# Modeling, Analysis, and Computation of Nonlinear Soft Tissue Interaction with Flow Dynamics with Application to Aneurysms.

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An intracranial saccular aneurysm is a focal dilation of the arterial wall that can be found in the Circle of Willis of the brain. The aneurysm which is a soft tissue interact with blood flow as well as Cerebral Spinal Fluid. Based on the influence of various bio-mechanical factors, the growing aneurysm can potentially rupture and lead to either a neurological disorder or death. Over the last two decades, there have been Several efforts to investigate the genesis, of the disease and develop a way for prediction of rupture aneurysm thorough mathematical modeling.

In this talk, I will present three mathematical models that are developed for understanding the role of biomechanical factors influence in rupture of intracranial saccular aneurysm. These models described a coupled fluid structure interaction between blood flow and the arterial wall. The arterial wall is modeled as two layered with consideration to its complex biological structure. This include incorporating the nonlinear effects of elastin and collagen fibers, that are considered the two most important components of wall soft tissue located in the outer and middle layers of the wall. The nonlinear models are solved analytically, and numerically. Furthermore, an experiment, that has been conducted to validate the linear model of the problem, will be described and the three-dimensional simulation of the problem will be also presented.