CONTROVERSIES IN TRANSFUSION MEDICINE

3 common questions are addressed

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Transfusion of blood and blood components is a critical therapeutic tool for patients who are bleeding or have impaired blood production. Advances in immunohematology testing, early detection of transfusion transmitted infectious diseases and better understanding of transfusion reactions have permitted the development of testing strategies and the design of clinical practices that have made the use of blood products extremely safe. Nonetheless, there are still some controversies that arise at the time of deciding when to transfuse or what type of blood products to transfuse.

▶ Is fresh blood better than old blood?
This is a question to which multiple efforts have been and continue to be invested to provide an answer. Some retrospective trials suggested that transfusing older red blood cells were associated with poor outcomes. Retrospective studies have several limitations and their conclusions should be taken with caution due to the possibility of confounding factors, and randomized controlled trials should be pursued whenever possible.

In this regard, a prospective randomized controlled study recently presented at the AABB2014 annual meeting, looking at more than 1,000 patients undergoing cardiac surgery at 33 centers, demonstrated there were no differences in outcomes when compared using fresh blood (<10 days) vs. old blood (>21 days). Overall, based on published literature, we can conclude that transfusing fresh blood is not superior to older blood.

Still, whether this conclusion applies to all populations remains unanswered. Additionally, current research is focused in understanding the processes involved in cell damage during storage and how cell damage can affect recipient outcomes. Ultimately, a better question to ask is not whether fresh blood is better than old blood, but rather, how storage lesion affects transfusion outcomes.

▶ What is the right combination of blood products to transfuse during bleeding emergencies?
Massive bleeding emergencies are not very frequent, but when these emergencies happen, the clinical service and the laboratory need to be ready to provide large amounts of blood products very rapidly. For this purpose, many institutions have developed a massive transfusion protocol which involves having a single order that includes a predefined combination of red blood cells, plasma, platelets and cryoprecipitate. The number of units and type of products included in this protocol varies among institutions. Most of the data supporting the use of a balanced transfusion strategy comes from retrospective studies, and this data suggest that early plasma administration and following a red blood cell/plasma 1:1 ratio provide better outcomes compared to situations when ratios were higher.

A recent study, the PROPPR study, was a randomized controlled trial that enrolled more than 600 patients in trauma setting to receive either plasma/platelets/red blood cells in a 1:1:1 or a 1:1:2 ratio. Final results of the study are pending. While these results are available, it is recommended to provide with transfusion support following a red blood cell/plasma 1:1 ratio. Whether the 1:1 ratio applies to all massive bleeding, or the ratio can be customized to the spe-
specific clinical circumstances (i.e., DIC, severe thrombocytopenia, oral anticoagulation) remain unanswered. Additionally, the role of prothrombin complex concentrates in MTP and how these products will change the ratio are still uncertain.

- **Is it safe to provide Rh positive apheresis platelets to Rh negative patients?**

Anti-D has been associated with hemolytic disease of the fetus and the newborn, so avoiding D antigen exposure to childbearing age women is critical. Administration of IgG Anti-D immunoglobulin is an effective method to prevent sensitization when an Rh negative patient has been exposed to Rh positive blood. Anti-D administration is recommended for patients that have been exposed to small amount of incompatible red blood cells, such as during pregnancy or delivery, or after a transfusion of a unit of platelets. With improving technologies in apheresis blood collections, it is now possible to collect platelets with very low content of red blood cells. The question arises on whether this small volume of red blood cells can still precipitate an immune response, and whether IgG Anti-D administration is indicated. A recent published study looking at a 3-year period at 11 centers found that only 1.44 percent of Rh negative patients developed anti-D after receiving D positive platelet transfusion. Despite this very low incidence, for now it is recommended to continue the administration of IgG Anti-D for females in childbearing age receiving Rh incompatible platelets, and remains controversial the indication in males or females out of childbearing age.

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**References**

2. Steiner ME, Triulzi DJ, Assmann SF et al. Randomized trial results: Red cell storage is not associated with a significant difference in multiorgan-dysfunction score or mortality in transfused cardiac patients. *Transfusion* 2014;Vol 54 Supplement.