Investigation of hemorheological and hematological properties of blood in stented mice

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Background or Objectives: Numerous studies suggest that red blood cells (RBCs) undergo mechanical and biochemical changes during blood passage through medical devices. Cardiovascular stenting is the conservative treatment used widely for the coronary artery disease. However, there is little information in the literature on how stenting can affect hemorheological and hematological parameters of blood. It is therefore, vital to investigate the effect of cardiovascular implants on specific hemorheological parameters that may compromise the device's functionality. **Methods:** Custom made self-expanding nitinol stents (0.7 x 3.3 mm), were implanted in the common carotid artery of male atherosclerotic ApoE−/− mice (Project license: CY/EXP/PR.L9/2019). Whole blood samples from stented and non-stented (control) mice were collected in citrate prefilled syringes using the cardiac puncture technique. For each sample, hematological analysis was performed and blood viscosity, RBC aggregation and deformability were estimated using standard techniques. **Results**: Our tests indicate that changes caused by the presence of a stent in a vessel affect some of the hemorheological and hematological characteristics of blood. More specifically, hematocrit increase and higher levels of hemoglobin, accompanied by an increase in white blood cell counts, resulted in increased viscosity in the blood samples from stented mice. **Conclusions:** Although the alterations observed in the hematological parameters, and consequently on blood rheology, may be the result of inflammation caused by the stent presence, the physiological consequences in the circulation due to the stent-induced flow changes, need to be further investigated. Cells could be subjected to repeated stresses caused by the complex local flow conditions and interactions with the protruding struts in the flow.