

TRALI: Transfusion Related Acute Lung Injury – Antibody Evaluation

Platelet and Neutrophil Immunology Laboratory, BloodCenter of Wisconsin

TRALI

Transfusion related acute lung injury (TRALI) is a serious, potentially fatal reaction that can occur following transfusion of a plasma-containing blood component. It is a clinical syndrome characterized by sudden onset of dyspnea together with hypotension, fever, and bilateral pulmonary infiltrates that usually develop less than 2 hours after the start of transfusion.^{1,2} FFP, packed RBCs, platelets, granulocytes, cryoprecipitate, and even IV immunoglobulin have been implicated in causing TRALI.^{2,3} The incidence of TRALI is estimated to be about 1 in 5,000 transfusions,^{1,4} although TRALI is thought to be under-diagnosed and under-reported. Most patients require supportive treatment with supplemental oxygen, while diuresis should be avoided. If treated quickly and appropriately, the majority of patients recover completely, but a fatal outcome occurs in 6-10% of cases.¹ TRALI is the third leading cause of transfusion-related mortality, accounting for 13% of all transfusion deaths reported to the FDA.⁵

The precise mechanism responsible for TRALI is unknown, but the syndrome has been associated with passive transfer of leukocyte antibodies and biologically active lipids in blood components.^{1,2,6,7} The majority of cases of TRALI (65-80%) are thought to be triggered by passive transfer of HLA Class I and/or neutrophil-specific antibodies,^{1,4,5,6,8} or HLA Class II antibodies^{9,10} present in the plasma of the transfused blood product. In a minority of cases, the causative antibodies are present in the recipient, and react with transfused cellular

material. Testing plasma samples from the implicated donor(s) and patient for leukocyte antibodies can be very helpful in evaluation of a suspected TRALI case.

TRALI Antibody Evaluation

Our laboratory has provided leukocyte antibody testing in suspected cases of TRALI since 1995. We provide complete flow cytometric testing for the detection and identification of neutrophil antibodies. We also perform bead-based flow cytometry assays for the detection and identification of HLA Class I and II antibodies. Flow cytometry bead assays have been recommended for detection of both HLA Class I and II antibodies in TRALI evaluations because some antibodies are missed by traditional AHG-CDC lymphocytotoxic assays.⁹

The diagnosis of TRALI is made clinically based upon clinical signs, symptoms, and treatment outcome, as well as details about the blood product(s) transfused. Once a clinical diagnosis has been established, or strongly suggested, laboratory confirmation should be pursued and include the following:

- 1) Test serum or plasma from the donor(s) of implicated blood products for neutrophil and HLA Class I and II antibodies by flow cytometry. Suggested criteria for prioritizing the selection of implicated donors:
 - Donors of blood products transfused within 2 hours of TRALI reaction
 - Multiparous or previously transfused female donors
 - Other female donors
 - Male donors.

- 2) Testing of serum from the patient for neutrophil-specific, HLA Class I and HLA Class II antibodies.
- 3) If neutrophil and/or HLA antibodies are detected in either the donor or patient sample, then more specific tests may be required to confirm their involvement in the TRALI event, including:
 - Identification of the neutrophil or HLA antigen for which the antibody is specific
 - Typing the donor or patient for the specific antigen
 - Crossmatch of the donor serum vs patient cells or patient serum vs donor cells.

Contact Us

TRALI antibody testing can be ordered through The Platelet & Neutrophil Immunology Laboratory at BloodCenter of Wisconsin.

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