1046-74-1314 **Janet Chen Daniel**, **Anthony Tongen**, **Paul G Warne** and **Debra Polignone Warne*** (`warneda@jmu.edu`), Department of Mathematics & Statistics, MSC 1911, James Madison University, Harrisonburg, VA 22807. *A 3-D Nonlinear Anisotropic Elastodynamic Model for Rapid Enlargement of Intracranial Saccular Aneurysms.* Preliminary report.

Cerebral aneurysms are essentially a blood-filled ballooning out of the artery wall. The major catalyst for biomechanical modeling of intracranial saccular aneurysms has been the axisymmetric membrane treatments of Humphrey et al. We expand on the foundational membrane dynamics to develop a coupled fluid-solid-fluid (blood-aneurysm-cerebrospinal fluid) model from fully 3-D nonlinear elastic equations of motion and constitutive laws, with system coupling at both inner and outer fluid-aneurysm boundaries consistent with Navier-Stokes. Fundamental focal dilatations of the arterial wall due to biological forcing are explored. We derive the 3-D elastodynamics, employ strain-energies (including anisotropic arterial wall models), and determine governing nonlinear ordinary differential equations. We solve these numerically for comparison of lesion models in rapid enlargement. We observe aneurysm cyclic stretches, thickness changes, effects of material and geometric parameters, and through-the thickness stresses. More accurate assessment of treatment risks are critical in the medical dilemma of whether to monitor the patient for lesion changes or to surgically intervene as the consequences of rupture associated with spontaneous subarachnoid hemorrhage are devastating. (Received September 15, 2008)