EDUCATIONAL COMMENTARY – THE IMMEDIATE SPIN CROSSMATCH

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LEARNING OBJECTIVES

On completion of this exercise, the participant should be able to

- describe the intent of the immediate spin crossmatch.
- identify acceptable criteria to perform an immediate spin crossmatch.
- recognize the causes of an incompatible immediate spin crossmatch.

Introduction

Except in an emergency, a crossmatch test must be performed on all patients receiving red blood cells (RBCs). Historically, the crossmatch of choice for all recipients was the antiglobulin crossmatch, because of its ability to detect immunoglobulin (Ig) G and complement antibodies. It is now an acceptable practice to omit the antiglobulin phase if no history of clinically significant antibodies exists and the current testing detects no such antibodies.

The practice of excluding the antiglobulin crossmatch began around 1977, when Boral and Henry concluded that relying on the ABO group, Rh type, and antibody screen would be 99.9% effective in preventing the transfusion of incompatible blood. The 11th edition of the AABB Standards for Blood Banks and Transfusion Services, published in 1984, stated that the antiglobulin phase could be omitted from the crossmatch. In 1986, Garratty determined that omitting the antiglobulin crossmatch when the antibody screen is negative results in a 0.005% possibility that a clinically significant antibody will be missed. More recently, in the 15th edition of the AABB Standards published in 1993, the electronic or computer crossmatch replaced the immediate spin crossmatch, provided that specific pretransfusion guidelines were met. Of the 3410 laboratories that responded to a 2010 College of American Pathologists (CAP) survey, 16.5% performed the electronic crossmatch as compared to 2.5% in 2005.

While the use of the electronic crossmatch is increasing, the immediate spin crossmatch continues to be widely used and is a necessary backup method to the electronic crossmatch. The immediate spin crossmatch can be used to detect an ABO incompatibility between the recipient and donor and is an alternative method of crossmatching when electronic crossmatching is unavailable. Clearly defined institution-dependent policies that include criteria and eligibility requirements for omitting the antiglobulin phase should be implemented.
Specimen Requirements

Proper specimen collection and patient identification is key to ensuring that compatible blood products are transfused. Specimens must be labeled at the time of collection and include, at a minimum, patient identifiers and a mechanism to identify the date of collection and the phlebotomist. Historical records should be compared with current results as a safety measure to identify mislabeling or a previous antibody that has fallen below the limit of detection. If no historical records are available, the transfusion service should be aware of the possibility of an incorrect blood type and, consequently, a hemolytic transfusion reaction. Some facilities choose to collect an additional specimen for an ABO group and Rh type for the purpose of verifying the patient’s identity.

Pretransfusion Testing

The required testing preceding an immediate spin crossmatch includes ABO group, Rh type, and antibody detection. If the recipient has been pregnant or received a transfusion within the past three months, or if the history is uncertain, AABB and CAP require that the recipient’s plasma or serum be tested for alloantibodies within three days before crossmatching (Table 1).

Table 1. Pretransfusion Testing Criteria

- Current sample for crossmatching within three days (if pregnant or received transfusion within last three months, or unknown)
- ABO group and Rh type performed on recipient specimen
- No history of clinically significant alloantibodies and current antibody screen is negative

Once this testing is complete, the recipient is eligible for an immediate spin crossmatch, provided that the result of the current antibody screen is negative and there is no history of clinically significant antibodies. Before performing the crossmatch, the donor ABO group and the Rh type of Rh-negative units must be confirmed by the transfusing facility. The donor segment used for the immediate spin crossmatch must be from the tubing attached to the blood container and should be suspended in saline to make a 2% to 5% RBC suspension. Saline should be used to make the suspension as to avoid prozone and postzone effects. It is also a good practice to wash the cells before testing to remove unwanted fibrin clots or agglutinins that may interfere with testing. Proper test tube labeling is imperative, especially when multiple donors are being crossmatched at the same time. The immediate spin crossmatch is performed by adding patient plasma or serum to donor RBCs, centrifuging immediately, and observing for hemolysis and/or agglutination. If no hemolysis or agglutination is seen, this indicates a compatible crossmatch, and the unit may be transfused. As with all crossmatch methods, the immediate spin crossmatch will not predict normal in vivo RBC survival, prevent alloimmunization of the recipient, prevent delayed hemolysis,
detect Rh incompatibility in the absence of anti-D, detect all ABO and Rh errors in donor or recipient, or predict all types of transfusion reactions, such as cytokine and febrile.

When performing immediate spin crossmatches, it is important to bear in mind that false reactions do occur. Cold antibodies (such as anti-M and anti-I), contaminants in the test system, and rouleaux are some causes of positive reactions. False-negative reactions may occur if the test is not performed correctly or if it is performed using infant specimens or RBCs suspended in plasma. Immediate spin crossmatches do not detect all ABO incompatibilities. The literature states that between 17% and 49% of crossmatches between group A_{2}B donors and group B recipients are negative. An incompatible immediate spin crossmatch should be investigated, and additional testing should be performed (Table 2).

<table>
<thead>
<tr>
<th>Causes of an Incompatible Immediate Spin Crossmatch</th>
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<tr>
<td>• Donor RBCs are ABO incompatible</td>
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<tr>
<td>• Donor RBCs are polyagglutinable</td>
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<td>• Anti-A1 in the serum/plasma of an A_{2} or A_{2}B patient</td>
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<td>• Alloantibodies reactive at room temperature</td>
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<td>• Rouleaux</td>
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<td>• Cold autoantibodies</td>
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<tr>
<td>• Passively acquired anti-A or anti-B</td>
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### Advantages and Disadvantages

Omitting the antiglobulin phase of the crossmatch and using the immediate spin phase alone reduces the amount of technologist time, the time to get compatible blood, and the amount of reagents needed. The immediate spin crossmatch can also detect newly forming antibodies not detected otherwise. For transfusion services that have implemented electronic crossmatching, the immediate spin crossmatch serves as a backup method when computer functions are unavailable. Also, if a patient does not meet the requirements for an electronic crossmatch, but does not have clinically significant antibodies, an immediate spin crossmatch can easily be performed. Some notable disadvantages to using the immediate spin crossmatch are the potential to unintentionally detect clinically insignificant cold-reacting antibodies and to not detect all ABO incompatibilities.

### Summary

In a patient with no clinically significant antibodies, the immediate spin crossmatch is an acceptable abbreviated crossmatch to detect an ABO incompatibility between recipient and donor. Omitting the antiglobulin phase of the crossmatch has proved to be safe and efficient. With transfusion services increasingly implementing electronic crossmatches, the immediate spin crossmatch remains necessary.
when computer functions are unavailable or the recipient is otherwise ineligible for a computer crossmatch. Standard operating procedures should clearly identify recipients who are eligible for an immediate spin crossmatch.

**Suggested Reading**


