25G1730 Smit

Title: **Influence of variation in melanin content on absorbance spectra of liquid skin phantoms**
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Background and objective: Non-invasive laser-light treatment of skin disorders requires accurate skin optical property information; including the effect epidermal melanin has on the planning of skin tumour treatment parameters. Computational light propagation models can aid this process, but their accuracy depends on a thorough knowledge of cell tissue optical properties for different skin types. However, access to samples of all skin types is often limited and skin-like phantoms are used instead. The objectives of this study are to (a) compare liquid skin-like phantoms representing Skin Types I to VI experimentally and computationally and (b) determine how well these phantoms can predict wavelength dependent trends observed in real human skin.
Methods: Melanin samples at increasing concentrations were prepared from a pH ~ 7 melanin aqueous stock solution. Skin-like phantoms were prepared by addition of either Pheroid™ or Intralipid (20% fat emulsion). UV-VIS transmittance spectra of the samples were measured over the wavelength range 370 to 900 nm and compared to simulated results using the same optical parameters.
Results: Melanin only samples displayed broadband absorbance. Skin-like phantoms followed similar non-monotonic absorbance trends towards UV wavelengths, albeit at longer wavelengths than observed in real human skin. High and low concentration melanin samples interacted differently with the Pheroid™ and Intralipid respectively.
Conclusions: Comparison between experimental and computational results suggests that the phantoms may be able to represent optical characteristics of real skin. However, to verify how well these phantoms represent real skin, a comparison with skin biopsies needs to be made.

(Purple) Dentistry

25P1700 Baptista

Abstract presentation

Title: **The use of high and low power laser on oral pediatrics surgery. Case report**
Author(s): Alessandra Baptista[1], Silvia Cristina Nuñez[1], Martha Simões Ribeiro[1]
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Background and objective: Dental lasers contribute significantly to the field of pediatric dentistry, providing a valuable resource for clinicians who perform different types of pediatric procedures, mainly during surgical events. An increasing number of general dentists are using the diode laser due to its characteristics as lower cost compared to traditional high power lasers as CO2 and erbium lasers. This case report presents successful cases of maxillary labial frenectomy in pediatric patients associating high and low power laser.
Methods: A continuous high power laser (λ=830nm) with output power of 1.2W combined with low power laser (λ=830nm), beam diameter 0.028mm, output power 80mW and 18s per point around the surgical wound and one at the its center. After topical anesthesia, the labial frenum area was gently removed with controlled movements from mesial toward distal direction and the carbonized tissue was carefully removed with wet gauze. Immediately after total fibrotic tissue removal, the area was irradiated with the low power laser. The clinical outcome was evaluated according to clinical and patient point of view.
Results: During the surgical procedure, the lack of blood, the fewer anesthesia used and the faster performance greatly increased the compliance of the therapy. The use of low power laser promotes analgesic effects and an improved healing process, meanwhile through the patient point of view the procedure was not considered traumatic neither painful.

Conclusion: Our results indicate that for pediatric patients the surgical therapy combining high and low power infrared lasers is a less traumatic and a more efficient procedure.

25P1730 Carmen Todea — Abstract presentation

Title: **Laser Doppler Flowmetry monitoring of dental pulp vitality after laser-assited pulp capping**
Author(s): Carmen Todea, Cosmin Balabuc, Mariana Miron, Laura Filip, Diana Lungeanu, Dorin Dodenciu; University of Medicine and Pharmacy of Timisoara, Romania
Background and objective: During tooth preparation or traumatic injuries, it is possible to accidentally expose the dental pulp without the involvement of microorganisms. Therefore, direct pulp capping may be indicated for maintaining pulp vitality and function.The aim of the present study is to investigate the pulpal blood flow in teeth subjected to laser-assisted pulp capping in comparison with conventional method.
Methods: This study was conducted on 30 patients receiving laser-assisted pulp capping, divided into five study groups. Teeth from laser groups underwent laser irradiation: group I Er:YAG laser (180-270 mJ); group II 980 nm diode laser (1W); group III Nd:YAG laser (1.25 W) and group IV CO2 Laser (2W). After laser treatment, in teeth from groups I, II, III and IV calcium hydroxide was applied on irradiated capping area. In group V control, only calcium hydroxide was placed. The pulp microcirculation was recorded using Laser Doppler flowmetry immediately after exposure, at 1 and 12 weeks post-treatment. The PBF recordings displayed variation of mean PU for every tested tooth after the initial laser irradiation.
Results: The collected data showed non-significant increase of dental pulp blood flow due to the heat generated by laser irradiation as compared to the control group ($P>0.005$). Moreover, after subsequent examinations, no changes in pulpal blood flow were noticed ($P>0.005$).
Conclusion: Under the study conditions, laser-assisted treatment proved to be more effective than conventional approach. The results demonstrated only small changes of microcirculation within the dental pulp after laser irradiation in pulp capping, thus leading to the qualitative assessment of the treatment outcomes.

25P1715 Sousa / Chavantes — Abstract presentation

Title: **LLLT Dosimetry Relevance: Experimental Study with Materials' Phantom.**
Author(s): Marcelo V. P. Sousa[1], Elisabeth M. Yoshimura[1], André L. O. Ramos[1], Ana C. Magalhães[1], Marcia T. Saito[1], Liliam R. Santos[2], M.Cristina Chavantes[2]. 1. Institute of Physics, University of São Paulo, São Paulo, Brazil. 2 Laser Medical Center of Heart Institute (InCor), Clinical Hospital, Medical School, Universidade de São Paulo.
Background and objective: Due to a great number of new clinical applications with Low-Level-Laser-Therapy (LLLT), the development of precise, solid, stable and low coast phantoms' skin, fat and muscle becomes extremely important, as they provide means to quantify light fluence in tissues under the skin, helping to find the best clinical dose.The aim is to get the best combination of matrix, absorber and scatters, as in a turbid medium, which simulates skin, fat and muscle tissues to build LLLT phantoms.
Methods: Matrixes of epoxy, polyester resins and paraffin were used with varied dyes' concentrations and scatters (nanoparticles-Al_2O_3) to change optical parameters. CCD camera was used to obtain transmission and scattering images of phantoms and of swine tissues illuminated by Diode laser (635 nm).
Results: The fluence of light transmitted through the sample form Gaussian shaped profiles. Light scattered at 90 degrees show an intensity profile with a steep growth followed by an exponential attenuation. The comparison of these two kinds of profiles for phantoms and swine tissue was used to evaluate the concentrations that simulate better different kinds of tissues. As nanoparticle concentration increases, transmitted intensity decreases, Gaussian width become larger and scattering peak becomes shallower. The resin with 10% concentration of Al_2O_3 simulates quite well fat tissue; the same matrix, with smaller Al_2O_3 concentration and with an absorber dye is indicated to muscle; paraffin can be used for skin simulation.