26G1615 Ernesto **Invited speaker**

Low-level laser therapy in progressive-intensity running exercise in treadmill: Effects on exercise performance, oxidative stress and biochemical markers related to skeletal muscle damage

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Objective: To evaluate the effects of LLLT in skeletal muscle fatigue and exercise performance in progressive-intensity running exercise in treadmill, oxidative stress and in biochemical markers of muscle damage in humans.
Methods: A randomized double-blind placebo-controlled crossover trial was performed with 22 untrained male volunteers. LLLT was performed 10 minutes before progressive-intensity running protocol (810 nm, 200 mW, 30 J in each site, 30 seconds of irradiation in each site), employing a multi-diode cluster (with 5 diode spots - 6 J from each spot) in 12 sites of each lower limb (6 in quadriceps, 4 in hamstrings, and 2 in gastrocnemius). Subjects performed a standardized progressive running protocol in a motor-drive treadmill until exaustion. Pre-exercise and post-exercise measurements were taken of muscle damage (CK and LDH), antioxidants enzymes (SOD and CAT) and oxidative stress (Lipidic Peroxidation and Carbonylated Proteins). Exercise performance ($VO_{2\,max}$, time to exaustion) was also analysed.
Results: Compared to placebo LLLT, active LLLT significantly increased exercise performance ($VO_{2\,max}$ - p=0.01, time to exaustion - p=0.04), decreased change in biochemical markers of muscle damage (CK - p=0.0004, LDH - p= 0.0002), antioxidant enzyme SOD (p=0.003) and oxidative stress (Lipidic Peroxidation - p=0.0001, Carbonylated Proteins - p=0.02). However, antioxidant enzyme CAT do not changed with active LLLT (p=0.17).
Conclusion: We conclude that LLLT before progressive-intensity running exercise increase exercise performance, decrease exercise-induced muscle damage and oxidative stress. We also conclude that decreasing oxidative stress is one of mechanisms involved in effects of LLLT in delaying skeletal muscle fatigue.
Keywords: LLLT, Progressive-intensity exercise, Muscle damage, Oxidative Stress.

26G1645 Meneguzzo Abstract presentation

Title: **INFLUENCE OF LOW INTENSITY LASER THERAPY PROTOCOL ON EDEMA TREATMENT AND PREVENTION**

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Background and objective: Low intensity laser therapy (LILT) has been demonstrated to reduce rat paw edema and leukocyte migration similarly to sodium diclofenac. Previous studies showed that the moment and local of irradiation also influence the edema prevention. This study evaluated the relation between energy and power density and compared the best irradiation moment and local of irradiation in different mouse strain.
Methods: The carrageenan (CA) acute inflammatory model was performed by a sub-plantar injection of 0,5mg/paw of CA in 100 male mice (BALB-c and C57BL/6) and the paw volume was measured using a plethysmometer before and 1 to 6h after CA. The LILT treatment was performed by a 810nm laser device, spot area of 0,028cm^2, varying the local (paw, inguinal lymph nodes (LN), and both), moment of irradiation (before, during and after edema evolution), energy (1 and 3 Joules) and power density (1, 2.1 and 3.5W/cm^2).
Results: The edema reduction was achieved with 1J and 3.5W/cm^2, and by 3 Joules with all power densities tested. The preventive irradiation on LN was the best laser treatment on both mouse strain (BALB-c and C57BL/6). The paw irradiation during the edema evolution and the LN irradiation after edema evolution on BALB-c also showed to be effective on edema treatment.
Conclusion: 810nm LILT was effective on edema prevention and treatment on a protocol dependent manner, being energy, local end moment of irradiation important parameters to be considered during laser therapy.

26G1700 Hans Romberg

Abstract presentation

Title: **Which properties are important for a phototherapy device, either to buy it or to perform scientific studies: power? Power density? Beam properties? Coherence? Wavelength?**
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Background and objective: Not only users, but often enough even producers of phototherapy devices do not know the basic properties of their devices. A physicists approach to the important properties to obtain medical or scientific results is presented.
Methods: The physical properties of laser and LED light is looked at from light production, via penetration into tissue, to absorption.
Results: Depending on the medical aim, different devices appear favorable. For scientific studies, the homogeneity is crucial, but poorly realized in nearly all devices. It is speculated on the effect of coherence inside the body, leading to locally inhomogeneous intensities.
Conclusion: For low level phototherapy devices to show strong effects, strong amplification inside the body's regulatory system is needed. These devices may thus be looked at as stimulating devices. Stimulation strength might be defined by comparison to regular target surrounding, thus allowing for a broad variety of optimal treatment parameter.

(Purple) Dentistry

26P0915 Fontana Lopes

Abstract presentation

Title: **Lasertherapy as a Prevention of Oral Mucositis in Pediatrics Patients undergoing Hematopoietic Stem Cell Transplantation (HSCT) – Preliminary Results**
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Background and objective: Mucositis is associated with fever, appetite and weight lost as well as needed of parenteral nutrition, possibility raise of systemic infections with longer hospital stays. Generally, the incidence of oral mucositis in patients subjected to HSCT is 76-89%. It is higher in