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**Non-invasive vascular ultrasound elastography of carotid arteries**  
**for stroke prevention**

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Carotid plaque rupture leading to stroke involves alteration of arterial wall mechanical properties. This paper addresses reproducibility and potential clinical impact of non-invasive vascular elastography. Fifteen symptomatic and 15 asymptomatic patients with greater than 50% stenoses of their internal carotids, and 15 control subjects were scanned independently by two radiologists. Radio-frequency cine-loops were acquired on left and right common and proximal internal carotids. For control subjects, homogeneous strains with successive compression and dilatation of the vascular wall from systole to diastole and few shear patterns were observed. The axial strain did not differ between recording sites, sides and radiologists (ANOVA,  $p > 0.19$ ). For patients, heterogeneous axial strain patterns with both compression and dilatation of tissues within plaques were noted along with shear concentrations at interfaces of tissue structures. Despite similar blood pressures, larger mean instantaneous axial strains were measured in symptomatic ( $1.5 \pm 0.6$  %) versus asymptomatic ( $1.2 \pm 0.5$  %) patients in systole for common carotids (t-test,  $p < 0.02$ ). To conclude, reproducible results were obtained for control subjects and in patients, larger axial strains in common carotids may be associated with plaque rupture. This new imaging method may become a unique approach to characterize vulnerable plaques for stroke prevention.