LASER THERAPY TREATMENT TECHNIQUES
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Laser comes from the acronym for light amplification stimulated by emission of Radiation. Laser therapy receives different terms, such as therapeutic laser or photobiomodulation, due to its effects on the organism.

There are a large number of scientific articles that prove the beneficial effects of the laser therapy. Thanks to the contribution of photons to the organism, it is achieved a stimulation effect in a cellular level by chromophores, iron of the hemoglobin and copper of cytochrome c-oxidase (located in the mitochondria), by a redox reaction it creates ATP, and due to this, releases nitric oxide and reactive oxygen species. All these reactions, lead to the regeneration and healing process in different tissues, control immunological process of inflammation and decreased pain.

To achieve all this goals on different tissues, it is essential to choose properly the different parameters and know the characteristics of the laser therapy equipment. The most important parameters are wavelength, frequency versus continuous wave, and dosage.

On laser therapy, the wavelength (the unit of measurement is nm) range is between 630-1200 nm. This characteristic of a laser therapy determines its absorption properties. Some equipments have different wavelengths to enhance photobiomodulation effects.

Power (expressed in W) determinates the penetration of the energy into the tissues and the treatment time. Actually, the most used lasers are Class IIIB laser (reaches 0,5 W) and class IV laser (exceeds 0,5W).

Frequency (expressed in Hz) and continuous wave have different affinities for different tissues. This affinity depends on the optical density of the tissues. This frequency range is between 1-25.000 Hz.

Dose (J/cm²) is the amount of energy delivered to a precise area. Dosage recommended in the literature range from 1-10 J/cm². Although numerous authors, in certain chronic pathologies, recommend to increase the dose reaching up to 30 J/cm². The choice of dose depends on whether the process is acute or chronic, as well as the depth of the target tissue. Also, it is important to choose dosage, depending on the characteristics of the equipment (power, wavelengths, handpieces available), individual patient response, and their particular characteristics. In addition, to select the treatment technique used to deliver the energy is mandatory too.

In recent years, laser therapy has undergone a great growth. Actually, in veterinary medicine there are a large number of manufacurers offering laser therapy equipments. These devices have pre-established protocols, where the previously mentioned parameters are taken into consideration.

Despite all these improvements formentioned, different results can be obtained, using the same device, consequence of the individual response and treatment techniques.

TREATMENT TECHNIQUES
**Scanning mode**: a uniform movement and the speed of the handpiece is performed throughout the treatment area. This technique is chosen in high power equipments. The scanning speed depends on the parameters of the device and the heating that occurs at the surface of the body.
**Point to point mode**: the treatment area is divided into points. It is recommended in class IIIB laser and class IV laser equipment’s of lower power.
**Pressure**: in both, scanning and point to point technique, pressure can be made in the treatment area to implement penetration.
This techniques can be applied as follows:

**Contact mode:** the handpiece is in contact with the target tissue, so the scattering decreases. It is recommended in many cases, being contraindicated in acute processes and dermatology disease. The contact mode with the scanning technique creates like a massage that helps to potentiate the benefits of laser therapy.
In acute processes, it is recommended to avoid pressure and contact until the discomfort has disappeared.

**Non-contact mode:** the handpiece is no touching the patient, in this way, greater reflection is created, so photons are reflected from the surface, resulting in loss of energy and diminishing the amount of energy given. The technique is prescribed in acute processes, skin problems and intrasurgically.
It is important to mention that there are authors who recommend increasing the dosage in a range between 2-5 J/cm² when non-contact mode is used, especially in scanning mode. This scattering is different in punctual techniques.

**IMPROVEMENT OF THESE TECHNIQUES**

**Frequency of laser sessions**
In both, acute and chronic processes, a first phase is recommended, where the goal is to create the photobiomodulation effect. Being able 1-5 times per week, depending on the pathology, and process. This phase, is maintained until some improvement is observed. In chronic patients, to get this improvement more sessions are needed.
The second phase begins when this enhancement is observed, beginning to space to 1-2 times per week. In degenerative or chronic pathologies a maintenance sessions are advised, once every three or four weeks depending on the needs of the patient and the individualized response.

**How to penetrate to a depth target tissue in joints?**
In musculoskeletal disorders, to improve application, joint should be flexed. Some patients, due to present a limitation of the passive range of motion, it is not advised force such positioning.

**Handpieces**
On one hand, some devices have different handpieces to improve penetration and making scanning mode more confortable for the patient in contact mode.
On the other hand, when non-contact technique is used, some equipments have handpieces to reduce scattering caused by this mode.

**Implants**
The use of laser is indicated with the use of implants. It should be kept in mind the goals of the laser therapy. For example, after a TPLO or TTA surgery the first phase, the objective is inflammation and pain control, so it is recommended to apply on surgery side. While, after this first phase the goal is a correct ossification, so it is advised to apply to the opposite side of the implant.

**Anatomy knowledge**
It is important to treat the different anatomical structures, so it is fundamental to know the tissues involved in the target tissue.

**Consider differences according to species**

**Sports dogs**
In these patients the important goal is injury prevention, trying to avoid injuries and maintain maximum long-term performance and preparation the patient for the next competition.
REFERENCES