HÉMA-QUÉBEC

HÉMA-VİGİE…always on the lookout!

A Monthly Newsletter Summarizing Important Advances in Transfusion

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in vitro derivation of blood platelets from embryonic stem cells

Blood product suppliers are continuously monitoring advances in the field of stem cell biology, owing to the fact that this research could eventually lead to the *in vitro* production of blood components. In this regard, a recent article from Tetsuro-Takahiro Fujimoto (Hiroshima University, Hiroshima, Japan) report on the *in vitro* derivation of platelets from murine embryonic stem cells. This work constitutes a proof-of-principle of the laboratory production of a blood component.

Fujimoto, T. T., et al. (2003). **Production of functional platelets by differentiated embryonic stem (ES) cells in vitro**. Blood 102 : 4044-4051.

Stimulation of the expansion of hematopoietic stem cells by HOXB4

Two teams of scientists recently reported experimental results describing the effect of the HOXB4 protein on hematopoietic stem cells, which are the precursors of all blood cell types. HOXB4 stimulates proliferation while simultaneously inhibiting differentiation of target cells. This work is an additional step in the design of strategies aimed at the *in vitro* derivation of blood components.

Krosl, J., et al. (Université de Montréal) (2003). ***In vitro* expansion of hematopoietic stem cells by recombinant TAT-HOXB4 protein**. Nat Med 9 : 1428-1432.

Amsellem, S., et al. (Institut Cochin, Paris, France) (2003). ***Ex vivo* expansion of human hematopoietic stem cells by direct delivery of the HOXB4 homeoprotein**. Nat Med 9 :1423-1427.

Prion diseases: are nucleic acids contributing to infectivity?

According to the most accepted paradigm, prion diseases, such as mad-cow disease, and its human form, variant Creutzfeld-Jakob disease, are caused by the accumulation of aberrant forms of the prion protein (PrP^{Sc}) in the central nervous system. Besides PrP^{Sc}, some evidence suggests that the infectious agent is composed of additional, yet ill-defined components. The results of Deleault and coworkers (Dartmouth Medical School, Hanover, NH, USA) suggest that RNA, a biological molecule highly homologous to DNA, could be involved in prion infectivity.

Deleault, N. R., et al. (2003). **RNA molecules stimulate prion protein conversion**. Nature 425 : 717-720.

A simple method allowing storage of platelets in the cold

The current requirement for room temperature storage of platelets, coupled to their shelf life limited to five days, are major constraints for inventory management and supply of this important blood component. Storage of platelets in the cold (4°C) could lengthen shelf life while reducing the risk of bacterial contamination. Research work from Hoffmeister's team (Harvard Medical School, Boston, MA, USA) suggest that by modifying the composition of sugar molecules found on the surface of platelets, one can store them in the cold without adversely affecting their *in vivo* activity and survival after transfusion. The technology appears relatively simple and reasonably inexpensive. Future advances in this field could lead to major impacts on inventory management of this labile blood component.

Hoffmeister, K. M., et al. (2003). **Glycosylation restores survival of chilled blood platelets**. Science 301 : 1531-1534.

A clinical trial evaluating platelets subjected to a pathogen inactivation treatment

A technology developed by Cerus Corp. (Concord, CA, USA) aimed at inactivating pathogens potentially present in blood components was tested on platelets transfused to thrombocytopenic (platelet deficit) patients. In general, the *in vivo* activity of platelets subjected to the pathogen inactivation treatment was found similar to that of untreated platelets. Although the technology is expensive, it nevertheless deserves that we keep an eye on future developments.

van Rhenen, D., et al. (2003). **Transfusion of pooled buffy coat platelet components prepared with photochemical pathogen inactivation treatment: the euroSPRITE trial**. Blood 101 : 2426-2433.