ENGINEERING MECHANICS OF THROMBOLYSIS

**Objective:** The objective of this research is to investigate the mechanical deformation of a thrombus (blood clot), as well as analyze its detachment from the vessel walls using Fluid Structure Interaction module in 3-dimensional modeling software, COMSOL Multiphysics®.

**Background:** Blood coagulation is the regulatory mechanism for preventing excessive blood loss at the site of an injury\(^1\). However without an extensive clear out of the clot build up in the arteries, this mechanism becomes one of the leading causes of cardiovascular diseases. Blood clots that develop inside the blood vessels can cause heart attacks and strokes. Therefore, the prediction of mechanical properties of blood clots can help enhancing the fractionation of the clot tissues. Based on existing clinical procedures for thrombolyis (breaking of blood clots), are limited due to the inefficiency caused by significant risks of excessive bleeding. There is an intense need for a widespread research on the blood clot deformation modeling, which could possibly enhance the efficiency of the thrombolytic techniques\(^2\).

**Expected Results:** Since blood vessels are smaller in dimensions, the blood flow will be assumed laminar with (Re << 100). The eddy movements around the blood clot will be restricted to the smaller areas\(^3\). In order to analyze the deformation pattern of clot, different shear modulus values will be applied for the blood clot, whereas a constant value will be used for the vessel wall. The blood fluid and the clot are expected to experience the same deformation pattern. The simulation framework developed in this study will assist in increasing the efficiency of “Engineering Mechanisms of Thrombolysis”.

**References:**