# NUMERICAL MODELING OF SHEAR- INDUCED PLATELET ACTIVATION IN HEMODIALYSIS ARTERIOVENOUS FISTULA

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Native arteriovenous fistula (AVF) is a surgically created anastomosis between the artery and vein of the patient. AVF is a prevailing type of vascular access (VA) for performing hemodialysis. The potential of using AVF as a VA is limited by high rate of thrombotic complications [1].

Thrombus formation in intensive blood flow is well-studied for large human arteries. It is established that initiation of thrombosis processes in such conditions starts from platelet activation. Also, shear stress is considered as the key hemodynamic characteristics triggering platelet activation. When the shear stress exceeds a certain critical value, intracellular processes leading to platelet activation can start inside platelets [2]. Hemodynamics in AVF is only partly consistent with hemodynamics of large arteries. In particular, flow in AVF cannot be treated as laminar what is evidenced by the presence of the sound when listening AVF with a stethoscope [1]. Taking into consideration that distribution and values of critical shear stresses are highly dependent on flow regime it is of great interest to study the effect of turbulence on platelet activation in AVF.

The purpose of this study was to investigate the influence of flow characteristics and anatomical vessel features that determine the turbulence intensity on platelet activation in radiocephalic AVF. Anastomosis angle, the degree of vessel narrowing and total flow in vein were selected as changing parameters. Numerical modeling revealed that platelet activation intensity in AVF with moderate stenosis can change several times with decreasing of anastomosis angle and total flow in the vein. The set of clinical recommendations was formulated based on the results.

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**References.**

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