Reviewer's report

Title: Arterial Elasticity Imaging: Comparison of Finite-Element Analysis Models with High-Resolution Ultrasound Speckle Tracking

Version: 1 Date: 1 March 2010

Reviewer: Francesco Faita

Reviewer's report:

This study aimed to evaluate the effect of surrounding tissues on arterial stiffness evaluation. For this purpose, in-vivo analysis of brachial artery ultrasound images was performed. Moreover, a Finite-element Analysis (FEA) of an arterial model was presented. Authors concluded that contribution of surrounding tissues should be carefully considered when arterial compliance is evaluated. These findings are of interest for those who study mechanical properties of the vascular system. However, the manuscript suffers of some limitations (as reported in subsequent “Major Compulsory Revisions” section) and it should be considered for publication only after that major revisions will be correctly answered.

Major Compulsory Revisions:

1) In the “Background” section, several non-invasive techniques for arterial stiffness evaluation have been presented. At the present, the carotid-femoral PWV as obtained with applanation tonometry is considered the gold standard technique for arterial stiffness evaluation. For this reason, a complete discussion of this reference technique should be included together with appropriate bibliography.

2) The study population consists of only 1 subject. The authors are invited to widen their experimentation to a more suitable number of subjects. In reviewer’s opinion, 10 subjects may be reasonable.

Discretionary Revisions:

1) For FEA modelling, the stress/strain relationship was obtained empirically from samples of bovine carotid artery. On the contrary, in-vivo analysis was performed on human brachial artery. As authors known, brachial artery is a muscular vessel while carotid artery is an elastic one. The elastic and muscular components are characterized by quite different Young’s modulus. In the future, the analysis could be performed using specimen of muscular arteries instead of elastic arteries.

2) Despite the brachial artery was scanned in short axis, the displacement of the vessel was evaluate in side position, where the ultrasound beam and the border of the vessel are near parallel. This may be a problem because edges parallel to the ultrasound beam are usually imaged with lower signal-to-noise ratio. Authors should consider the opportunity of excluding side positions from measurement and/or acquiring long axis images from different projections.
**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests