HÉMA-QUÉBEC

HÉMA-VİGİE…always on the lookout!

A Monthly Newsletter Summarizing Important Advances in Transfusion

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Pathogen inactivation in platelet concentrates

For the past few years, several organizations have been working on the development of technologies for inactivation of pathogens in blood components. Mohr and Redecker-Klein (Blood Center of the German Red Cross Chapters of NSTOB, Institute Springe, Springe, Germany) have published a research article presenting their results on pathogen inactivation in platelet concentrates. Briefly, their method relies on the use of a photodynamic agent, i.e., a compound capable of inactivating viral and bacterial nucleic acids upon exposure to light, coupled to a UV-B ultraviolet irradiation step. The analysis of platelet concentrates deliberately contaminated with various pathogens revealed that viruses and bacteria are variably sensitive to the inactivation procedure. Furthermore, additional tests suggest that platelet function is affected by the treatment. In short, there is room for improvement.

Mohr, H. and Redecker-Klein, A. (2003). **Inactivation of pathogens in platelet concentrates by using a two-step procedure**. Vox Sang 84 (2) : 96-104.

Ex vivo expansion of umbilical cord blood cells

The use of umbilical cord blood for hematopoietic reconstitution of cancer patients subjected to aggressive chemotherapeutic treatments is increasing steadily. An important limitation of cord blood transplantation is the small number of stem cells available in a single cord. To circumvent this drawback, a team of research clinicians from Duke University (Durham, NC, USA), led by Joanne Kurtzberg, undertook a phase 1 clinical trial to assess the safety and feasibility of *in vitro* – expanded, cord blood - derived, hematopoietic stem cell transplantation from cord blood. *in* vitro expansion with the Aastrom-Replicell culture system developed by Aastrom Biosciences resulted in modest increases in stem cell numbers. Expanded stem cell grafts were comparable to unexpanded cells, in terms of efficacy and incidence of adverse reactions.

Jaroscak, J., et al. (2003). **Augmentation of umbilical cord blood (UCB) transplantation with ex vivo-expanded UCB cells: results of a phase 1 trial using the AastromReplicell System**. Blood 101 (12) : 5061-5067.

An efficient microfluidic device for pathogen detection and screening by nucleic acid – based testing

The advent of nucleic acid testing, and its application to transfusion-transmitted virus screening, have enhanced transfusion safety. The *in vitro* amplification reaction that is central to nucleic acid tests takes a few hours; such a lengthy process constitutes an important logistical and technical bottleneck. A consortium of engineers from Greece and Canada (Micralyne Inc., and University of Alberta, Edmonton, Alberta, Canada), under the supervision of Theodore K. Christopoulos (University of Patras, Patras, Greece) has worked on designing a microfluidic device specially adapted for rapid nucleic acid amplification. Owing to the use of micro-volumes of samples, permitting rapid thermal exchanges, the device allowed to reduce reaction times from three hours to six minutes. Such technologies will likely exert a significant impact in the field of high-throughput screening.

Obeid, P. J., et al. (2003). **Microfabricated device for DNA and RNA amplification by continuous-flow polymerase chain reaction and reverse transcription-polymerase chain reaction with cycle number selection**. Anal Chem 75 (2) : 288-295.

Immunomodulatory effects of blood platelets

The primary function of blood platelets is to maintain hemostasis, which designates an array of physiological mechanisms that come into play when a blood vessel is wounded. The results of Timothy L. Ratiff's team, from the University of Iowa (Iowa City, IA, USA), suggest that platelets would also play a role in acquired immune defense mechanisms, by stimulating B and T lymphocytes involved in antigen-specific immune responses.

Elzey, B. D., Tian, J., et al. (2003). **Platelet-mediated modulation of adaptive immunity: A communication link between innate and adaptive immune compartments**. Immunity 19 (9) : 9-19.

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