Blood type Rh factor and Rh incompatibility

What is the Rh factor?

The Rh factor, often referring specifically to the D antigen in the Rh blood group system, is a protein on red blood cells. A person whose red blood cells carry this protein is Rh-positive. A person whose red blood cells do not carry it is Rh-negative. Rh status is inherited from biological parents and is reported alongside the ABO blood type, such as A positive, O negative, B positive, or AB negative.

For most everyday medical situations, Rh status matters mainly for blood transfusion compatibility and pregnancy. An Rh-negative person can safely live, conceive, and carry a pregnancy. The concern is not the absence of the Rh protein itself; the concern is whether the immune system becomes exposed to Rh-positive red blood cells and forms antibodies against them.

How Rh incompatibility happens in pregnancy

Rh incompatibility refers to a mismatch between an Rh-negative pregnant person and an Rh-positive fetus. This can occur if the fetus inherits Rh-positive status from the other biological parent. During pregnancy, small amounts of fetal blood may enter the maternal circulation, especially around delivery,

miscarriage, abortion, ectopic pregnancy, abdominal trauma, bleeding episodes, or invasive prenatal procedures such as chorionic villus sampling or amniocentesis.

If an Rh-negative immune system recognizes Rh-positive fetal red blood cells as foreign, it may produce anti-D antibodies. This immune response is called Rh sensitization or alloimmunization. Sensitization usually does not cause symptoms in the pregnant person, which is why screening is so important.

Once anti-D antibodies form, they can persist. In a later pregnancy with an Rh-positive fetus, these antibodies may cross the placenta and attach to fetal red blood cells. That is why prevention before sensitization occurs is a central goal of prenatal care.

Why sensitization can affect the fetus or newborn

When maternal anti-D antibodies cross the placenta and target fetal Rh-positive red blood cells, they can cause hemolysis, meaning destruction of red blood cells. This condition is known as hemolytic disease of the fetus and newborn, historically called erythroblastosis fetalis. The severity varies widely.

Mild disease may cause newborn jaundice or anemia that can be treated after birth. More severe disease can lead to significant fetal anemia, enlargement of the liver or spleen, fluid accumulation in fetal tissues, hydrops fetalis, heart strain, or, rarely, fetal loss. These outcomes are far less common where routine prenatal testing and Rh immune globulin prevention are available, but they remain medically serious.

It is also important to know that not every Rh-negative pregnancy is high risk. If the fetus is Rh-negative, there is no Rh mismatch. If the pregnant person has not formed anti-D antibodies, preventive treatment is usually highly effective. If antibodies are already present, Rh immune globulin cannot remove them, but specialized monitoring can help guide care.

Testing: blood type, Rh status, and antibody screen

Early prenatal care typically includes blood typing to determine ABO group and Rh status, plus an antibody screen to look for red blood cell antibodies,

including anti-D. These tests are often part of routine blood tests in pregnancy and may be repeated later, especially in Rh-negative patients.

A negative antibody screen means no clinically significant antibodies were detected at that time. For an Rh-negative pregnant person, this is the situation in which Rh immune globulin can help prevent sensitization if exposure occurs. A positive antibody screen means antibodies are present and need clarification. The care team may identify the antibody type and measure its level, often called a titer, to help estimate fetal risk.

Sometimes paternal blood type or fetal Rh status may be considered, depending on local practice and available testing. Decisions about testing strategies should be individualized by the obstetric team, particularly when there is a prior affected pregnancy, prior transfusion, or known alloimmunization.

Prevention with Rh immune globulin

Rh immune globulin, commonly known by brand names such as RhoGAM, is a medication made from antibodies that helps prevent an Rh-negative person’s immune system from becoming sensitized to Rh-positive red blood cells. It works by binding fetal Rh-positive cells in the maternal circulation before the immune system mounts its own lasting antibody response.

In many settings, Rh-negative pregnant people with a negative antibody screen receive Rh immune globulin around 28 weeks of pregnancy. If the baby is confirmed Rh-positive after birth, another dose is typically given within about 72 hours after delivery. Additional doses may be recommended after events that can mix fetal and maternal blood.

Situations that may require prompt medical discussion about Rh immune globulin include:

Vaginal bleeding or significant spotting in pregnancy.
Miscarriage, abortion, ectopic pregnancy, or pregnancy loss.
Abdominal trauma, such as a fall or motor vehicle collision.
Procedures such as amniocentesis, chorionic villus sampling, or external cephalic version.
Delivery of an Rh-positive infant.

The dose and timing depend on gestational age, amount of fetomaternal bleeding, local protocols, and the clinical situation. Rh immune globulin is preventive; it is not a treatment for someone who has already formed anti-D antibodies.

What happens if Rh antibodies are already present?

If an antibody screen shows anti-D or another clinically significant red blood cell antibody, the pregnancy is not automatically in danger, but it does need structured follow-up. The care team may repeat antibody titers, review prior pregnancy history, assess whether the fetus could carry the relevant antigen, and refer to maternal-fetal medicine.

Monitoring may include detailed ultrasound assessment and Doppler evaluation of the fetal middle cerebral artery, which can help estimate the risk of fetal anemia. In selected severe cases, fetal blood sampling or intrauterine transfusion may be considered by specialists. Timing of delivery may also be adjusted if the fetus or newborn is at risk.

After birth, the newborn may need evaluation for anemia, bilirubin levels, and signs of hemolysis. Treatment can range from observation and feeding support to phototherapy, intravenous immunoglobulin, or transfusion in more serious cases. These decisions require neonatal expertise and depend on the baby’s condition and laboratory results.

Rh incompatibility compared with other pregnancy blood concerns

Rh incompatibility is one specific immune-related blood issue in pregnancy. It is different from anemia, where the pregnant person may have low hemoglobin or iron deficiency, and different from clotting disorders, where the concern is excessive clot formation or thrombosis risk. Because several blood-related conditions can be screened during prenatal care, it is reasonable to ask your clinician which tests have been done and what each result means.

Bleeding deserves special attention in an Rh-negative pregnancy because it may represent an opportunity for fetal and maternal blood to mix. Not every episode causes sensitization, and not every spotting episode is dangerous, but contacting a healthcare professional promptly helps determine whether

evaluation or Rh immune globulin is needed.

Questions to ask your healthcare team

It can be reassuring to bring specific questions to a prenatal visit, especially if lab results appear in a patient portal before they have been explained. Consider asking:

What are my ABO blood type and Rh status?
Was my antibody screen negative or positive?
If I am Rh-negative, when should I receive Rh immune globulin?
Should I call after any bleeding, fall, procedure, or abdominal trauma?
If antibodies are present, what type are they and how will the fetus be monitored?
Does my history of transfusion, miscarriage, abortion, ectopic pregnancy, or prior delivery change my plan?

These conversations are not about blame. Rh sensitization can occur silently, and many people only learn about Rh status during pregnancy. The goal is practical prevention, careful monitoring when needed, and coordinated care for both pregnant person and baby.