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Resolution of ABO Discrepancies for A Subgroups and Patients with Anti-A1- Blood Bank

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

This document will provide policies and procedures for resolving ABO discrepancies caused by A subgroups or anti-A_1.

II. INTRODUCTION:

A. ABO subgroups are phenotypes that differ in the amount of A and B antigen carried on the red cells and present in secretions.

B. ABO subgroups can result in irregularities or discrepancies observed during ABO typing of a red blood cell donor unit or a patient sample.

C. Subgroups that leads to reduced expression of A antigen, such the A_2 subgroup, may result in a weaker forward reaction during typing.

III. CLINICAL SIGNIFICANCE:

A. ABO discrepancies of A subgroups may present with a mixed-field or invalid graded reaction in the forward A typing in a patient who otherwise appears to be group A or AB.

B. ABO discrepancies of patients with anti-A_1 may present with unexpected reactivity with the A_1 reverse cell in a patient who otherwise appears to be group A or AB.

C. Patients with RBCs that are A_1 positive are generally considered incapable of making anti-A_1.

IV. DEFINITIONS / ACRONYMS:

A. **ABO discrepancy**: Generic term for a variety of situations in which the interpretation of a patient or donor's ABO grouping results is unclear.

B. **ABID**: Blood Bank computer test code used to document antibody identification work-ups.

C. **Rh discrepancy**: Generic term for a variety of situations in which the interpretation of a patient or donor's Rh results are unclear.

D. **Mixed field (MF)**: Sample that contains 2 distinct populations of red cells, usually as a result of recent RBC transfusions of a dissimilar ABO or Rh type as the patient.

E. ***Dolichos biflorus* (anti-A_1 lectin)**: Is a lectin most often used to distinguish the two main subgroups of blood group A: A_1 and A_2. *Dolichos* acts as an anti-A_1 reagent, meaning that it will agglutinate red cells that are of the more common A_1 subtype, distinguishing them from the less common A_2 subtype.

F. **WBIT (wrong blood in tube)**: When a sample is drawn from the wrong patient, so that the identifying information of the patient on the label does not correlate with the patient from whom the blood in the tube was drawn.

G. **NPR (No previous record)**: SoftBank test code that allows repeat ABO/Rh values to be entered into the system but does not generate a patient charge and does not cross the interface to the hospital computer system.

H. **GND (Group not determined)**: If the forward typing and the reverse typing do not agree, an ABO discrepancy has occurred. If the discrepancy cannot be resolved at that time, then the patient's group is considered "Not Determined".

I. **RND (Rh not determined)**: If the Rh typing discrepancy of a patient cannot be resolved at that time, then the patient's Rh type is considered "Not Determined".

J. **Health Information system (HIS)**: Refers to a system designed to manage health care data. This includes systems that collect, store, manage and transmit a patient's electronic health record, a hospital's operational management or a system supporting health care policy decisions.

K. **QSR (Quality Safety Report)**: Report made in the hospital incident reporting system (i.e. RL Solutions) regarding any process / incident inconsistent with the routine operation of the hospital or the routing care of patients in any setting. This includes errors that result in actual or potential injury to a patient or visitor, including near misses or unsafe conditions.

L. **Internal Variance**: Report made internally in the Blood Bank for documentation of an incident such as error detected, accident, complaint, unplanned deviation, or incident for review, evaluation, investigation, and correction.

M. **Designee**: Any Blood Bank technical director, or transfusion medicine fellow.

V. POLICIES:

A. If a mixed-field or invalid graded reaction appears in the forward A typing of a patient who otherwise appears to be group A or AB, the patient's red blood cells (RBCs) should be typed with anti-A_1 lectin (Dolichos biflorus lectin), if not previously tested.

1. The patient's transfusion history must be obtained to verify that the patient was not transfused in the preceding 90 days. Refer to Transfusion Medicine policy, Obtaining Patient Histories.
   Note: When an A subgroup is ordered on a potential kidney donor then it is not necessary to obtain this transfusion history because in order to be an eligible kidney donor, the donor must not have been recently transfused.
2. The manufacturer's insert / directions must be reviewed and followed.

B. If unexpected reactivity with the A_1 reverse cell is observed in a patient who otherwise appears to be group A or AB, an order for ABID will be placed and a tube panel will be performed to determine whether the unexpected reactivity in the reverse type is due to a cold reacting antibody or the presence of anti-A_1 as described in Transfusion Medicine policy, Antibody Identification: Tube Panel for the Identification of Anti-A1.
   1. It is not necessary to perform repeat tube panels to confirm the presence of anti-A_1 for patients with a history of anti-A_1 unless reverse typing with A_2 cells does not resolve the discrepancy.

C. If anti-A_1 is confirmed as the cause of the typing discrepancy, the canned comment **AA1** (Anti-A_1 identified: Antibody causes ABO Discrepancy) may be appended to the ABO/Rh result.

D. Patients less than 2 years old may not be typed for the A_1 antigen due to the incomplete development of the antigens in the ABO system. Adult levels of ABO expression are generally observed by the age of 2 years.

E. **Crossmatching for A Subgroups**
   1. If a patient is a known A subgroup but does **not** have a current or historical anti-A_1, then the patient may receive group A RBCs from the standard inventory using electronic crossmatch.
   2. Anti-A_1: If anti-A_1 was detected in the patient's sample (currently or historically), then the patient should be transfused with RBCs that are negative for the A_1 antigen and crossmatch compatible.
      a. This is most easily accomplished by providing group O RBCs that are **immediate spin** crossmatch compatible. Patients who are group AB (A_2B or weaker subgroup) may receive group B RBCs that are crossmatch compatible with an **immediate spin** crossmatch.
      b. As an alternative to group O RBCs, patients who are group A (A_2 or weaker subgroup) may receive A_2 RBCs (RBCs that test negative with A_1 lectin) that are crossmatch compatible with an **all phase** crossmatch. As an alternative to group B RBCs, patients who are group AB (A_2B or weaker subgroup) may receive A_2B or A_2 RBCs (RBCs that test negative with A_1 lectin) that is crossmatch compatible with an **all phase** crossmatch.
   3. If the patient has anti-A_1 and also has additional unexpected antibodies, then **both** immediate spin and antihuman globulin crossmatches (usually by the gel method) are required. Refer to Transfusion Medicine policy, *Policies for Providing RBCs for Patients with Unexpected Antibodies*.

VI. PROCEDURE:

A. Perform the steps below after observing unexpected reactivity with the A_1 reverse cell in a patient who otherwise appears to be group A or AB.

1. If not previously tested, type the patient's RBCs with anti-A_1 lectin and interpret the A_1 type as indicated in the *Interpretation* section.
    a. If the patient's RBCs are A_1 positive, then return to Transfusion Medicine policy, *Resolution of ABO and Rh Discrepancies* for other possible causes of reverse / serum typing problems. This patient is generally considered incapable of making anti-A_1.
    b. If the patient's RBCs are A_1 negative, then proceed to Step 2.
2. Perform a tube panel to attempt to identify anti-A_1, if indicated;
    a. If anti-A_1 is identified, then attempt to resolve the ABO discrepancy by performing the reverse type with an A_2 reverse cell.
    b. If anti-A_1 is not identified then return to Transfusion Medicine policy, *Resolution of ABO and Rh Discrepancies*, for other possible causes of reverse / serum typing problems.
3. Determine whether the reverse typing discrepancy is resolved.
    a. If the discrepancy is resolved, refer to Transfusion Medicine policy, Resolution of ABO and Rh Discrepancies: Documentation of Resolved ABO or Rh Discrepancies.
    b. If the discrepancy remains unresolved, then refer to Transfusion Medicine policies, Resolution of ABO and Rh Discrepancies: Documentation of Unresolved ABO or Rh Discrepancies, and *Resolution of ABO and Rh Discrepancies: Unresolved ABO Discrepancies- Transfusion Required*, which indicates that group O RBCs must be used if transfusion is necessary.

VII. INTERPRETATION:

A. **Adding Comments to the ABO/Rh Test**

1. Observations of all test results must be recorded properly at the time the test is performed. Therefore, when an ABO or Rh discrepancy is observed, all results (including discrepant results) must be documented at the time the test is performed.
2. The results should not be interpreted until the investigation is complete and the discrepancy is resolved. The **ABORH** canned message will be used for this purpose; refer to the Blood Bank CDM - Documentation of ABO/Rh Discrepancies.
    a. For example: Anti-A_1 was detected in the tube panel. The patient's RBCs were an A_2 or weaker subgroup. The "Note" field of the **ABORH** canned message may be documented "Anti-A_1 detected." The "Method" field of the **ABORH** canned message may be documented as "Reverse type with A_2 reverse cell," also indicating the lot number and expiration date of the A_2

cell.

Blood Group	ABO Interpretation	Reactions with Anti-A (Forward Typing)	Reactions with Anti-A_1 lectin	Canned Comment to be added to ABO/Rh test result
A_1	A	3+ to 4+	2+ to 4+	**A1A1**
A_1B	AB	3+ to 4 +	2+ to 4+	**A1A1B**
A_{int}	A	Positive (any strength) including mixed field	Weak + to 1+	**A1WK**
$A_{int}B$	AB	Positive (any strength) including mixed field	Weak+ to 1+	**A1WK**
A_2	A	Positive (any strength) including mixed field	0	**A1A2**
A_2B	AB	Positive (any strength) including mixed field	0	**A1A2B**
A_3, A_m A_x,	A_x			
		A_x,	A_x,	**A1A2**

VIII. NOTES:

A. Patients with A_2 or weaker A subgroups may develop anti-A_1. If the patient has anti-A_1, then the patient should receive RBCs that are A_1 negative. Refer to policy, V.E. *Crossmatching for A Subgroups*.

1. Patients with A_1 subgroups (including A intermediate subgroups) should generally not make anti-A_1.
2. If anti-A_1 is detected in an A_1 patient, consider the possibility of passive anti-A_1 due to recent group O or group B platelet transfusions.
3. Caution should be exercised when assigning the A Intermediate subgroup since A_2 or A_2B RBCs will also react weakly with anti-A_1 lectin if the test is inadvertently incubated.
4. Consult the anti-A_1 lectin *Instructions for Use* to ensure that all testing is read as required. For example: Immucor anti-A_1 indicates that following centrifugation, all tests should be read immediately and interpreted without delay (not incubated).
5. A_2 subgroups or weaker (A_3, A_m, A_x, etc.) subgroups are not differentiated; these subgroups are all reported as A_2 or Weaker A Subgroups.

IX. REFERENCES:

1. AABB, *Technical Manual*, current edition.
2. AABB, *Standards for Blood Banks and Transfusion Services*, current edition.
3. College of American Pathologists, *Transfusion Medicine Checklist*, current edition.

Attachments

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