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EDITORIAL

Predonation of autologous blood is jeopardized by new regulations

At the annual meeting of the Network for Advancement of Transfusion Alternatives (NATA) in Berlin in April 2001, a project was presented that is of concern to European anaesthesiology departments employing autologous blood predeposits. It is a call to participate in a controlled double-blind randomized multicentre trial addressing the question of how to store autologous blood.

Among blood conservation strategies, predonation of autologous blood is probably the most effective. However, it is expensive, requires time and organization, such as scheduling and interdepartmental co-operation. Although the controversy about the cost effectiveness of autologous blood transfusion is not definitely settled [1], the benefit of autologous transfusion, i.e. no transfusion transmitted diseases [2], a decreased cancer recurrence rate [3], and a decreased rate of postoperative infections [4] probably outweighs its cost in most settings. Low production cost, however, is essential for cost effectiveness [5].

Recently, German authorities included leukocyte reduction or depletion of autologous blood into the new transfusion guidelines [6]. An autologous predeposit is required to be stored as leukocyte depleted whole blood, or as buffy coat poor packed red cells and fresh frozen plasma. Similar regulations have been introduced in Austria. The new regulations simply transfer standards of allogenic transfusion to autologous predeposit. They are not based on evidence derived from the autologous setting. Most of the proven or suspected advantages of leukocyte reduction or depletion (Table 1) do not apply to autologous blood. For the majority of autologous donors no fresh frozen plasma is required during surgery or during the recovery period. The longer permissible storage period of autologous packed red cells with additive solutions does not reduce the allogenic transfusion rate in hip arthroplasty when compared with whole blood [7]. A meta-analysis comparing storage of blood as buffy coat poor packed red cells and as whole blood demonstrated little difference in terms of quality at the end of the permissible storage period; in particular, no difference in the 24-h survival rate of the erythrocytes [8]. Leukocytes and platelets release biologically active substances and activate complement during storage. Immunomodulators such as tumour necrosis factor alpha, interleukins, and complement 3a are increased in stored whole blood. If the product is retransfused to healthy volunteers, moderate and transient immunomodulation occurs, including increased cell counts of neutrophils, elevated plasma concentrations of IL-6 and C3a, and increased phagocytosis activity of monocytes and neutrophils. Transfusion of autologous packed red cells and fresh frozen plasma is not associated with similar change [9]. No such difference in immunological parameters can be demonstrated in the context of immunomodulation by anaesthesia and trauma in patients undergoing hip arthroplasty [10,11]. The effect on outcome parameters (e.g. rate of infection) of the transfusion recipient is not known.

Therefore, the evidence behind the new regulations has not been proven. The risk is high that the new transfusion guidelines will change transfusion practice without an improvement of quality and that they may jeopardize the predonation of autologous blood. Their economic consequences are: leukocyte depletion will increase the cost at least by half, and the production of components will double the cost compared with unprocessed whole blood. In addition, the staff and equipment required for processing will make it difficult for community hospitals to support donation programs and render this service at a local level. However, the transfer to blood banks may

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Table 1. Benefit of leukocyte reduction/depletion prior to storage

	Leukocyte reduction (removal of the buffy coat)	Leukocyte depletion (inline-filtration)
Reduction of	platelets by 90% leukocytes by 80–90% [12]	leukocytes by 99.99%
Proven advantages	• Prolonged storage period of red cells • Conserved coagulation factors in fresh frozen plasma • Reduced frequency of nonhaemolytic transfusion reactions* • Reduced HLA alloimmunisation*	• Reduced transmission of CMV, EBV, HTLV* • Reduced frequency of TRALI • Reduced frequency of graft vs. host disease*
Suspected advantages		• Reduced TRIM – by biologically active substances – by donor leukocytes* • Reduced transmission of other leukotrope viruses* • (Theoretically) reduced transmission of Creutzfeld-Jakob disease*

*Only relevant in allogenic transfusion.
HLA: Histocompatibility antigene; EBV: Ebstein Barr virus; HTLV: Human T-cell leukemia virus; TRALI: Transfusion associated lung injury; TRIM: Transfusion induced immunomodulation.

restrict predonation to the minor proportion of the autologous donor collective – younger persons without serious diseases. An increasing allogenic transfusion rate may even produce or aggravate a shortage of allogenic donor blood.

Hence the introduction of leukocyte reduction for autologous transfusion should be evidence-based. To this end, the presented multicentre study (http://www.ma.uni-heidelberg.de/Institute/anae/forscher/transfus/store.htm) addresses the required fact – the outcome of autologous transfusion recipients. Autologous predeposit for patients scheduled for hip arthroplasty will at random be stored either as whole blood, or as leukocyte-depleted whole blood. Wound infection (classified with the ASEPSIS index), urinary tract infection, pneumonia and septicaemia will be evaluated on a daily basis. Study endpoints will be rate of infection, antibiotic treatment, length of hospital stay and allogenic transfusion rate. To reach a statistical power of 80% ($P \leq 0.05$) we estimate that 1400 patients have to be enrolled, requiring at least 10 centres to complete the investigation within a reasonable time. Every concerned anaesthesiology department in Europe is invited to participate.

In conclusion, whereas there is ample evidence that leukocyte depletion of allogeneic blood will benefit the patient, there is no such evidence regarding autologous predeposit. On the contrary, extension of leukocyte reduction and leukocyte depletion to autologous blood may endanger the cost effectiveness and existence of donation programs and, unless proven to be of benefit, may reduce rather than increase the quality of transfusion medicine. The proposed study on storage of autologous blood is needed urgently.

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