This update of the Lewis blood group system (Combs MR. Lewis blood group system review. Immunohematology 2009;25:112–8) describes new information on the clinical significance of Lewis antigens regarding susceptibility of individuals to certain diseases and the possible role of bacteria in Lewis expression. This update also describes recently reported examples of Lewis antibodies causing hemolytic transfusion reactions. No new antigens have been identified in the International Society of Blood Transfusion system 7, leaving the antigen count to stand at six: Le\(a\), Le\(b\), Le\(bH\), ALe\(b\), BLe\(b\), and Le\(ab\). Immunohematology 2019;35:65–66.

Key Words: Lewis, fucosyltransferases, antigen, antibody

Lewis Antigens

Lewis antigen fucosyltransferases are encoded by the 
\(FUT3\) gene located on chromosome 19p13.3.\(^1\) The presence or absence of Lewis antigens in an individual can be associated with the individual's susceptibility to certain diseases and infections. As described in a recent review,\(^2\) non-secretors are more likely than secretors [Le(b+)] to be susceptible to symptomatic cholera,\(^3\) bacterial meningitis,\(^4\) type 2 diabetes mellitus,\(^5\) and type 1 diabetes mellitus.\(^6\) In addition, increased activity of the secretor and Lewis fucosyltransferases seems to be involved in the development and control of cancers of the distal colon.\(^2\)

A recent review\(^7\) discusses the possible role of bacteria in Lewis expression. The intestinal tract switches from sialylated glycans to fucosylated antigens with age and bacterial colonization.\(^8\) It is speculated that the low Le\(b\) expression on neonatal red blood cells (RBCs) reflects the immature nature of gut flora.\(^7\)

Lewis Antibodies

Lewis antibodies are usually clinically insignificant and are rarely associated with hemolytic transfusion reactions (HTRs). Three recent reports of Lewis antibodies associated with HTRs have been reported.

A case report from 2013 describes a severe HTR due to anti-Le\(a\) in a multiply transfused Le(a−b−) patient.\(^9\) After receipt of a crossmatch-compatible Le(a+) RBC unit, the patient developed an acute transfusion reaction with fever, chills, severe back pain, hemoglobinuria, and increased levels of bilirubin, alanine transaminase, and serum creatinine. A monocyte monolayer assay, testing the patient's serum with the Le(a+) RBCs causing the reaction, was positive.

A case report in 2015 of a possible HTR due to anti-Le\(a\) was reported in a pregnant patient with sickle cell disease with a 37°C gel-reactive anti-Le\(a\).\(^10\) The crossmatch was compatible using prewarmed plasma neutralized with Lewis substance. During transfusion, the patient experienced significant dyspnea, hypotension, and hemoglobinuria. Indirect bilirubin and lactate dehydrogenase tests were elevated. The direct antiglobulin test on the post-transfusion sample was negative, indicating the possibility that all incompatible RBCs were cleared.

A case of an HTR due to anti-Le\(b\), also in 2015, was reported.\(^11\) A pretransfusion sample from a 30-year-old African-American woman showed a negative antibody detection test in solid phase. Nine days after receipt of two computer crossmatch-compatible RBC units, her hemoglobin dropped to 7.9 g/dL. The post-transfusion sample typed as group B, D+, although agglutination with the reagent B RBCs in the reverse grouping was detected and thought to be a cold agglutinin. Electronic crossmatch-compatible RBC units were issued. During infusion, the patient developed signs of an acute HTR (chills, nausea, brown urine). An in vitro hemolytic IgM anti-Le\(b\) was identified. A tube test–only, room temperature–reactive anti-Le\(a\) was also identified.

References


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