New approaches for vascular imaging

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Technology description

A non-invasive vascular elastography (NIVE) method, a model-based approach for the computation of the biomechanical properties of the vascular tissue, an automatic intravascular ultrasound (IVUS) image segmentation method, and a Method for semi-automatic segmentation of the intima-media layers of carotid arteries in ultrasonic B-mode images

Description

The Laboratory of Biorheology and Medical Ultrasonics (LBMU) pursues researches in medical imaging and blood rheology. It has recently developed new methods to characterize the mechanical properties of vascular tissues with ultrasound elastography.A new method for automatic segmentation of the vascular wall from intravascular ultrasound (IVUS) images was developed as well as a new method for semi-automatic segmentation of the intima-media layers of carotid arteries in ultrasonic B-mode images
The NIVE method is proposed to characterize the mechanical properties of arteries. It allows the detection of atherosclerotic plaque in the vessels, the prediction of arterial rupture sites, and assits the clinician in the diagnosis and the follow-up of vascular pathologies.
The method was also adapted (microNIVE) for small superficial vessels in humans or vessels in experimental rodent animals.
The EVE method is a model-based approach for the computation of the biomechanical properties of the vascular tissue that will allow, at least, the calculation of the vessel wall elastic properties.
The automatic IVUS segmentation method allows the detection of boundaries in 3D images of any muti-layered vessels or structures.
Finally, the segmentation of the vascular wall could very well turn out to be an important pre-processing step to any ultrasonic elastography algorithm, which enables the study of deformations of a tissue under mechanical constraints.

Application area

This technology regroups three applications:
-Non-invasive vascular ultrasound elastography (NIVE);

-Non-invasive microvascular ultrasound elastography (MicroNIVE);
-Endovascular ultrasound elastography (EVE).

Institution

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