An Overview of Some Mathematical Models for Blood Coagulation

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Abstract

Blood coagulation is an extremely complex biological process in which blood forms clots (thrombus) to prevent bleeding; it is followed by their dissolution and the subsequent repair of the injured tissue. The process involves different interactions between the plasma, the vessel wall and platelets with a huge impact of the flowing blood on the thrombus growth regularisation.

Recent developments of the phenomenological cell-based models will be explained to demonstrate the current shift from the classical cascade/waterfall models and a short survey of available mathematical concepts used to describe the blood coagulation process at various spatial scales will be referred.

Moreover, recent developments and numerical simulations of a new reduced cell- based model that includes slip velocity at the vessel wall and the consequent supply of activated platelets in the clot region, will be specially addressed in this talk.

This is a joint work with Tomás Bodnár, Antonio Fasano and Jevgenija Pavlova.

Keywords: Blood; coagulation; platelet; thrombin; fibrin; thrombus; coagulation cascade; cell-based model.

References

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