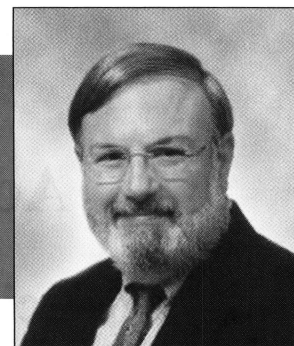


Low Level Laser Therapy – A Clinician's View

By Bernard E. Filner, MD



Low level laser therapy (LLLT) has been used in clinical practice for decades — although much more in Asia and Europe than in the U.S. It has been in more widespread use in the U.S. since the 1990's, and has begun to be used extensively in the past five years as more instruments have become available. Two excellent reviews of the subject can be found in this journal from 2003 and 2004.^{1,2} In the past three years, I have become very interested in the use of "energy medicine" for the treatment of chronic pain in my practice. As part of this approach, I have used LLLT, microcurrent electrotherapy (MET), cranial electrotherapeutic stimulation (CES, which is a subtype of MET), and auriculotherapy. All of these have proven very successful in treating the variety of cases that I have seen over these years, and continue to demonstrate their effectiveness.

The Setting

I am a Board-certified Anesthesiologist, having practiced anesthesiology in both an academic setting and in private practice. Twenty years ago, I developed Meniere's Disease and was forced to stop practicing anesthesiology, as the malpractice insurance carrier would not provide coverage for someone "with my condition." With the help of Dr. Janet Travell, and other colleagues in the Bethesda and northern Virginia areas, I was able to establish a Chronic Pain Treatment Center in Rockville, Maryland.

I see patients with:

- primary myofascial pain syndrome (MFPS),
- fibromyalgia syndrome (FMS),
- pre- and post- operative neck and back pain,
- carpal tunnel syndrome,
- migraine and "tension" headaches,
- chronic sinus headaches,
- neuropathic pain syndromes—including diabetic neuropathies,
- entrapment neuropathies such as greater occipital neuritis, common peroneal neuritis, piriformis syndrome,
- pudendal neuropathies (pre- and post- operative),
- vulvodynia, coccydynia, CRPS I and II,
- "visceral afferent" syndrome,
- Ehlers-Danlos Syndrome,
- plantar fasciitis,
- movement disorders of the face and extremities,
- interstitial cystitis,
- systemic lupus,
- rheumatoid arthritis,

as well as numerous sports-related and other types of injuries.

It should be noted that each of these conditions has some component of myofascial trigger points as a cause of their pain symptoms.

One of the primary principles of treating myofascial pain that I learned from Dr. Travell^{3,4} was that MFPS was a condition that affected "functional units" (e.g., a shoulder, a hip, etc.) and that in order for a treatment to be as complete as possible, the clinician had to find and inactivate each and every trigger point that could be found in that functional unit. Otherwise, a non-treated trigger point would create the condition(s) for a rapid reactivation of the treated trigger points and the associated pain symptoms. Thus the evaluation and treatment of a particular functional unit is approached as if "peeling an onion," until all of the trigger points are eliminated and the pain is resolved and function restored — through reconditioning, if necessary. Needless to say, most chronic pain patients have more than one functional unit involved, and the number of trigger point injections could get quite extensive. So I searched for a technique that would allow me to treat these difficult cases with a minimum of pain (from the treatment). LLLT was one of those modalities, and the use of these non-invasive techniques has changed the nature of my practice in many ways. This article is intended to present the how's and the why's of this approach as it involves LLLT.

Since the mid-1990s, I have begun to see more patients with FMS in my practice. It has been my observation (confirmed by numerous discussions with colleagues) that these patients do not respond well to the use of trigger point injections (TPIs) compared to patients who have only MFPS. It has been my experience, as well, that every patient with FMS has MFPS as a significant component of their pain. This continual pain is part of the reason that they develop the central sensitization that is the hallmark of FMS. Some method of inactivating their widespread trigger points (TPs)—without causing significant pain—had to be found. LLLT turned out to be the ideal treatment.

In the Beginning

I first heard about LLLT in early 2003, when a patient sent me an article from the Washington Post about the use of LLLT by a trainer for the New England Patriots during and before the Super Bowl that had recently been played. I read the article, was very skeptical, but began to look into the use of LLLT. I initially searched the Internet and read many of the citations noted in the later articles in *Practical Pain Management*.^{1,2} In addition, I went to the web site of the company that made the unit that had been used by the Patriots and read, downloaded, and ob-

tained some of the cited research. I was quite intrigued, and called the company to arrange a demonstration of the unit two weeks later. I “recruited” seven patients with all types of MFPS, from simple, to complex — I had more volunteers than I could handle — for the demonstration. The eighth subject was me, as I have extensive TPs in my neck and upper back. The company representative came on the appointed day and we spent about six hours together. I was shown how to use the equipment and then did the procedures on my patients. My assistant then treated my own TPs. Each and every TP was inactivated using the LLLT, including eight of my own. I was so impressed that I bought a unit on the spot. The representative came back two weeks later to deliver the unit and we treated seven more patients with similar results. Two of those patients had carpal tunnel syndrome (CTS), symptoms of a positive Tinel’s sign and numbness and tingling in the distribution of the median nerve, in addition to TPs that referred pain into the forearm and wrist (more about these patients later).

Clinical and Technical Considerations

The laser unit that I use has three 30mW beams (90mW total power), with a wavelength of 830nm. This wavelength provides an adequate (for most purposes) depth of penetration through the skin, with power that is low enough to avoid heating or otherwise damaging the tissues. The laser does not penetrate bone, and this is occasionally a problem with certain conditions. There is essentially no risk to this procedure, other than avoiding direct illumination of the eye, which is avoided by the use of appropriate shielding glasses. I do not use it over a pregnant uterus, or over a known cancer or infection. For a fuller explanation — beyond the scope of, and basis for, this paper — see the excellent papers from PPM.^{1,2}

Several things need to be noted at this point. First of all, I think of the laser as a non-invasive TPI, with no risk involved. The laser beam, by definition, follows a straight line. In fact, it goes straighter than a needle since it is not subjected to deflection by soft tissue, as needles are. While the beam becomes less “powerful” as it penetrates deeper into the soft tissue, this can often be overcome by using more joules/cm²—that is, more exposure time. This characteristic of the laser beam (that it follows a straight line) means that the clinician has to aim the beam directly at the trigger point. The clinician must be able to palpate the trigger point, isolate it so that it does not move during exposure, and move the beam along the taut band(s) so as to inactivate the entire TP. Thus the skill required is essentially equal to the skill required to do a TPI. This is not true for the use of LLLT to treat CTS and other conditions where straightforward protocols have been established as effective, and can be easily followed by well trained assistants.

Second, while a TPI has a number of local effects that contribute to its ability to shut off the pain coming from that TP (for an excellent discussion of this and all aspects of the diagnosis and treatment of MFPS — through the mid 1990s — see Travell and Simons^{3,4}), it is essentially a “band-aid,” requiring a vigorous stretching and reconditioning program to be effective and giving the injections some longevity. On the other hand, LLLT has numerous local and systemic effects that, with repeated treatments, have an additive effect.^{1,2} A vigorous stretching and reconditioning program is still needed for resolution of the MFPS, but the effect of each treatment begins to last longer, as long as

perpetuating factors or untreated TPs are eliminated from the clinical picture. This, after all, is the main responsibility of the clinician treating the MFPS: inactivating all the TPs and eliminating all the perpetuating factors.

Third is the element of *time*. The clinician and his/her assistants must be willing to devote the time that it takes to use the appropriate techniques and provide adequate “exposure time” to do the job completely. And most importantly, to take the time to get a good history, do the proper physical examination and tests to determine the problem, and choose the best treatment for that condition (it will often—but not always—be LLLT). If you don’t take the time necessary, the likelihood is that your results will not be as good as you and your patient would like them to be.

The Pros of LLLT

This article is based on my experience of the last three and a half years of using the cold laser in my practice. I see six to eight patients a day, depending on the mix of new vs. previously seen patients, and a mix of conditions. In that period, I have inactivated more than 11,000 individual TPs on the patients I’ve seen. I have successfully inactivated all but four of them. Typically, my patients have had pain from six months to forty years. Most of them have had a misdiagnosis or no diagnosis of their condi-

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tion. Almost every one has at least some component of myofascial pain with trigger points and the associated referred pain and dysfunction. They can almost all, with rare exceptions, be helped by treating their myofascial TPs. In this section, I will detail the major advantages of using LLLT (especially with certain conditions), as well as some of the few problems I’ve encountered in my practice.

I have found the LLLT to be extraordinarily effective for inactivating individual trigger points in patients with MFPS and especially FMS patients. The latter, in particular, do very well without the pain of the TPI, which used to last for several days (at least). Their treatment is far easier, for both myself and the patient, using the LLLT. The use of the laser allows them to use heat, stretching and light exercise on the same day of their treatment, making it even more effective. The use of LLLT eliminates some of the problems with traditional inspections. For example, injection of the sternocleidomastoid muscle trigger point(s) often resulted in a worsening of the symptoms before they improved. Also, driving home after the injection was also problematic, as a sudden turn to look for traffic might result in a major spasm of the muscle, with potentially disastrous consequences.

I have treated six patients with CTS, each to complete resolution of their symptoms. Unfortunately, in our community, most of these patients go from their primary care physician or internist to a neurologist and then to physical therapy and on to neuro- or orthopedic surgeons. A significant number do not resolve their symptoms. I see quite a few of these patients (usually a patient I am seeing for another problem who states that they also have CTS, either pre- or post-surgery) whose symp-

toms are entirely myofascial in origin. Most of the time, the symptoms can be completely eliminated by finding and inactivating all the involved TPs.

A common problem in patients with significant neck pain and headache (and/or facial pain) is greater occipital (and/or lesser occipital) neuralgia/neuritis from entrapment by very tight posterior neck muscles. Inactivating the neck TPs is often enough to relieve the entrapment and pain (and sometimes facial numbness and/or tingling in the distribution of the nerve). For persistent symptoms of neuritis/neuralgia, the previous method of treatment was a steroid injected along the course of the nerve—a painful injection that often resulted in a flare-up of the pain prior to the steroid taking effect in three days. Now, a five to ten minute treatment along the tender part of the nerve relieves the pain completely, and only needs to be redone if the neck muscles continue to tighten and entrap the nerve. This same protocol works very well for other superficial entrapment neuropathies. The use of LLLT avoids potential infection in diabetics and also eliminates potential bleeding problems with patients taking aspirin or coumadin, thus making treatment of their TPs possible and more effective.

The treatment of CRPS II, that has a significant myofascial component, is greatly facilitated by avoiding the need to do a large number of injections to the TPs in the affected extremity. As was noted in the references,^{1,2} the LLLT causes the release of nitric oxide (NO) from small blood vessels that can dilate those blood vessels as well as desensitize the nociceptors, thus alleviating decreased circulation, pain, and allodynia noted in this syndrome.

While this is not an absolutely complete listing of the advantages, it provides a good paradigm for determining when use of the LLLT is better than using TPIs or other methods of inactivating trigger points. When combined with the cons noted below, it should provide a good basis for using this technology.

The Cons of LLLT

There are a few problems associated with use of LLLT although some of them can be overcome fairly easily. Others, however, are inherent in the techniques, the basic physics, and the available instruments. These need to be evaluated in terms of the equipment you buy, and the

selection of patients for treatment with the LLLT. Remember, there is no treatment or protocol that works for all patients under all circumstances.

In one of the sections above, I noted that four patients had a trigger point that I could not inactivate. Two of these were piriformis muscles in a patient with very large buttocks. The effectiveness of the 830nm laser beam (its power) falls off dramatically after 3-5 cm in depth, although I have been able to inactivate piriformis muscle TPs using the LLLT that I would have needed a 3-inch needle to reach. The amount of fat tissue may also affect the depth of penetration. Indeed, the third TP that couldn't be inactivated was in a pectoral muscle of a body builder that was quite bulky (the laser may pass through fat better than dense muscle). The fourth TP was just a very painful, active TP in a gluteus minimus muscle in a fairly thin individual — it was easily treated with an injection.

I have already mentioned that it takes significant extra time to do this therapy (although it seems to work better in the long run than injections, as long as the treatment program is appropriate). Additionally, as the effects of LLLT are additive, the patient has to be seen, initially, at least once a week (ideally 2-3x per week). This may be difficult for both the clinic and the patient.

Due to the fact that laser does not go through bone, and the "business" head of the laser may be too large to fit certain areas of the body (for example, it can't be used in the mouth) there are some conditions that can't easily or effectively be treated with LLLT. These include temporalis tendonitis, stylomandibular ligament inflammation, facial TPs near the eyes, and some others. Additionally, when using LLLT on open wounds (e.g., diabetic ulcers), care has to be taken to avoid infection of the patient and contamination of the laser head.

One of the under-appreciated problems of using LLLT is that the practitioner's hand may begin to hurt and develop myofascial and/or arthritic pains in the hands and arms. To minimize this, it is important to have the patient in a position that is comfortable for both the patient and yourself. If you are using LLLT for 4-5 hrs per day, you will need to set up some type of a "third hand." I have rigged a microphone stand for this purpose that works quite well. I have also

treated my own forearm TPs and finger joints with the LLLT.

Finally, one of the major, if not *the* major problem is with insurance reimbursement. If the clinician is doing the treatment, payment as a P.T. modality will be inadequate. Many carriers, in spite of the voluminous literature (thousands of studies, hundred of controlled, blinded studies, more than 2 million citations on a Google search) continue to call LLLT experimental and investigational. An entire article could easily be devoted to shortcomings of the governmental and private carriers in our health care system, particularly in the way it handles the treatment of chronic pain, and the introduction of new methods and technology that save money and improve patient care. This is especially true of the private, indemnity carriers who don't want to cover anything new that might cost money, even if it lowers the overall cost, because it doesn't fit their business model.

Conclusion

What I have tried to do in this brief article is to describe the use of LLLT in a clinical setting, how and why I began using it in my practice, some of the changes it has brought to that practice, and some of the problems I have encountered on the way. It is my opinion, based on these years of experience, that LLLT is part of a wave of new approaches that will change the way chronic pain is treated in this country, and should become part of the armamentarium of every clinician treating these conditions. ■

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