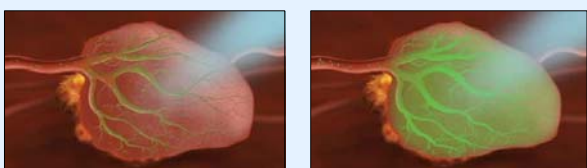




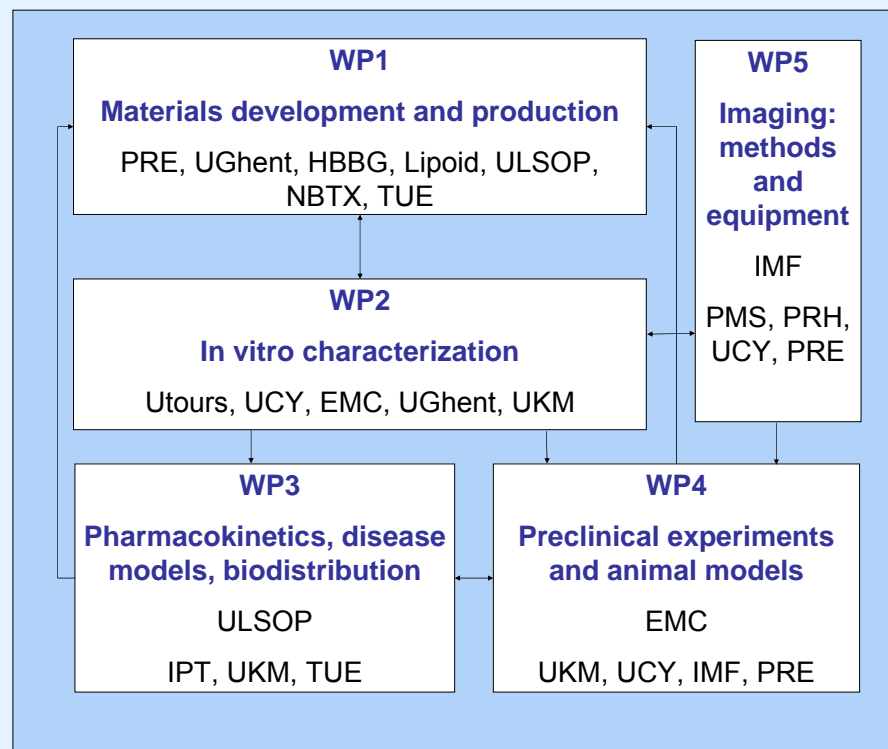
# Image-Controlled Ultrasound-Induced Drug Delivery

## Objectives

SONODRUGS addresses clinical needs by developing novel drug delivery technologies for localised treatment of cardiovascular disease and cancer. SONODRUGS develops drug delivery concepts where drug release can be triggered by focused ultrasound induced pressure or temperature stimuli within the diseased tissue. New drug loaded nanocarriers will be designed for tailored drug delivery systems that respond to either of the two stimuli. Medical imaging, i.e. magnetic resonance imaging and ultrasound imaging, will be used to guide, follow and quantify the drug delivery process. Therapy efficacy using different drug delivery systems will be assessed in vitro and subsequently in preclinical studies. Starting from research on a broad range of materials and drugs, two nanocarriers will be finally selected, optimized and produced on a pilot scale in combination with image-guided delivery tools and methods. SONODRUGS binds expertise in materials research (Philips, TUE, UGent, HBBG); material production (Nanobiotix, Lipoid); clinical knowledge in oncology (UTours, HBBG) and cardiology (UKM); in vitro and preclinical validation (UTours, EMC, UKM); research on imaging techniques (UCY, Philips, IMF); pharmacokinetics, toxicology and biodistribution (ULSOP, IPT).



## Methodology and work plan



MR-Guided HIFU

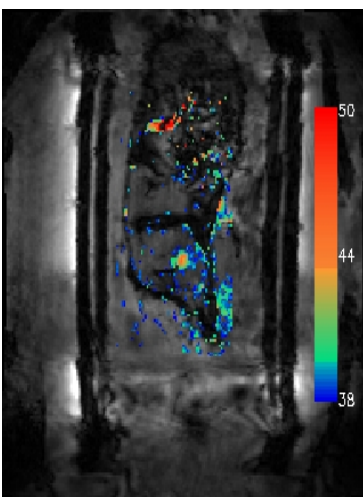
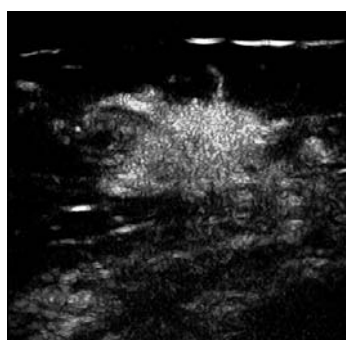
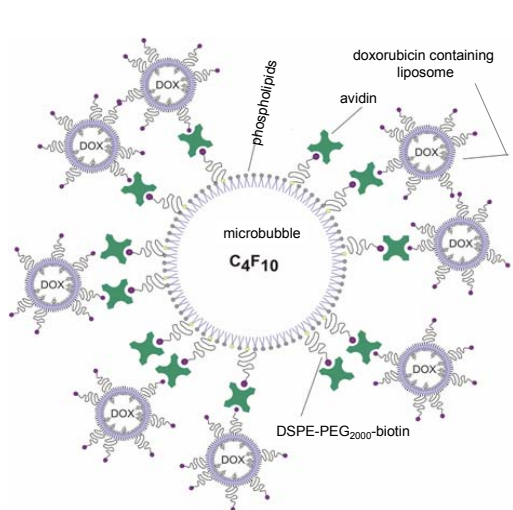


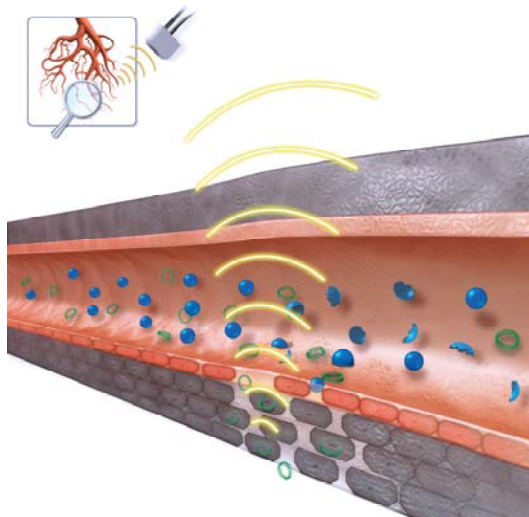
Image of a sonication in the hind leg of a rat



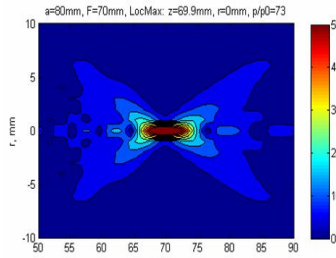
Contrast ultrasound image of breast carcinoma



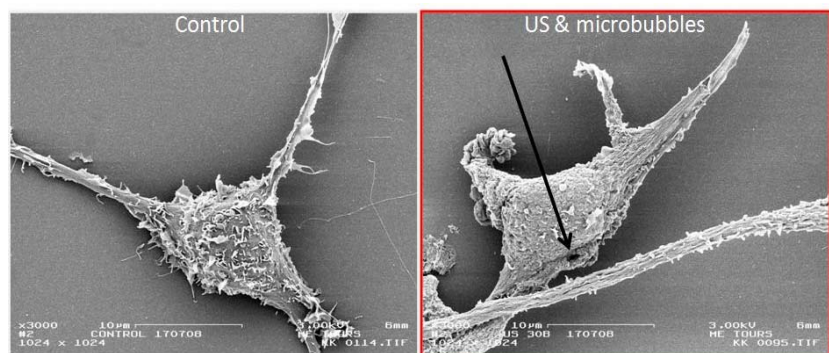
Schematic representation of an ultrasound responsive microbubble loaded with doxorubicin containing liposomes.



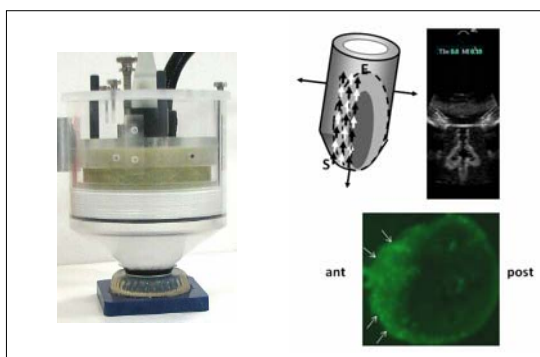
Targeted drug delivery by focused ultrasound for treatment of cardiovascular diseases.



Ultrasound field from a therapy transducer



SEM image of glioblastom cell in control (left) and after sonoporation with ultrasound and microbubbles (right)



HIFU - mediated gene delivery with fluorescence labelled pDNA (loaded on the shell of microbubbles)

## CONSORTIUM

Philips Research Eindhoven (PRE)

Philips Research Hamburg (PRH)

Philips Healthcare Helsinki (PMS)

Lipoid AG (Lipoid)

Nanobiotix SA (NBTX)

University of Cyprus (UCY)

University of Ghent (UGent)

University of Helsinki (HBBG)

University of London (ULSOP)

Eindhoven University of Technology (TUE)

University of Tours (UTours)

University Victor Segalen Bordeaux 2 (IMF)

University of Udine (IPT)

Erasmus Medical Center (EMC)

Westfälische Wilhelms University (UKM)