

Beaumont

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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-A₁.

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 A₂ 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-A₁ may present with unexpected reactivity with the A₁ reverse cell in a patient who otherwise appears to be group A or AB.
- C. Patients with RBCs that are A₁ positive are generally considered incapable of making anti-A₁.

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-A₁ lectin):** Is a lectin most often used to distinguish the two main subgroups of blood group A: A₁ and A₂. *Dolichos* acts as an anti-A₁ reagent, meaning that it will agglutinate red cells that are of the more common A₁ subtype, distinguishing them from the less common A₂ 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-A₁ 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 A₁ 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-A₁ as described in Transfusion Medicine policy, *Antibody Identification, X.E Tube Panel for the Identification of Anti-A₁*.
1. It is not necessary to perform repeat tube panels to confirm the presence of anti-A₁ for patients with a history of anti-A₁ unless reverse typing with A₂ cells does not resolve the discrepancy.
- C. If anti-A₁ is confirmed as the cause of the typing discrepancy, the canned comment AA1 (Anti-A1 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 A₁ 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-A₁, then the patient may receive group A RBCs from the standard inventory.
 2. Anti-A₁: If anti-A₁ was detected in the patient's sample (currently or historically), then the patient should be transfused with RBCs that are compatible in an all-phase crossmatch:
 - a. The transfused RBCs should be negative for the A₁ antigen (most easily accomplished by providing group O RBCs).
 - b. As an alternative to group O RBCs, patients who are group A (A₂ or weaker subgroup) may receive A₂ RBCs (RBCs that test negative with A₁ lectin)
 - c. Patients who are group AB (A₂B or weaker subgroup) may receive A₂B or A₂ RBCs (RBCs that test negative with A₁ lectin), or group B RBCs.
 - d. If the patient has anti-A₁ and also has additional unexpected antibodies, then both all-phase 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 A₁ 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-A₁ lectin and interpret the A₁ type as indicated in the *Interpretation* section.
 - a. If the patient's RBCs are A₁ 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-A₁.

- b. If the patient's RBCs are A₁ negative, then proceed to Step 2.
2. Perform a tube panel to attempt to identify anti-A₁, if indicated;
 - a. If anti-A₁ is identified, then attempt to resolve the ABO discrepancy by performing the reverse type with an A₂ reverse cell.
 - b. If anti-A₁ 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* in the section *Documentation of Resolved ABO or Rh Discrepancies*.
 - b. If the discrepancy remains unresolved, then refer to Transfusion Medicine policy, *Resolution of ABO and Rh Discrepancies* in the section *Documentation of Unresolved ABO or Rh Discrepancies*, and *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 - *ABORh Discrepancies*.
 - a. For example: Anti-A₁ was detected in the tube panel. The patient's RBCs were an A₂ or weaker subgroup. The "Note" field of the ABORH canned message may be documented "Anti-A₁ detected." The "Method" field of the ABORH canned message may be documented as "Reverse type with A₂ reverse cell," also indicating the lot number and expiration date of the A₂ 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 ₁ B	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 ₂ B	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 A₂ or weaker A subgroups may develop anti-A₁. If the patient has anti-A₁, then the patient should receive RBCs that are A₁ negative (group A₂ or group O). Refer to policy, V.E. *Crossmatching for A Subgroups*.
1. Patients with A₁ subgroups (including A intermediate subgroups) should generally not make anti-A₁.
 2. If anti-A₁ is detected in an A₁ patient, consider the possibility of passive anti-A₁ due to recent group O or group B platelet transfusions.
 3. Caution should be exercised when assigning the A intermediate subgroup since A₂ or A₂B RBCs will also react weakly with anti-A₁ lectin if the test is inadvertently incubated.
 4. Consult the anti-A₁ lectin *Instructions for Use* to ensure that all testing is read as required. For example: Immucor anti-A₁ indicates that following centrifugation, all tests should be read immediately and interpreted without delay (not incubated).
 5. A₂ subgroups or weaker (A₃, A_m, A_x, etc.) subgroups are not differentiated; these subgroups are all reported as A₂ 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

[Resolution of ABO Discrepancies for A Subgroups and Patients with Anti A1.pdf](#)

Approval Signatures

Step Description	Approver	Date
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RESOLUTION OF ABO DISCREPANCIES FOR A SUBGROUPS AND PATIENTS WITH ANTI-A₁

Section 1: Unexpected Reactivity in the Reverse Typing

- Perform a tube ABO/Rh type if Anti-A₁ is suspected in the reverse typing (e.g., if there is unexpected reactivity in the reverse well).
- Document results on this form or in Soft Bank. QC rack: _____

Anti-A	Anti-B	Anti-D	Control	A ₁ cells	B cells	ABO/Rh Interpretation	Tech initials / Date

Section 2: Special Antigen Testing

- Verify patient has NOT been transfused in last 90 days.
- Patients with Anti-A₁ antibody are expected to have A₁-negative RBCs.
- Order and result the A₁ antigen (A1) in SoftBank.
- Add a special message (e.g., if RBCs are A₁ negative add "A₂ or weaker A subgroup"; if RBCs are A₁ positive add "A₁ subgroup."

	Results of Anti-A ₁ Lectin	Tech initials / Date
Patient:		
Positive Control (A ₁ cells)		
Negative Control (A ₂ cells or B cells)		

	Manufacturer	Lot #	Exp Date	Visual Inspection (S/U)
A ₁ cell				
A ₂ cell				
B cell				
Anti-A ₁ lectin (A1L)				

***Remember to perform quality control for A₁, A₂ and A1L and document with routine QC records.**

Section 3: Reverse Type with A₂ Cells

- If Anti-A₁ was previously identified, then reverse type the patient using A₂ cells.
- If the *Tube panel for the identification of Anti-A₁* is indicated (newly identified) this step is included with the panel.

	Results of patient plasma @ I.S.	Test cell, lot # and exp date
A ₂ reverse cell		
B reverse cell		

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Section 4: Tube panel for the identification of Anti-A₁

- If unexpected reactivity is observed in the reverse tube typing, perform a tube panel if patient had no previous history of Anti-A₁. It is not necessary to perform repeat tube panels to confirm the presences of anti-A₁ for patient with previous history of anti-A₁ unless typing with A₂ cell does not resolve the discrepancy.
- Order ABID in SOFT and result as Anti-A₁ if applicable.

Expired Cell Quality Control*						
Test Cell	Manufacturer	Lot #	Exp Date	Visual Inspection (S/U)	Positive Control	Negative Control
A ₁ cell						
A ₁ cell						
A ₂ cell						
A ₂ cell						
* A ₁ Cell: Pos Control = test with Anti-A, Neg Control = Test with Anti-B						
A ₂ Cell: Pos Control = test with Anti-A, Neg Control = Test with Anti-B						

Test Cell	IS	RT	4°C (If Indicated)	37°C	AHG	CC
A ₁						
A ₁						
A ₁						
A ₂						
A ₂						
A ₂						
O						
O						
O						
AC						

Section 5: Notes

- Testing with Anti-A₁ lectin must be read immediately and interpreted without delay (do not incubate).
- Do NOT A₁ type patients less than 2 years old (ABO antigens are not well developed at this age).
- Patients with Anti-A₁ need *all-phase crossmatches* with group O or A₁ negative RBCs (order and result in Soft).
- Tech must verify that the patient has NOT been transfused in the last 90 days before the special antigen testing can be entered into SoftBank.

• Reviewed by: _____ Date: _____