — Red, visible

Penetrates skin and superficial tissue. Strongest evidence base: collagen synthesis, skin tone and fine lines, wound healing. A 2014 randomized controlled trial in Photomedicine and Laser Surgery found significant improvement in collagen density and skin complexion after 30 sessions versus control.

850nm — Near-infrared, invisible

Penetrates deeper into muscle and bone. Strongest evidence base: exercise recovery. A 2016 meta-analysis in the European Journal of Sport Science, covering 13 randomized controlled trials, found photobiomodulation applied before or after exercise significantly reduced muscle soreness (DOMS) and creatine kinase levels, a marker of muscle damage.

Most consumer panels deliver both wavelengths simultaneously. Research suggests complementary rather than overlapping effects, so dual-wavelength panels are preferable to single-wavelength devices for general use.

Dosing Protocol

Distance, duration, frequency

Core Dosing Principle

Dose follows the Arndt-Schulz law: too little light produces no measurable effect, too much can inhibit the same enzymes the therapy targets (a biphasic dose-response). Effective doses documented in skin and muscle research typically fall between 3 and 50 J/cm², depending on tissue depth and target outcome. More exposure is not automatically better.

By Application

Skin (face, superficial)

- Distance: 15–30 cm from panel or targeted device
- Duration: 10 minutes per area
- Frequency: 3–5x per week; daily use is well tolerated for handheld devices
- Wavelength: 660nm primary

Muscle recovery (post-exercise)

- Distance: 10–20 cm from full-body panel
- Duration: 10–20 minutes per muscle group treated
- Frequency: immediately post-workout, or within a few hours
- Wavelength: 850nm primary, 660nm complementary

Cognitive / mood (transcranial)

- Distance: per device instructions, typically direct contact or near-contact
- Duration: single sessions of 8–12 minutes in published pilot research
- Frequency: evidence here is early-stage; treat as exploratory, not established protocol
- Wavelength: near-infrared (810–850nm) used in most published trials

Timing Within the Day

Red light is markedly less melatonin-suppressive than full-spectrum white or blue light, which makes evening use compatible with sleep — unlike screens or bright overhead lighting. For circadian and mood applications, morning sessions are commonly used as a complement to standard bright light therapy. For muscle recovery, timing is dictated by the workout, not the clock: apply as soon as practical after training.

Device Selection

What actually matters when buying

Variables That Matter

- Irradiance (mW/cm²) — the actual determinant of dose, verified by independent testing rather than manufacturer marketing claims
- Wavelengths — 660nm and/or 850nm cover the applications with the strongest evidence
- Coverage area — full-body panels for muscle recovery; handheld or facial devices for targeted skin use
- Cooling — panels should have a fan to maintain stable LED output across a session
- EMF emissions — lower-EMF panels are preferable for close or prolonged exposure

What the Evidence Does Not Support

Red light therapy has not been shown to meaningfully reduce body fat in controlled trials, despite common marketing claims. Evidence for thyroid benefits, testosterone increases, and gut health improvements in humans remains too thin or methodologically limited for confident claims. Treat these as unproven, not disproven — the research base simply has not caught up to the marketing.

A Simple Starting Protocol

- Week 1–2: 3 sessions/week, 10 minutes, 20–30 cm distance — build the habit before increasing dose
- Week 3 onward: increase to 4–5 sessions/week if using for skin or general wellness
- Post-workout use: apply within a few hours of training, 10–20 minutes at 10–20 cm
- Track subjective response (skin appearance, soreness, sleep) over 4–6 weeks before judging results

Referenced Research

- Photomedicine and Laser Surgery (2014) — RCT on red light and skin collagen density, complexion, and wrinkle reduction
- Journal of Photochemistry and Photobiology (2013) — 633nm red light and dose-dependent wound healing
- European Journal of Sport Science (2016) — meta-analysis, 13 RCTs, photobiomodulation and exercise recovery
- Behavioral and Brain Functions (2017) — pilot RCT, transcranial near-infrared light and cognitive performance

This guide is for informational purposes and does not constitute medical advice. Consult a physician before starting any new therapy, particularly if pregnant, photosensitive, or taking photosensitizing medication.