



# Pain MANAGEMENT

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## How Laser Therapy Works

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*"The real voyage of discovery consists not in seeking new lands but in seeing with new eyes." Marcel Proust*

Because of the increasing popularity and success of laser therapy, we would like to know more about how coherent light affects living systems. While our picture is not yet complete, we know enough to provide helpful information for both the patient and the therapist. Experience shows that a clearer understanding of what coherent light or any other energetic treatment is doing can actually enhance the therapeutic encounter in several ways.

## THE CIRCUITRY OF THE BODY

Recent research in cell biology has described a continuous microscopic matrix that extends into every part of the organism, including into every cell and into every nucleus, of all cells, throughout the body. This system is called *the living matrix*. The key elements in this system are the collagen-rich connective tissues (tendons, ligaments, fascia, cartilage, bone), the cytoskeletons of the various cells, the nuclear matrices that support the genetic material, and the integrins. The latter are trans-membrane proteins that link the cell interior with the extracellular or connective tissue matrix.

We have known for some time that this entire matrix has semiconductor properties, although this fact is not widely appreciated. The 2000 Nobel Prize in Chemistry is for the discovery of semiconducting polymer films, and comparable materials exist through the human body as planes of fascia. Semiconductors are the materials that provide the basis for our modern electronics industry, including computers. Many of the remarkable successes of laser and other therapies can be explained by reference to this remarkable whole-body system with its electronic and solid-state properties. The term, *solid state*, refers to a branch of physics dealing with condensed or solid matter. Research in this area helps us understand a number of phenomena that have considerable significance for the study of life and the healing response. Let us summarize some of these.

## NONLINEARITY

First, the living matrix is a nonlinear system. This means that very tiny influences, such as the application of small amounts of light or sound or other energies, can produce large effects.<sup>1</sup> This is particularly the case if the energy is introduced at especially sensitive areas on the body surface. Various therapeutic systems utilize such highly responsive regions which are variously termed trigger points, acupuncture points, critical points, and chakras.

Extensive research has documented that the 'less is more' principle, the hallmark of homeopathy, applies to any therapeutic intervention. We are learning that if the therapy does not seem to be effective, we should always try using *less* energy, rather than more. Cells actually respond better to very tiny 'whispers' than to larger stimuli. This phenomenon is described in the biophysical literature as 'windowing.' A window is a narrow region in the frequency spectrum and in the range of intensity that will provide a biological response.<sup>2</sup> Each type of cell, and each tissue, appears to respond best to a particular frequency or set of frequencies.<sup>3</sup> These frequencies must be provided at a sufficiently small intensity or there will be no effect. One reason for the frequency specificity arises from another attribute of the living matrix, *crystallinity*.

## CRYSTALLINITY

Large portions of the living matrix are composed of crystalline or nearly crystalline matter. The fact that the molecules in these parts of the matrix are closely packed together, in highly organized and evenly spaced or *coherent* arrays helps us understand the effectiveness of coherent light. In fact, the crystalline arrays found in living matter are described as liquid crystals. These are materials that have properties of both solids and fluids. Their properties are nicely summarized by Ho:<sup>4</sup>

*Liquid crystallinity gives organisms their characteristic flexibility, exquisite sensitivity and responsiveness, and optimizes the rapid noiseless intercommunication that enables the organism to function as a coherent coordinated whole.*

A number of scientists, looking at these highly organized liquid crystalline systems, predicted that energy input into such materials should cause the molecules to begin to vibrate in unison. In other words, when a certain energetic threshold is reached molecular arrays should vibrate coherently at particular frequencies in the visible and near-visible part of the

electromagnetic spectrum. Research has shown that this is indeed the case. The scientific literature on this subject is of great interest to all therapists, and several articles are highly recommended.<sup>5,6</sup> Unfortunately the first of these publications is out-of-print, and second is in German. However, the interested reader can find fully referenced summaries in several publications.<sup>7-9</sup>

### LIGHT AS INFORMATION

The research just cited has led a number of scientists to realize that for the body to function in a coordinated or coherent manner, there must be some kind of signaling system that enables every part to “know” what every other part is doing. The phenomenon is best exemplified by peak athletic or artistic performances in which one has the impression that every tissue, cell, and molecule of the body is being utilized in a perfectly harmonious manner. This has been referred to as *systemic cooperation*.<sup>7</sup> This state is also encountered from time to time during peak therapeutic encounters, when the therapist and patient both can have a remarkable sense of interconnectedness. Hence the exploration of systemic cooperation has significance for all endeavors.

A distinguished German researcher, Fritz Albert Popp, has suggested that coherent light is the most likely candidate for the information carrier in living systems. If he is correct, the coordination of living processes is an ultra-fast process. Researchers at the University of California in Irvine have documented such ultra-fast phenomena exist in the human body.<sup>10</sup> Specifically, when they used non-contact ultrasonic stimulation of “vision points” on the foot, functional magnetic resonance revealed that neurons in the visual cortex were responding far too quickly to be explained by nerve conduction. Some non-neural carrier of information was conveying the “message” from the feet to the brain.<sup>11</sup> Light is a very good candidate for this ultra-fast communication. Certainly the system being studied by Jones provides an opportunity to study ultra-fast communication processes in living systems.

The ‘noiseless’ attribute of intercommunication, mentioned in the quote from Mae-Wan Ho above, is of great interest. Because intercommunication is noiseless, and because it is not mediated by the nervous system, we are not usually consciously aware that such communication is taking place. It has been suggested that this subconscious noiseless non-neural communication system is actually the body’s *operating system*, working silently in the background, coordinating all living processes, including injury repair and protection from disease.

### CLINICAL SUMMARY

Our clinical use of low power cold laser technology has shown its profound capacity to reduce inflammation, improve range of motion, engage proprioception and integrate locomotor processes. An astonishing aspect of this is the speed and longevity of the changes. Re-establishing strength in muscles that test 3+ on neurologic examination most often occurs within seconds of laser stimulation and remains strong until further trauma. The same results are

seen with increases in joint range of motion. This is seen with high predictably in old joint injuries, particularly in the shoulder. Swelling in acute traumatic soft tissue injury decreases significantly within minutes of laser therapy. The sooner the laser is applied, the more profound the response. When used early in rehabilitation low level laser dramatically facilitates the integration of injured joints and muscles into complex locomotor movement patterns. This is critical, as it appears, that early movement creates the reorganization of the body’s tissues necessary to integrate strain-free, energy efficient full body movement.

The speed and profound effects of the laser are clinically amazing. Specifically in the area of acute and chronic pain the reduction is fast and dramatic. Moreover the effect of the laser is long lived unless the patient over taxes the area of involvement. The need to neuromuscularly challenge the affected area cannot be underestimated. Significant increases in ATP also seem to be the reason that the muscle is reset so rapidly.<sup>12</sup>

The use of various frequencies of laser also increase the rapidity and longevity of the results. We are on the edge of a revolution in the clinical treatment of the patient and with further training and knowledge we will step into the future of fast, safe and effective methodologies such as the laser. It is time that therapists avail themselves of this remarkable technology to assist the patient to overcome pain and musculoskeletal dysfunction. The time to act and enjoy the new paradigm is now.

### SOME CONCLUSIONS

The material summarized here begins to develop a picture of a whole-body living matrix with remarkable properties. It is of interest to both the patient and the therapist using lasers that coherent light can affect the entire living matrix. This means that the effects reach into every nook and cranny of the body. Because many of the cellular enzymes are located on the cytoskeletal matrix, coherent energies moving through the fabric of the body can reach and affect biochemical pathways. Because this is the body’s operating system, coherent energies moving through the matrix can open up or *exercise* regulatory pathways. This opening up of pathways is of great importance in facilitating healing; it is also of value to the athlete or other performer seeking full body systemic cooperation in order to maximize the operations of their sensory and movement systems.

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