Abstract: **P4841**

High-resolution vascular ultrasound imaging for accurate measurement of carotid intima-media thickness

Authors:
H. Taki[1], T. Sakamoto[1], K. Taki[2], M. Yamakawa[3], T. Shiina[4], M. Kudo[2], T. Sato[1], [1]Kyoto University Graduate School of Informatics - Kyoto - Japan, [2]Shiga University of Medical Science - Otsu - Japan, [3]Kyoto University - Kyoto - Japan, [4]Kyoto University Graduate School of Medicine - Kyoto - Japan,

On behalf: Kyoto University/Canon joint research project

Topic(s):
Echo / Doppler, other

Citation:
European Heart Journal (2012) 33 (Abstract Supplement), 852

Purpose: Several clinical trials have used carotid intima-media thickness (CIMT) measured using the ultrasound B-mode image to monitor the progression of cardiovascular diseases. However, its accuracy and reliability is not enough to predict cardiovascular risk. In this study, we employ a non-invasive high-range-resolution ultrasound imaging method to improve the accuracy in ultrasound measurement of CIMT.

Methods: The imaging method used in this study is based on frequency domain interferometry (FDI), where optical coherence tomography also uses this technique in optics to acquire high quality images of the human retina. We applied the FDI imaging method to both the simulation and experimental data. The experimental data were acquired by a commercial ultrasonographic device with a 7.5 MHz linear array probe. For in vitro and in vivo experiments, we used a swine femoral artery and a living human carotid artery, respectively.

Results: The simulation study shows that CIMT value estimated using the conventional technique varies with the echo intensity returned from lumen-intima interface and that from media-adventitia interface; in contrast, the FDI imaging method succeeded to measure CIMT accurately. The FDI imaging method also depicted high-range-resolution images of a living human carotid artery in vivo and a fresh swine femoral artery in vitro, as shown in the figure. The in vitro results indicates that the FDI imaging method has the potential to estimate CIMT with an estimation error of less than 0.01 mm.

Conclusions: The simulation and in vitro results indicate that the FDI imaging method largely improves the accuracy in ultrasound measurement of CIMT. We believe that the FDI imaging method helps the appearance of a reliable indicator that predicts cardiovascular risk.

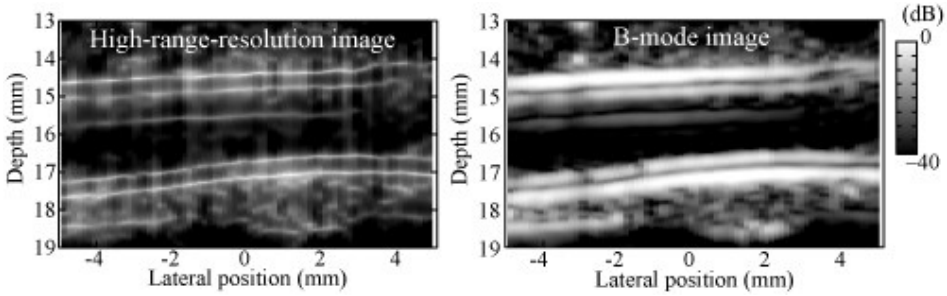

Figure 1. Ultrasound images of a swine artery.