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| **Compatibility Testing- AHG Gel Testing**  |
| **Purpose** | This procedure provides instruction for crossmatching of patient’s plasma/serum against donor cells using the gel testing methodology. Testing is performed to determine compatibility of red cell products to intended recipient.  |
| **Policy Statements** | Refer to [TS 3.4 Crossmatch Process-Red Cell Orders for Patients over 4 months old](file:///%5C%5Ckidsnet.childrenshc.org%5C..%5CLaboratory%20Policy%20and%20Procedure%20Manual%5CTransfusion%20Services%5C3%20Processing%20Orders%5CTS%203.4%20Crossm%20) for general policy statements related to compatibility testing, selection of compatibility testing method, and red blood cell selection.* An antiglobulin crossmatch is required for all red cell transfusions in patients who currently demonstrate or have a history of clinically significant antibodies.
* Donor units that are antigen negative to the clinically significant antibody(s) shall be selected for compatibility testing.
* An Immediate Spin Tube Crossmatch (TS 4.21) must be performed in conjunction with an AHG Gel Crossmatch during Sunquest system downtimes to verify patient/donor ABO compatibility.
* Crossmatching performed by MBC does NOT need to be repeated at Children’s.
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| **Test Codes** | %XM is a test that is automatically added to a pre-transfusion testing battery (TYAS, HOLD, DCAS) when red cell products are allocated under the associated accession number. |
| **Related****Documents** | TS 7.14 Making a 0.8% Donor Unit Cell SuspensionTS 4.9 Grading and Interpretation of Gel Card Reactions[TS 5.2 Blood Order Processing](file:///%5C%5Ckidsnet.childrenshc.org%5Cchcdfs%5Cdept%5CLab%20Procedures%5CTransfusion%20Services%5C2011%20Revsions%20working%20area%5C5%20Specimen%20Result%20Reporting%5CTS%205.2%20Blood%20Order%20Processing-Entry%2C%20Single%20Order.doc)TS 4.34 Investigating an Incompatible Crossmatch |
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| **Materials** | **Equipment** | **Reagents** | **Supplies** |
| * IH-Incubator L
* IH-Centrifuge L
* IH-Reader 24-Stp only

Biohi | * IH-Card AHG Anti-IgG
 | * MLA pipette tips
* Donor unit segments/

 pilot tube* 10 x 75 mm test tubes
* 50 μl MLA pipette
* 25 μl MLA pipette
* 10 μl MLA pipette
* 1000 μl MLA pipette
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| **Sample** | No special preparation of the patient is required prior to specimen collection. Blood should be collectedand labeled according to approved policies and procedures. [Collection of Patient Specimens](http://xpedio02.childrensmn.org/stellent/groups/Public/%40XCP/%40Manuals/%40Lab/%40TransfusionSvc/documents/PolicyReferenceProcedure/web012709.asp)Fresh serum or plasma collected with anticoagulant (EDTA) may be used in crossmatching.Testing should be performed as soon as possible. Samples that cannot be tested immediately should be stored at 2-8°C. In the case of potential recipients of blood transfusion, specimens must be tested within 3 days of collection if the patient has been transfused pregnant in the preceding 3 months, or if the history is uncertain or unavailable. Hemolyzed and grossly icteric blood samples may cause difficulty in interpretation, and test results should be used with caution. Grossly lipemic samples containing particulates that clog the gel, as indicated by diffuse blotches of red blood cells in the microtube, may be clarified by centrifugation or filtration and retested.Rouleaux may cause false positive results.Donor red blood cells may be used within the dating period of the unit. Red blood cells that are direct antiglobulin positive should not be used. |
| **Quality Control** | Refer to TS 18.14 Performing Quality Control IH-Reader 24 or Manual SystemReagents must be evaluated each day of use with appropriate controls. |
| **Before** **You Begin** | 1. Confirm sample acceptability and review patient history per procedure.
2. Inspect and label Gel Card per TS 4.7 Inspection and Labeling of Gel Cards.
3. Bring samples and reagents to room temperature (18-25°C)
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| **Procedure** |  |
|  | **Step** | Action |
|  | 1 | Obtain patient sample. |
|  | 2 | Select the appropriate donor units for the patient with regard to ABO, Rh, component type, age of unit, and transfusion request specifications. Refer to [TS 3.4 Crossmatch Process-Red Cell Orders for Patients over 4 months old](file:///%5C%5Ckidsnet.childrenshc.org%5Cchcdfs%5Cdept%5CLab%20Procedures%5CTransfusion%20Services%5C2011%20Revsions%20working%20area%5C3%20Processing%20Orders%5CTS%203.4%20Crossmatch%20Process-Red%20Cell%20Orders%20for%20Patients%20over%204%20months%20old.doc) **Note: Units must be prepared/modified to meet patient attributes prior to allocation in Sunquest.** |
|  | 3 | Record patient information and unit selection in function Blood Order Processing or on Downtime worksheet**. Refer to Result Reporting section.** |
|  | 4 | Allow reagents and samples to reach room temperature (18-25°C) before use. |
|  | 5 | Prepare cell suspension as follows:1. Pipette 1 mL IH-LISS into an appropriately labeled test tube.
2. Add 10 μL donor packed red cells to the IH-LISS.
3. Mix
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|  | 6 | Inspect the IH-Card for evidence of damage to the foil or drying of the gel. Do not use if such evidence is observed. IH-Cards with splashes of gel in the reaction chamber may be centrifuged prior to use. |
|  | 7 | Label the IH-Card according to procedure TS 4.07 Inspection and Labeling of Gel Cards. |
|  | 8 | Carefully peel back the foil seal from the individual microtubes of the IH-Card being used for the testing leaving the seal in place for microtubes not being used.**Note: Once the foil has been removed from the microtubes, testing must be initiated as soon as possible (recommended within 20 minutes) to prevent drying o the microtubes.** |
|  | 9 | Add 50 μL of the donor red cell suspension to the correspondingly labeled microtube reaction chamber on the IH-Card taking care to maintain the air gap between the cells in the upper reaction chamber and the AHG reagent in the column of the microtube. |
|  | 10 | Add 25 uL of patient plasma/serum to the reaction chamber of the microtube containing the donor cells. |
|  | 11 | Place the IH-Card(s) in a card rack or the 24-card centrifuge head. Place in the IH-Incubator L and incubate 15-20 minutes at pre-set temperature of 37 ±1°C. |
|  | 12 | After incubation, centrifuge the IH Cards using the 24-card head in the IH-Reader 24 or IH-Centrifuge L at the pre-set time and speed of 10 minutes at 85 x G (910 RPM). |
|  | 13 | When the centrifugation cycle is complete the IH-Reader 24 will read the card(s) or remove the IH-Card(s) and read the reactions according to procedure TS 4.09 Grading and Interpretation of Gel Card Reactions |
|  | 14 | Review reactions in the IH-Com or record reactions and interpretations per procedure. Refer to Interpretation section below. |
| 15 | Use the following table to determine the next appropriate action. |
| **If the crossmatch result is:** | And red cells are  | **Then proceed to** |
| Compatible |  | Allocation and tagging of Red Cell unit(s)  |
| Incompatible | Not needed urgently | Refer to Investigation of Incompatible Crossmatch |
| Urgently required | Consult with ordering providerConsult with Pathologist |
|  | 16 | Review the computer record or worksheet result entry including a final clerical check of sample, label, and request.  |
|  | 17 | Dispose of all supplies used for the examinations in a biohazard waste container. |
|  | 18 | Store the patient sample. |
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| **Interpretation** | Agglutination of the red blood cells as seen by clumps of cells caught within the gel column is a positive test and indicates the presence of antibody(ies) directed against antigens on the donor red cells and hence an incompatible crossmatch. Hemolysis indicates incompatibility and reflects the presence of an antibody/antigen reaction. To grade the reaction follow procedure TS 4.09 Grading and Interpretations of Gel Card Reations. No agglutination is observed as a smooth surface button at the bottom of the gel column. This is a negative reaction and indicated that no antibody against donor red cell antigens was detected.Following centrifugation, IH-Cards should be read as soon as possible and results interpreted within 6 hours of processing. If unable to read with in that time period, the IH-card can be sealed with tap and stored at 2-8°for up to 24 hours. Further delays in reading and interpretation can lead to drying of the gel which will interfere with accurate reading of results. **XIS XINC XAHG XCC XGEL Interpretation** NT NT NT NT 0 CMP NT NT NT NT + ICMP\* or LCMPNT NT NT NT ICLR ICLR  NT NT NT NT NT NRQ.Key to testing results:0 = no agglutination + = agglutinationICLR = Inconclusive,repeat testing (;ICLR) NT = not tested Key to Interpretation:CMP = compatible (key **[** )ICMP = incompatible (key **(** )ICLR = Inconclusive,repeat testing (;ICLR)LCMP = Least incompatible (key **.** )  NRQ = Not required (key @) |
| **Limitations** | Erroneous and abnormal results may be caused by:* Bacterial or chemical contamination of the blood specimens, reagents, supplementary materials and/or equipment.
* Patient medication or disease yielding a cross-reaction.
* Sample hemolysis prior to testing.
* Contamination between microtubes through pipetting errors.
* Grossly icteric blood samples, blood samples with abnormally high concentration sof protein or blood samples from patients who have received plasma expanders of high molecular weight may give false positive results.
* Fibrin, clots, particulates or other artifacts may cause some red blood cells to be trapped at the top of the gel and cause and anomalous result. They may appear as a pinkish layer. In a negative reaction the false appearance of a mixed field could lead to misinterpretation.
* If red blood cells (pellet at the bottom of the microtube) are too low in concentration, they become difficult is visualize, and a weak positive reaction may fail to be detected.
* Incorrect pipetting into the reaction chamber causing the air gap to be eliminated.
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| **Alternate Procedure** | TS 4.22 Compatibility Testing-AHG Tube TestingTS 4.24 5% Albumin, Antibody Screening or Compatibility Testing |
| **Result Reporting** | TS 5.11 Entering Results of Compatibility Testing-Tube or Gel or Ref Lab |
| **References** | AABB Standards for Blood Banks and Transfusion Services, current editionPackage insert: IH-Card AHG Anti-IgG, Bio-Rad Medical Diagnostics GmbH, current versionPackage insert: IH-Card Anti-IgG,-C3d, Bio-Rad Medical Diagnostics GmbH, current versionPackage insert: IH LISS Solution, Bio-Rad Medical Diagnostics GmbH, current version. |
| **Approval****Workflow** | Transfusion Service/Laboratory Director |
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| **Historical Record** | **Version** | **Written/Revised by:** | **Effective Date:** | **Summary of Revisions** |
| 3 | S. Cassidy | 02/17/2023 | Updated procedure for new reagents and updated format from PDF |