



## Weak D

### To "D" or not to "D", that is the question

Provided by LifeServe Blood Center's Medical Department

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#### Background

When the Rh D antigen is not fully expressed serologically in an individual, the individual's Rh type is referred to as a "weak D". The two most common causes for a weak D are:

1. An inherited mutation of the Rh D protein (formerly D<sup>u</sup>) that affects the insertion of the protein in the RBC membrane resulting in fewer D antigens expressed on the RBC outer membrane surface.
  2. When an Rh Ce (r') gene is *trans* (i.e. is present on the partner chromosome 1) to a normal Rh D gene, there can be decreased expression of the D antigen on the RBC surface.
- Due to the reduced number of Rh D antigens on the RBC surface, the RBCs will not agglutinate when using anti-D typing reagents with an immediate-spin technique.
  - Detection of weak D requires an enhancement technique to detect it, typically by using an indirect antiglobulin (IAT) procedure.  
(Note: Before weak D testing results can be considered valid, a negative direct antiglobulin (DAT) test on the patient's RBCs must be confirmed to insure that pre-existing antibody was not already attached *in vivo* to the patient's RBCs.)
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Current weak D testing requirements

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Current AABB standards require weak D testing of individuals in two circumstances.

- Infants of Rh negative women who are candidates for Rh immune globulin (RhIg)
- Blood donors for determining the Rh type of their donor units

**\*\*\*Rh typing of potential transfusion recipients for weak D is not necessary and not routinely recommended. \*\*\***

If the patient's Rh D typing results are negative at immediate-spin, they are considered Rh negative and should receive Rh negative blood products according to your facility's policies and, if a female child or woman of child-bearing age, is a candidate for Rh immune globulin (RhoGAM).

The rationale for this is based on erring on the side of caution...there are other Rh D genetic variants (other than weak D) that may react when testing for weak D by IAT but are capable of developing anti-D when exposed to Rh positive blood products.

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Rh D typing issues

There are several instances when discrepancies in a patient's Rh type may occur.

- A patient, who has previously been typed as Rh positive based on prior weak D (previously D<sup>u</sup>) testing, may now be classified as Rh negative on the basis of the immediate-spin D typing results.  
This is most likely to occur with women who have had prior pregnancies when weak D (D<sup>u</sup>) testing was routine and were classified as Rh positive and therefore were not considered RhIg candidates. If they are retyped now as part of a prenatal workup, they will type as Rh negative and be candidates for RhIg. They will also need to receive Rh negative blood products if transfusion is required. Note: As weak D women who were previously Rh typed as weak D (D<sup>u</sup>) positive move out of their child-bearing years, this will become a less likely occurrence as laboratories rely on immediate-spin D typing for determining a patient's Rh type.
  - An infant who is determined to be weak D positive (i.e. had weak D testing done because the mother was Rh negative and a possible candidate for RhIg) and who subsequently needs to be transfused, may have computerized blood bank testing records that automatically force the infant's Rh type to be classified as Rh positive. This could potentially result in the infant receiving Rh positive blood, when Rh negative blood products are actually indicated.
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RHD genotyping      An interorganizational workgroup of the AABB and CAP and four other medical societies (ACOG, America's Blood Centers, American Red Cross and Armed Services blood Program) have recently recommended phasing in RHD genotyping of pregnant women and women of childbearing potential that test serologically positive for weak D. The intent is to avoid unnecessary administration of RhIg during pregnancy and the need to use Rh negative blood for transfusion in these women. Women who genotype as weak D types 1, 2 or 3 can safely receive Rh positive blood and do not require RhIg prophylaxis during pregnancy or following delivery of an Rh positive infant.

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References

1. Reid ME et al. "The Rh Antigen D: A review for Clinicians" Blood Bulletin, America's Blood Centers, 2008.
2. Petrides M et al. Practical Guide to Transfusion Medicine, 2<sup>nd</sup> ed. Bethesda, MD: AABB 2007.
3. Roback JD, ed. Technical Manual, current ed. Bethesda, MD: AABB.
4. "Joint Statement on Phasing-In RHD Genotyping for Pregnant Women and Other Females of Childbearing Potential with a Serologic Weak D Phenotype". AABB 2015.
5. Sandler SG et al. "It's time to phase-in RHD genotyping for patients with a serological weak D phenotype", Transfusion 2015; 55:680–689.

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*The information reflected in this document is based upon the advice and recommendation from LifeServe Blood Center's Medical Department. If you have additional questions or concerns, please feel free to contact the department directly by calling 515.309.4840 or email [physician@lifeservebloodcenter.org](mailto:physician@lifeservebloodcenter.org).*