

PROJECT REVIEW

"Detection of Autologous Blood Transfusions by flow cytometry: a multiparametric approach"

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Blood doping is banned by the World Anti-Doping Agency in all sports due to its effects on sport performance, especially in endurance disciplines. WADA accredited laboratories have developed testing methods for the detection of blood doping by erythropoietins, synthetic hemoglobins, RSR13, and homologous blood transfusions, while no direct, internationally recognized method is yet available for the detection of autologous blood transfusions. We propose a flow cytometric approach based on the recognitions of markers of storage in red blood cells. More specifically, markers of apoptosis (namely, phosphatidylserine) and markers to detect reduction of antigen expression on red blood cells membrane (primarily among them CD55 and CD59 proteins) have already been evaluated by our laboratory as potential diagnostic parameters to detect the infusion of previously stored blood, with very promising results. Preliminary data obtained on several different blood samples, tested at different times after collection and in different storage conditions, showed that the selected parameters are significantly modified by red blood cells storage. We are planning to implement the number of markers considered for this study, possibly broadening the panel of diagnostic markers to be monitored to effectively detect the recourse to autologous blood transfusions. Once the most suitable diagnostic markers will be identified and selected, the effectiveness of the approach will be verified on subjects undergoing preoperative autologous donation in the framework of pre and post- surgery practices.

We strongly believe that the proposed approach could effectively complement the analysis presently under evaluation for the detection of autologous blood transfusions, representing a significant advancement towards the development of a robust and reliable direct method to detect autologous blood transfusion.