



FROM VISION TO DECISION

SEMINAR FRIDAY 25.11.11

PLACE: Aud. 2, BBB

TIME : 12:00-13:00

TITLES:

1. The physics and mechanics of sonoporation
2. Biological applications of sonoporation
3. How to obtain local drug delivery to the pancreas
4. MedIm - Norwegian Research School in Medical Imaging - a short presentasjon

SPEAKERS:

1. Researcher Spiros Kotopoulos (1)
2. Researcher Antony Delalande (2)
3. Associate professor, Georg Dimcevski, UiB (3 and 4)

ABSTRACT:

Ultrasound is very well known for its use in clinical diagnostics and non-destructive testing. For past few years its use for therapeutics has been explored. Existing approved uses include physiotherapy, surgery using high-intensity focus ultrasound and facial rejuvenation.

Our work demonstrated the manufacture of ultra-high resolution transducers capable of thermal ablation with millimetre accuracy. Such methods could be used to treat areas where invasive surgery is not possible.

During high-intensity ultrasound, gas cavities may form (acoustic cavitation), disrupting the ultrasound propagation. This can affect the efficiency of for high-intensity focused ultrasound surgery. We designed and built a tool to investigate and control cavitation to help enhance the effect of ultrasound or therapy.

In clinical-diagnostic imaging, gas microspheres (microbubbles) are used to increase the blood acoustic backscatter. These microbubbles are also acoustically active, allowing for complex acoustic interactions. We took advantage of this and showed that it is possible to precisely control and manipulate thousands of microbubbles using ultrasound in the clinical diagnostic range.

Recent research has also shown that microbubbles in the presence of ultrasound have the ability to enhance cellular drug or gene uptake. This is known as sonoporation. We investigated this phenomenon using HeLa cells and saw that there was a specific threshold where this uptake was most efficient. Using these ideal settings we showed gene transfection in to mice tendons that lasted for over 100 ays. This is also resulted in restoration of the collagen fibers.

We investigated the physical mechanism behind this increased uptake and saw that it was possible to direct a fluorescence-coated microbubble directly into cells where it subsequently dissolved.

