



EINLADUNG

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ZIH-Kolloquium

Titel: Some problems in the mathematical modelling of blood coagulation

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Abstract:

Blood coagulation is a robust security mechanism of human organisms, which prevents bleeding from minor injuries to occur. Any disruption in such system may have significant consequences. For instance, an impaired ability of blood to coagulate is cause of haemophilia, a serious hereditary disorder. On the other hand, an inordinate increase in the activation of the blood coagulation system may lead to abnormal thrombi formation, and consequently to a number of thrombotic pathologies.

The process of blood coagulation makes use of a complex array of interdependent, and finely tuned, biochemical reactions (the so-called biochemical cascade, (BC)), of which many details are known by now. In this lecture we shall derive a simplified mathematical model which allows us to gain insight into the early stages of thrombi formation. Such phenomena are characterized by the onset of a strong polymerization process, leading to the appearance of a microthrombi cloud (MC) that can be detected by means of ultrasound devices. We shall make use of our model to discuss issues such as the triggering of strong (thrombotic) coagulation in terms of biochemical parameters describing activation and lysis. In the case where coagulation is induced by external, pathological sources, a relation between the location of the MC and that of the activation source will be proposed. Finally, a number of problems and possible future research directions will be presented.

The work to be reported has been made in collaboration with G. Th. Guria and K. E. Zlobina, from the National Center for Hematology at Moscow, Russia.

Ort: Informatik-Neubau, Nöthnitzer Str. 46, INF 1096

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gez. Prof. Dr. Wolfgang E. Nagel