

## **USE OF LASERS IN VETERINARY MEDICINE: THE CARBON DIOXIDE (CO<sub>2</sub>) SURGICAL LASER AND THE CLASS IV THERAPEUTIC LASER**

**Study programme: MIMV    Curricular Year 4<sup>th</sup>, 5<sup>th</sup>    Semester 8<sup>th</sup>, 9<sup>th</sup>    Optional    ECTS: 2.5**

**Lecturers: José Sales Luís (CCP), Miguel Carreira (R)**

**1. Contact hours:** Lectures - 10; Practical – 18

**2. Objectives:**

The student must acquire knowledge about what a LASER is and the characteristics of electromagnetic radiation. This will enable them to understand how its physical properties allow it to interact with the main tissue chromophores present in the patient's body tissues, through the so-called photo-thermal interaction, which considers the phenomena of photopyrolysis, photovaporolysis, and biostimulation. They will understand how LASER interaction varies in a surgical and therapeutic context, and consequently, the results obtained.

**3. Programme:**

The theoretical program will be developed at the Faculty of Veterinary Medicine of the University of Lisbon and consists of two (2) different modules: the first module (Module I) for the surgical CO<sub>2</sub> LASER, and the second module (Module II) for the Class IV therapeutic LASER.

**MODULE I: THE CO<sub>2</sub> SURGICAL LASER**

- Brief history of LASER in surgery
- Reference to the interactions between the LASER and body tissues
- Characteristics of the surgical CO<sub>2</sub> LASER
- Safety in the use of the surgical CO<sub>2</sub> LASER
- Advantages and disadvantages of using the surgical CO<sub>2</sub> LASER
- Applications of the surgical CO<sub>2</sub> LASER - Clinical Cases with surgery in real time

**MODULE II: THE THERAPEUTIC LASER CLASS IV**

- Brief history of the therapeutic LASER
- Interactions between the LASER and body tissues
- Characteristics of the Class IV therapeutic LASER
- Applications of the Class IV therapeutic LASER - Clinical Cases with therapy session in real time

**4. Bibliography:**

- Class handouts, lecture notes, scientific and technical papers.
- Cópias dos ficheiros/diapositivos apresentados nas aulas, artigos científicos e técnicos.
- Berger, N. & Eeg, P.H. (2006) Veterinary Laser Surgery — A Practical Guide. Blackwell Publishing, Ames. Bussieres, M. et al. (2005) The use of carbon dioxide laser for the ablation of meibomian gland adenomas in dogs. J Am Anim Hosp Assoc. 41(4):227-234.
- Carreira L.Miguel, Ramalho R, Nielsen S, Azevedo P. (2017). Comparison of the Hemodynamic Response in General Anesthesia between Patients Submitted to Skin Incision with Scalpel and CO<sub>2</sub> Laser Using Dogs as an Animal Model. A Preliminary Study. ARC Journal of Anesthesiology 2,1:24-30, ISSN 2455-9792 DOI:

<http://dx.doi.org/10.20431/2455-9792.0201005>

- Carreira, L.Miguel, Azevedo, P.(2016). Comparison of the Influence of CO2-laser and Scalpel Skin Incisions on the Surgical Wound Healing Process. ARC Journal of Anesthesiology Volume 1, 3:1-8 ISSN No. 2455-9792, <http://dx.doi.org/10.20431/2455-9792.0103001>
- Godbold, Jr, J.C. (2013) Atlas of CO2 Laser Surgery CD ROM Edition. Southern Digital Publishing, Jackson.
- Godbold, Jr, J.C. (2015) Surgical Laser Basics: 5 Tips for the Novice User. Clinician's Brief. August 2015. [ONLINE] Available at: <http://www.cliniciansbrief.com/article/surgical-laser-basics-5-tips-novice-user>.
- Levi Silva, Pedro Azevedo, Rita Ramalho, Ricardo Baião, Steve Nielsen, L.Miguel Carreira. (2018). Comparative Study on the Plasmatic CRP Level Variation in Dogs Undergoing Surgery with CO2 Laser and Scalpel Blade Incisions in a Pre- and Post-Surgical Time-Point. ARC Journal of Anesthesiology 3, 4: 3-11 ISSN 2455-9792 DOI: <http://dx.doi.org/10.20431/2455-9792.0304002>
- Farivar S, Malekshahabi T, Shiari R. (2014). Biological effects of low level laser therapy. Journal of Lasers in Medical Sciences. 5(2):58–62. doi:10.22037/2010.v5i2.5540.
- Hawkins D. (2005). Low Level Laser Therapy (LLLT) as an Effective Therapeutic Modality for Delayed Wound Healing. Annals of the New York Academy of Sciences. 1056(1):486–493. doi:10.1196/annals.1352.040.
- Riegel RJ. (2017). The History of Laser Therapy In: Riegel RJ, Godbold JC, editors. Laser Therapy in Veterinary Medicine:Photobiomodulation. 1st ed. American Institute of Medical Laser Applications; p1-6.
- Peter H. Eeg, Noel A. Berger . Veterinary Laser Surgery: A Practical Guide. ISBN: 978-0-813-80678-5, Wiley-Blackwell
- Christopher J. Winkler.Laser Surgery in Veterinary Medicine. Publisher Wiley & Sons, Incorporated. 2019.
- María Suárez Redondo. VETERINARY LASER THERAPY IN SMALL ANIMAL PRACTICE. Stephens PhD SOUND Technologies, Inc. 2019.

## 5. Assessment:

The assessment of the Optional Curricular Unit will focus on the process of knowledge acquisition and will consist of an individual, in-person multiple-choice written test covering the presented pedagogical content.