

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Distribution of Wall Stress in Abdominal Aortic Aneurysm (AAA) JUAN LASHERAS, RUBING TANG, PIERRE BADEL, JAVIER RODRIGUEZ, CHRISTIAN GEINDREAU, University of California, San Diego — Abdominal aortic aneurysm (AAA) rupture is believed to occur when the mechanical stress acting on the wall exceeds the strength of the wall tissue. Therefore, knowledge of the AAA wall stress distribution could be useful in assessing its risk of rupture. In our research, a finite element analysis was used to determine the wall stresses both in idealized models and in a real clinical model in which the aorta was considered isotropic with nonlinear material properties and was loaded with a given pressure. In the idealized models, both maximum diameter and asymmetry were found to have substantial influence on the distribution of the wall stress. The thrombus inside the AAA was also found to help protecting the walls from high stresses. Using CT scans of the AAA, the actual geometry of the aneurysm was reconstructed and we found that wall tension increases on the flatter surface (typically corresponds to the posterior surface) and at the inflection points of the bulge. In addition to the static analysis, we also performed simulations of the effect of unsteady pressure wave propagation inside the aneurysm.

Juan Lasheras
University of California, San Diego

Date submitted: 15 Aug 2005

Electronic form version 1.4