

Seeing the Light

How light
therapy is surprising
skeptics and gaining converts

by Rich Smith



Kathy Tisko, PT, and Luko Arnett, DC, use light therapy in their respective practices.

Once he saw the light, a 59-year-old Texan became a changed man. Not emotionally or spiritually, but physically. The man was a patient at Park Cities Physical Therapy in Dallas, suffering from right upper extremity reflex sympathetic dystrophy. A diabetic with heart disease, he'd developed complex regional pain syndrome after a surgical procedure that compromised circulation in his forearm and hand.

"His right arm possessed no strength; he couldn't raise it or use it at all," recalls Park Cities owner Kathy Tisko, PT. "He couldn't perform finger-thumb opposition or finger flexion, which left him incapable of grasping objects. In fact, he had a certain amount of finger-muscle atrophy—clawing deformity. There was pain, too, in his hand and on the right side of his neck and shoulder."

Tisko opted to treat him (in part) with a modality that promotes rehabilitation through the emission of photons (light energy) aimed at affected tissues and muscle. On the first visit to Park Cities, Tisko used this modality to irradiate the man's cervical nerve roots as well as the thumb and fingers of his disabled hand. While that was occurring, Tisko helped him perform a brief flexion-improving exercise or two. At the end of the visit, the man's grip strength in his right hand

measured 5 lbs, as compared to his normal left-hand grip of 65 lbs.

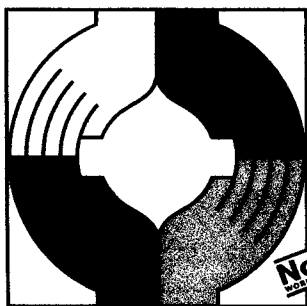
Light therapy (sometimes referred to as low-level laser therapy depending on the device being used) was again performed during the subsequent visit some days later. At the conclusion of the session (which involved a broader set of strengthening exercises), the man could elevate his arm above his shoulder and reported a significant decrease in neck and shoulder pain. By the eighth visit's end, the man was able to button his shirt and, with a grip strength of 20 lbs, execute a solid handshake.

"The improvements within so short a time were astounding," says Tisko. Unfortunately, his insurance covered him for just those eight visits. Tisko is reasonably sure the man would have continued making gains had the payor allowed further treatment. Nevertheless, for Tisko the case demonstrated once more the power of light to heal.

Healed in a Flash

By Tisko's rough tally, hundreds of studies thus far have been conducted to explore and explain how light at wavelengths between 600 nm and 1,000 nm (the slice of the spectrum that includes both

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Cover story



A manual stretch of the cervical muscle during light therapy.

visible and infrared light) and at power levels of less than 500 mw produces a favorable biostimulatory response in the human body.

"What researchers have found is that low-level light can have a favorable effect on bursitis, tendonitis, strains, sprains, and chronic inflammation," she says. "They've found as well that it promotes faster wound healing and appreciable reductions in pain."

Light therapy is similar to, but not quite the same as traditional infrared therapy using an infrared lamp. The latter irradiates within a range of wavelength frequencies and power output levels sufficient to produce soothing heat. Light therapy, by comparison, normally generates no heat—sometimes causing patients to doubt it's even working since they often experience no sensation from it.

"Light therapy bombards the skin with a stream of photons that can be transformed by cells below the surface into adenosine triphosphate which, in turn, boosts the various metabolic processes responsible for tissue and muscle stabilization, repair, and growth," Tisko explains.

Those rays are produced via bulbs or special diodes contained within a handheld, probe-like panel. Some versions allow the light-emitting unit to be positioned on portable stands placed in immediate proximity to the patient. Others permit strapping it directly over the portion of the body to be treated. Either way, those variants give the therapist two free hands with which to simultaneously perform a second intervention (neuromuscular reeducation, for example).

Six Food and Drug Administration (FDA)-approved light therapy systems are currently on the market. These compete against about 100 other domestic and imported light therapy systems sold without the government's blessings. These non-FDA-approved devices are permitted to be offered because they avoid making certain claims that would otherwise bar therapists and consumers from purchasing them, Tisko notes.

Lighting Up Their Lives

Depending on the condition to be treated, effective dosing can be as brief as 30 seconds. As for appropriateness, Tisko says the literature suggests light therapy may reduce symptoms of inflammatory processes (bursitis, tendonitis, carpal tunnel syndrome, and arthritis), as well as accelerating tissue repair and wound healing, and controlling pain from various sources. "From what I've ascertained in the literature, there are very few contraindications for it,"

she says. "In my own experience, I really haven't come across any instance where usage would be a negative."

Ninety-nine percent of patients arriving on Tisko's doorstep complain of pain in conjunction with whatever else afflicts them. Accordingly, one of the first interventions she and her staff provide is light therapy. "Often, we can obtain a degree of pain relief on the first visit," she says. "And, even though evaluation and treatment planning normally consume the bulk of any initial visit, there's always time for light therapy because it gives such a quick response. It's something you can easily fit in and be able to send the patient home feeling immediately better."

Still, Tisko acknowledges there are at least a few contraindications such as treating an area recently injected with a steroid or anti-inflammatory agent. "I wouldn't irradiate a cancerous area or use it directly over the eyes or in the immediate vicinity of the thyroid gland," she says, adding that neither will she shine the light directly over a womb containing a baby. "At present, there are as yet no studies to conclusively demonstrate the risks or the safety of irradiating those areas."

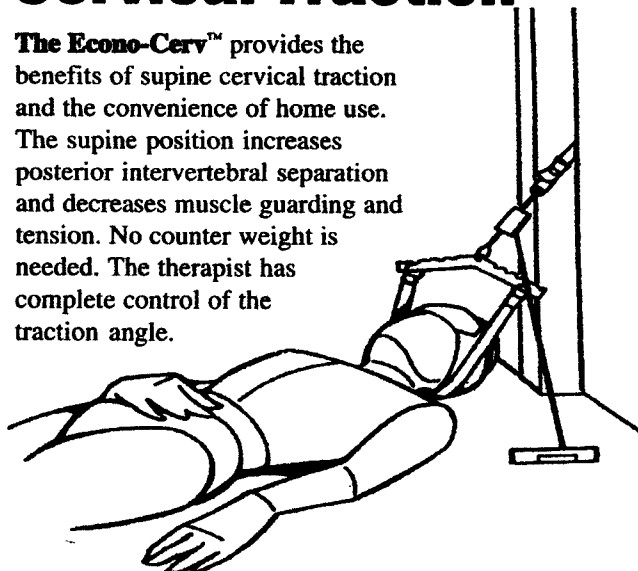
There's also a condition described as photosensitivity in which patients have an adverse reaction to light for reasons not well understood. "I've never encountered it, but it's something to be mindful of in using light therapy on patients," Tisko cautions.

Something else not clearly settled is the question of whether patients can overdose on light. According to Tisko, the thinking in certain quarters is that too much light could flip the body's biological response from a stimulatory to an inhibitory mode, thus impeding therapeutic progress.

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What's in a Name?

Phototherapy, also known as photobiomodulation, is defined by the North American Association of Laser Therapy (NAALT) as "a therapeutic physical modality that uses photons (light energy) from the visible and infrared spectrum for tissue healing and pain reduction." Other commonly used terms are low-level laser therapy (LLLT), cold or soft lasers, low energy or intensity lasers, and laser therapy. The photons or light energy can be produced by either low-level laser diodes, light emitting diodes (LEDs), or super bright LEDs called super luminous diodes (SLDs). The term light therapy often includes low-level lasers as well as LED/SLD energy sources (unless otherwise specified).

Generally speaking, therapeutic light-based devices are within visible red (in the 600 nm range) and infrared (ranges from 700 nm to 1000 nm) spectrum. Light from this range in the electromagnetic spectrum can be produced by either low-level laser or LED/SLD diodes.

The wavelength, light source, and power determine the depth of penetration. Visible red light (in the 600 nm range) has more superficial penetration with up to 2 cm for laser-based technology and up to 1 cm for broad-band devices. Infrared light penetrates more deeply up to 5 cm with direct and indirect effects for laser-based devices, and up to 2.5 cm for LED/SLD technology. The deeper the target tissue, the more energy or joules needed to ensure sufficient light is delivered to initiate a therapeutic outcome.

Laser light has two essential properties that other light forms do not have. First, the light produced is monochromatic (or one color) and has a very narrow beam width. Second, it has a high level of coherence, which means the light waves are in phase, resulting in laser speckling. This phenomenon produces tiny pockets of higher energy levels that are deposited throughout the level of penetration into the tissue. Although these two characteristics are not shared by LEDs/SLDs light, these light sources also create similar biochemical changes in tissues. Since low-level lasers produce focused points of light which penetrate more deeply, they are most often used to treat smaller areas of deeper target tissue. On the other hand, LED/SLD are most frequently built in larger multiple diode clusters, so they are most often used to deliver energy to larger, more superficial treatment areas. This broader application of light recruits the tissue surrounding the injury to increase the microcirculation to enhance healing and pain relief.

Slice of Discovery

Tisko became a fan of light therapy about 2 years ago. However, she used to be a skeptic. "I was most incredulous over the descriptions of how little time it took for the light to work its wonders," she says. "I remember thinking, hey, this is just light; how can it possibly do anything for the patient?"



Tisko uses light therapy (along with other modalities) to improve grip strength.

She received her answer while working one day in her kitchen at home. In the course of preparing a meal, Tisko's knife slipped, slicing open the top sides of the fourth and fifth fingers on her left hand. It so happened that a colleague—a practitioner in another health discipline—had suggested using his laser therapy device on her wounds. Tisko decided to give the device an up-close-and-personal controlled trial: while her fingers were on the mend, she treated one of them with light, the other with conventional salves alone.

The results stunned her. The finger that underwent light therapy (consisting of 2 or 3 exposures a day for about a minute's duration apiece over a span of 5 days) had fully healed 10 days after the accident, and was pain-free for almost the whole time. Meanwhile, the finger that didn't undergo light therapy took twice as long to heal and throbbed until virtually the final days of treatment.

For PTs thinking of light therapy, Tisko reminds that "light therapy is not a stand-alone treatment. The majority of the orders I get are simply to evaluate and treat for whatever condition the physician has specified. So, unless the physician states he or she doesn't want it utilized, I'm free to employ light therapy," she explains.

Physicians, of course, aren't the only ones who have yet to embrace light therapy. But Tisko is confident that most will find light therapy a superior modality for reduction of pain and inflammation, and for wound healing. "I think



there are a couple of reasons why more PTs aren't using light therapy," she offers. "One is confusion surrounding light therapy. A problem is that different brands operate at different combinations of light wavelength and power-output levels, which makes comparing the therapeutic usefulness of one product versus another a real challenge."

Adding to the confusion is the very nomenclature of the technology. "The term low-level laser therapy is often used interchangeably with low-level light therapy," says Tisko. "They are the same thing. Laser therapy has different applications because it usually involves power output greater than what you have in light therapy. Besides, any time you use the word laser, right away everyone starts thinking you mean cutting or burning lasers, the type used in surgery."

Brightening Picture

A second reason for PT's reluctance to use light therapy is a bit more concrete. From a business perspective, light therapy can be a dicey proposition. "The cost of the equipment is substantial," says Tisko. "Prices start at around \$5,000 and can go as high as \$13,000 or more."

Turning up in the coding manual this year is a temporary national code—S8948—which is more specific to light therapy, provided it's used in fully attended mode, Tisko shares. However, here too reimbursement is a mixed bag, with some payors willing to honor it and others (Medicare included) taking the opposite stance. "The best strategy for reimbursement is simply to integrate light therapy with whatever appropriately reimbursed intervention or modality the case calls for," Tisko recommends. "You should look at it from the perspective

of it mattering not at all whether the insurance company will reimburse for light therapy. It's a modality that works, a modality that delivers amazing results, and that's reason enough to use it."

Despite the costs and concerns, interest in the modality is growing. Tisko's evidence of this is strictly anecdotal, but she indicates that her light therapy sales and service representative has been besieged of late with requests for demonstrations.

The biggest surge of interest has come from the sports medicine arena. "If you're involved with athletes, especially at the professional sports level, the cost of the equipment is no deterrent as long as it can get the injured athlete back in the game faster and more successfully," she says. "They're adopting light therapy because it makes the rehabbing of injured athletes more efficient and successful. You can put the light on an edema-afflicted joint and the swelling goes right down after 3, 4, or 5 minutes."

It strikes Tisko as unfortunate that hospitals haven't yet jumped on the bandwagon, since they, more so than private practitioners, would be well-positioned to absorb the costs of the modality and make a huge splash with it. "Given the effectiveness of light therapy in wound healing particularly, I'd thought hospital CCUs and rehabilitation departments would be among the most enthusiastic proponents," she says. "Many of these wounds that are slow healing, that cause financially disadvantageous extended stays in the hospital, could be addressed satisfactorily with light therapy. Hospitals could be sending patients home much sooner and in far better condition thanks to light therapy." ■

Rich Smith is a contributing writer for Physical Therapy Products.

