Burned skin ablation by ultrashort laser pulses

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Ultrashort laser pulses have been used in biological application introducing new diagnosis and treatment modalities. Conventional laser ablation techniques have less precision and higher collateral damage compared with ultra-short laser pulses. The interaction in ultrashort laser pulses is completely different because there is no heat transfer to surrounding matter occurs due to plasma-mediated ablation. Thus, in this mechanism the plasma expands rapidly and blows itself out and all energy deposited in the matter is removed during ablation process, yielding almost no temperature increase. The aim of this study is investigate third-degree burned skin removed at dorsum of Wistar rats using ultrashort laser pulses. In this experiment, was used a Ti:Sapphire (λ=830 nm) with mean power of 720 mW and ultrashort pulses of approximately 30 fs at 4KHz. The pulses were focused by a lens (*f* =10 cm) on dorsum resulting in 0.22 MJ/cm^2. The skin of rats were shaved with razor-blade and positioned on a translating stage (Newport Inc., model ESP300) aligned perpendicularly to the laser beam. The dorsum of animal was exposed to maximum intensities with irradiation performed in raster line, with 7.0 mm lines width and 0.1 mm separating each line. The optical focused stage and translating stage were mounted into fume hood to avoid coat interference. To evaluated skin removed depth, space between irradiated lines the quality of lesions borders, the samples were analyzed using optical coherence tomography (OCT). An OCT system using SLD with central wavelength at 930 nm and about 100 nm of bandwidth was used (Thorlabs Inc.). This system provides an axial and lateral resolution in air of 6.0 μm and can be adjusted to get up to 8 frames per second. Our images were generated with 1M pixel (2000x512) corresponding to a lateral range of 6.0 mm and axial depth of 1.5 mm. This system is provided by a fiber optical hand probe. Acknowledgement: FAPESP CEPID (05/51689-2), CAPES/Procad (0349/05-4), Rede de Nanofotônica - MCT/CNPq (555170/2005-5), FAPEAM – Programa RH-POSGRAD.