Study: A dorsal window chamber was installed surgically on adult male Golden Syrian hamsters. A subdermal microvascular network was exposed and monitored for up to 21 days after surgery. Multiple laser pulses (five laser pulses at a repetition rate of 26 Hz, radiant exposure of 3 to 4 J/cm^2 per pulse) were used to induce consistent, selective photocoagulation of targeted arteriole/venule pairs. Color and laser speckle images were taken before, immediately after and up to 21 days post laser irradiation.
Results: When a 2-mm-long segment of the targeted vessel pairs was coagulated with multiple-pulse irradiation, we observed regeneration in $>90\%$ of the experiments (>10 animals). When the entire vessel pair was coagulated with multiple-pulse irradiation, we observed regeneration in $\sim 50\%$ of the experiments (5 animals). When the entire microvascular network was coagulated with multiple-pulse irradiation, we observed no regeneration (3 animals). However, skin necrosis occurred in two of the three window chamber preparations.
Conclusion: Long-term removal of blood vessel can be achieved if a large segment of the blood vessel is coagulated with multiple-pulse irradiation. Blood vessel morphology may have prognostic value in port wine stain treatment.

21

CHARACTERIZATION OF CELLULITE MORPHOLOGY WITH REAL-TIME HIGH-FREQUENCY ULTRASOUND

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Background: This study investigated cellulite morphology with High-Frequency Ultrasound (HFUS) to establish feasibility of monitoring therapeutic interventions by using real-time HFUS with focal depth up to 30 mm.
Study: A HFUS System (Spark™, 12 and 20 MHz probes, Ardent Sound, Inc., Mesa, AZ) was applied to 70 female subjects (age 10 to 55) to demonstrate a correlation between ultrasound images and clinical manifestations of cellulite. A protocol was designed to ascertain a reproducible U/S probe positioning for investigative and monitoring purposes. U/S mapping was conducted to characterize cellulite morphology.
Results: We have demonstrated a correlation between both raised and depressed lesions and irregularities of dermal-hypodermal junction. The images demonstrated that tension applied by fibrotic connective tissue strands to the junction contribute to fat protrusions into dermis and partial damage of the junction. There is a dynamic correlation between observed patterns of connective tissue matrix (supportive sheaths/thickened strands) and observed lesions. It was feasible to identify macroscopic nodular formations with U/S and confirm by palpation. A succession of orthogonal 2D images was linked to visual landmarks on the skin to create a reproducible assessment of underlying morphology. A set of still U/S images along with real-time cine loops were generated to characterize connective tissue matrix.
Conclusion: HFUS was used to characterize subcutaneous tissue morphology associated with several clinical manifestations of cellulite. A real-time deep HFUS assessment method was suggested for targeting cellulite treatments and feasibility of monitoring.

22

SELECTIVE LIPOLYSIS BY ULTRASOUND WITH A NOVEL TECHNOLOGY: FEASIBILITY AND DOSIMETRY STUDY IN AN IN-VIVO PORCINE MODEL

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Background: External ultrasound for body reshaping is a fast growing area, with several devices under development and others already in use. We aimed at conducting an in-vivo feasibility assessment and dosimetry with a novel selective ultrasound lipolysis system (Alma Lasers Ltd. Caesarea, Israel).
Study: Crossbreed (Landers & Large white) domestic pigs were divided to groups according to post treatment harvest time: acute, 3 days, 7 days and 14 days. Each animal was marked with grids of treatment areas differ in energy level and duration of treatment. Samples were harvested and histological sections were prepared using H&E stain. Histopathological analysis of the samples was made: trends of effects for each energy level and treatment duration were characterized through the time scale described above. Data is presented as histology slides sample pictures and descriptive histology.
Results: Well noted effects were observed in the subcutaneous fat: histology slides revealed various damages both at cell and tissue level: disruption of cellular membranes, membrane shape alteration, necrotic cells and lysis areas as well as separation from the connective tissue septae. Adverse epidermal and dermal damage was seen in some of the samples. In others, an epidermal/dermal sparing effect was found. A specific parameter combination of power level and treatment duration as well as a unique frequency window enabled a highly selective damage to the adipose tissue with no epidermal and dermal damage. Histology slides showed sparing effect for structures within the fat tissue as intact blood vessels and nerves surrounded with disrupted and lysed adipocytes.
Conclusion: Non invasive selective ultrasound assisted lipolysis is feasible through use of specific parameters composition with no epidermal and dermal damage. This can be performed in a very simple procedure, high efficiency and low complications rate. This highly selective ultrasound technology might be a solution for fat remodeling and sculpturing in the human body.

23

COMPARATIVE STUDY OF WAVELENGTHS FOR LASER LIPOLYSIS

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Background: Laser lipolysis is becoming a recognized technique for fat reduction. It has been demonstrated that i) fat liquefaction is induced by a temperature elevation of the adipocyte cells, ii) fat volume reduction depends on total cumulative energy delivered at the treatment site. This study aims to evaluate the role of different wavelengths (920 nm, 980 nm, 1064 nm, 1320 nm, 1440 nm) in laser lipolysis.
Study: The optical coefficients and the total attenuation for fat tissue were determined in the 400–1500 nm window. Numerical simulations were performed to estimate the final fat reduction as a function of the wavelength.