

Molecular Genotyping for Patient Blood Management – IRL Recommendations

Obtaining a red blood cell molecular antigen genotype of a patient allows the Immunohematology Reference Laboratory (IRL) to provide the best-matched units of blood with a single test, without the need for a blood specimen to perform an extensive workup before each transfusion event. Additionally, when a patient has a positive Direct Antiglobulin Test (DAT) and the presence of a warm autoantibody interferes with serological testing, complex adsorption procedures and elution studies are normally required to determine if there are clinically significant underlying alloantibodies. Molecular genotyping can expedite this workup and allow for selection of units that lack underlying corresponding antigens.

What is Molecular Genotyping? Genomic DNA extracted from a blood specimen and it is isolated and purified. Assays are performed to test for common red cell antigens in the Rh, Kell, Duffy, Kidd, MNS, Lu and Do blood group systems. With these tests, we can determine which antigens are present on the red cells and those that are not present. Based on this predicted phenotype, we then select donor units that are similar in profile to the patient's phenotype.

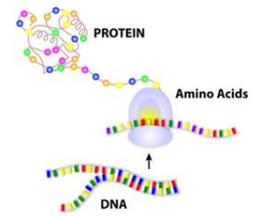
By providing the phenotype-matched blood through genotyping, you will be obtaining the safest blood possible for your patient. However, this does not mean that you do not need to monitor your patient and watch for any signs of a clinical transfusion reaction. Monitoring the patient's plasma for changes in reactivity (such as the antibody screen is now 3+ when it was only w+ before) might indicate that a new alloantibody is present, and the IRL should re-evaluate the patient's blood specimen for additional antibodies. If the patient does not achieve the expected increase in hemoglobin after transfusion, this may also be indicative of additional antibodies. The IRL also recommends repeating the workup after 3 transfusion events.

Conditions where molecular genotyping would be useful:

- Chronic transfusions due to Sickle Cell Anemia, Thalassemia, Cancer
- Patients with Warm Auto Immune Hemolytic Anemia (WAIHA) or a positive DAT
- Patients being treated with Daratumumab for relapsing Multiple Myeloma
- Prenatal testing to identify a fetus at risk of hemolytic disease of the fetus and newborn, or to determine RhD zygosity
- Patients who have recently received a transfusion, making serologic workup difficult
- Investigation of variant antigens (RhD, e, S or U)
- Investigation of mutations which might silence the expression of an antigen (i.e. Jk^a, Jk^b, S, s)

Advantages of Obtaining Molecular genotyping

- Allows for more rapid availability of blood for the patient
- Decreased cost for treating patient
- Clarifies confusing serologic typing results
- Confirms rare cell phenotypes (K_o, Rh_o, Lu_o, Jk_o)



Disadvantages of Molecular genotyping

- 2-3 days turnaround time, no emergency testing available
- Molecular genotyping assays are not FDA licensed, antigens must be confirmed serologically
- Does not ensure that antigen-matched blood will be available at all times
- Cannot test for some genetic variants, silenced genes, or suppressed genes unless that assay is specifically present on the testing menu

Obtain more information from Hoxworth IRL.

Please call the IRL any work day at 513-558-1547 to learn more about how to obtain molecular genotyping for your patient.