Abstracts of IWANASP, September 10 – 12, 2008, Ericeira, Portugal

A MATHEMATICAL MODEL DESCRIBING THE COMBINED CHEMICAL AND MECHANICAL PROCESS OF BLOOD CLOTTING

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Blood coagulation is one of the important defense mechanisms preventing the loss of blood following a vascular injury. When the endothelium is damaged a complex physiological process called hemostasis is set into action: the blood vessel diameter is diminished slowing bleeding, blood platelets get activated and a complex sequence of chemical reactions occurs, leading to the formation of a fibrin clot (thrombus) localized at the site of vessel wall damage.
The process of platelet activation and blood coagulation is quite complex and not yet completely understood. A number of researchers have attempted to tackle this challenging problem. Recently a phenomenological comprehensive model for clot formation and lysis in flowing blood that extends existing models to integrate biochemical, physiologic and rheological factors, has been developed. The aim of this talk is to present preliminary numerical simulations for the full coupled model [1] and to derive stability results for a simplified version of this model.

REFERENCES

[1] T. Bodnár and A. Sequeira, *Numerical simulation of the coagulation dynamics of blood*, Computational and Mathematical Methods in Medicine, 9, (2), 2008, 83 – 104.