High Frequency (20 MHz) Focused Ultrasound - A novel method for medical dermatology

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Objective: High intensity focused ultrasound (HIFU) at high frequencies is not well explored, and commercial systems with frequencies above 15 MHz for human therapy have so far not been commercially available. High frequencies however allow very small focal zones, and thereby precise confinement of lesions in e.g. the dermis layer of human skin. The objective of this work is to demonstrate a method and a new HIFU system working at 20 MHz suitable for a wide range of indications in dermatology.

Method: A new 20 MHz HIFU system has been used in the presented experiments. Tissue mimicking phantoms gel were used to verify acoustic field distribution and depth of treatments. The system was used to demonstrate the safety in a minipig animal study. Human experimental treatments were performed to investigate the efficacy of the method for Actinic Keratosis and tattoo removal.

Results: Pre-clinical, animal studies and pilot human clinical results are presented. Treatment on human skin demonstrate efficient reduction of Actinic Keratosis as well as removal of tattoos, regardless of color in a single session. The results indicate that a protocol for coverage of larger skin areas in 2 or 3 short sessions is feasible. The encouraging results demonstrate the feasibility for expanding the method to a very wide range of indications in the field of dermatology in the future.

Conclusions: High frequency HIFU has been used for research-based human treatment. A very effective method for treatment of Actinic Keratosis and tattoo removal is demonstrated. The method therefore has the potential to supplement or replace lasers and/or photodynamic therapy in both hospital and dermatology clinics.

Speaker Biography

Torsten Bove has nearly 20 years of experience in ultrasound research and manufacturing. Recently he was managing director at Meggitt A/S, a position he held for more than 10 years during a period where the company grew significantly and became one of the world's leading suppliers of piezoelectric elements for aerospace and medical devices. He holds a M.Sc. in Materials Science and has business diplomas from Copenhagen Business School and Oxford University. He is a LEAN champion, and has extensive practical experience with management in an international environment.

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