

# LOW-ENERGY LASER THERAPY AS QUANTUM MEDICINE

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**The author presents the possibilities of using low-energy laser therapy in treatment according to the most up-to-date bibliography and his own observations. Therapeutic techniques presently used are discussed as well. The author attempts to explain the terms often applied in quantum medicine. Positive therapeutic results confirmed by advanced experiments and clinical observations contribute to extending the range of treatment methods used so far.**

*Keywords: Laser Therapy, Quantum Medicine*

## Introduction

Achievements in science and technology influence the therapeutic and diagnostic methods used in medicine. An example is low-energy laser therapy whose expansion in various medical areas [1, 2, 14, 15] can be observed.

The term quantum medicine has been used for the last few years in scientific reports, at international congresses and conferences, and even in media, in reference to low-energy laser therapy. [3, 10, 15, 19]. As far as the history of science is concerned, in 1864 Maxwell formulated his famous equations connecting all previously discovered laws of electricity and magnetism, creating a new term, electromagnetism. In 1928 Dirac found a connection between Maxwell's equations and Einstein's theory of relativity as well as quantum mechanics, establishing a new area of science called quantum electrodynamics, which allows us to define the effects of light - matter reactions, especially those with charged subatomic molecules such as electrons.

Electrons are molecules with wave properties. A photon carries electromagnetic power transmitting energy from one electron to another, which translates to the photobiological and biochemical phenomena in living organisms.

Using light - a stream of photons - for treatment purposes has been known since medieval times. A spectacular example is the use of arch lamp light to treat incurable skin tuberculosis by Finsen, who received the Nobel Prize in 1903 for his invention.

The first laser, which was created by Maiman at Hughes Research Aircraft Laboratory in Malibu (USA) in 1960, fascinated the world of science and medicine with the opportunities it offers. Lasers, which are devices emitting a stream of cohesive light of the same wave length (monochromatic), are amazing devices. A stream of light of high energy (quantum) can cut metal, act as a scalpel during surgeries or coagulate exfoliated retina with just one impulse.

Laser radiation of as low intensity as a few milliwatts, causing no tissue destruction, has even more interesting biological features. It can make cells more active, resulting in faster healing of resistant wounds and ulcerations. It also speeds up delayed bone adhesions, regenerates damaged tissue, stimulates angiogenesis and active points as well as influences immunological processes. Clinical observations and experiments carried out so far suggest that low-intensity laser irradiation positively affects living organisms - their cells, tissue and the whole body. The effect varies depending on the wave length, dose, time of irradiation, impulse shape and the technique applied.

In order to understand the term quantum medicine some basic general truths must be taken into consideration. A living organism consists of elementary molecules - atomic nuclei and electrons. There is a relatively vast space between them. If a nucleus had a tennis ball size, the nearest electron would go around it in about three-kilometer distance. There is an apparently empty space between them filled with electromagnetic fields. Thus, the phenomena described as health and illness are based to a large extent on quantum energy transmission processes within this space.

What is known and understood from the medical point of view as the effect of enzymes, hormones, patho- and physiological processes and the lately discovered genetic code is a function of field energetic changes. It also seems that our psyche's reaction onto the energy accumulated in the empty space between the nucleus and electron affects physiological processes within an organism [10, 12, 19]. It has often been said in scientific circles that there is an urgent need to change the paradigm now based on mass and biochemical processes, to one based on energy and field phenomena. It turns out that the fundamental biomedical processes can be fully comprehended when the laws of quantum physics are taken into consideration [1, 2, 6, 10, 19]. If this issue is considered from the perspective of evolution, then organisms can be influenced by a much wider energy spectrum that

has been assumed [4, 9, 19]. Quanta, understood as energies of outgoing radiation or absorbed by electrons, are in most cases a decisive factor in medical actions. After all, pharmacological treatments also work via quanta.

A biological reaction of laser irradiated cells triggers off various changes. A molecular photoacceptor is made of breathing chain components in the mitochondria where electron photostimulation and biochemical changes of chromophore properties take place [11, 12]. There are various proteins and even genes that could be potential photoacceptors affecting not only biochemical changes but also the shapes of cell and tissue [1, 6]. Those initial physical and/or chemical changes stimulated by laser irradiation in photoacceptor molecules trigger off an abundance of biochemical reactions in cells, causing, in effect, a further transmission and strengthening of the signal chain. These reactions change the parameters of cell homeostasis stimulating their activity and redox regulation. This is probably the fundamental therapeutic mechanism of the laser light that produces such clinically observed results as: faster healing of resistant wounds and ulcerations, better blood flow, improved and corrected immunological and hormonal processes. Similar effects can be observed in tissue irradiated in vitro [16].

The relationships between the processes of activating and limiting cellular activities caused by laser light confirm the influence of laser irradiation on the redox activity of the respiratory chain processes in mitochondria as they are also significant in photodynamic therapy [20]. It can be stated that a thermodynamic equilibrium - an interaction involving laser light and living processes - takes place between a living object irradiated with laser light and its structures, depending on the wave length and energy dose. To give an example, irradiating plants with laser of 660 nm wave length results in growth acceleration while growth and blooming is stunted by 750 nm wave length irradiation [12].

Low-intensity lasers can be successfully applied in almost all branches of medicine where the processes of physiological mechanisms disorders, homeostasis, blood supply, immunology, degeneration, inflammation along with others take place. It is important to understand not only the mechanisms of their influence on a living organism but also the methods of application [3, 13, 15, 17].

1. *No-contact radiation* - recommended for mucosa, skin, ulcerations, bed-sores and surface inflammations.

2. *Contact radiation* - when this method is applied almost all energy is absorbed by cells in which it spreads according

to the laws of nonlinear optics due to nonhomogeneity of tissue, protein, water content and electrolytes. Irradiation affects the deeper skin layers, internal organs and excretion glands depending on the emitter's properties, wave lengths, frequency and power. Also, the application of permanent emission lasers such as He-Ne gives different results compared to semi-conductor lasers emitting pulsed radiation.

3. Contact radiation with compression resulting in tissue thinning allows a deeper penetration and dispersion of irradiation.

4. Blood irradiation is one of the most effective and universal techniques of low-intensity laser therapy. The treatment's efficiency has been confirmed by numerous clinical experiences and experiments. Side-effects or light complications concerning blood pressure do not cause serious dangers. The method is based on inserting a light tube into an elbow vein or through a catheter into a subclavian vein. Inserting a light tube into the portal circulation, which is another option, has not been clearly worked out yet. The therapeutical results that follow can eliminate, reduce or modify the need for pharmacological treatment [2, 13].

5. Body cavities irradiation- a light tube is inserted into the pleural cavity through a thoracoscope, into the abdominal cavity through a laparoscope, into joints through an arthroscope. The part of the light tube with a connecting rod at the end can be left inside for the duration of treatment, allowing regular irradiation.

6. Seldom put into practice and with a need for further scientific research, laser therapy is used for: blood radiation with reinfusion, a donor's preserved blood irradiation, auto-blood irradiation during hemosorption, and plasmatorbition and plasmapheresis. In the first two cases blood is irradiated in standard plastic containers with an anticoagulative stabilizer.

### **Concluding remarks:**

The basic feature of laser therapy entails corrective biochemical effects. Clinical experiments show that local laser therapy is most effective in tissues and organs with significant blood and lymphatic vessels. Low-energy laser therapy has a general influence on blood and its components [6, 18], and on haematopoietic organs and other diseased tissues and organs. The healing effect is most significant in pathological situations. In healthy tissues and organs this influence is subtle, and is characterized by a slight increase in metabolic processes. Clinical observations show that when local irradiation is applied, the healing

effects can be observed in other anatomically distant body parts and organs. In this way a general positive effect of local laser therapy can be visible. The healing effect of low-energy laser therapy can also change pharmacological treatment, potentiating its effect, leading to the dose reduction or its total elimination [7]. There is evidence that parenterally given medicines get more concentrated in tissues irradiated earlier. This phenomenon can be partly explained as a result of microcirculation activation at the site of irradiation. It is assumed that at those sites the medicine is more quickly absorbed by the tissue.

Some consideration should be given to whether the introduction of the new term quantum medicine explains or systematizes anything. In practice, it turns out that the electromagnetic field powers do not only connect an organism's organs and cells, but also have an influence on all life functions. Physiological processes and pathologies depend on energy phenomena taking part in the apparently empty space between an atom's nucleus and an electron. Also, matter or organic tissue are in fact a complicated mosaics and a labyrinth of energy quanta.

The conclusion is that in medical activities, in order to obtain a better healing effect, the influence of energy of a defined electromagnetic spectrum is sometimes more important than a limited action on matter or organs. The application of quantum physics to a human organism may be surprising, especially as we still lack a satisfactory research method in this area. However, it must be taken into consideration that a human organism consists of the same molecules and energy phenomena that physicists put on the laboratory dish. The medical world has only just started to recognize them.

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*From L to R, Professor Kazuhiko Atsumi, Dr. Toshio Ohshiro, Dr. Junichiro Kubota and Professor Chukuka S. Enwemeka at dinner, following three hours of Executive Business Meeting held in Tokyo, Japan, in the Fall of 2000. The meeting yielded a suggested plan for the future direction of WALT.*



*A cross-section of participants at the third Congress of WALT held at Athens, Greece, May 2000*



*Drs. Mario Trelles and A. Katsambas confer during the third WALT Congress; Athens, Greece, May 2000*

