CONDITION

Rh sensitization during pregnancy

Rh sensitization happens when an Rh-negative pregnant person develops antibodies that can attack an Rh-positive baby's red blood cells.

WHAT IT IS
Anti-D antibodies formed after exposure to Rh-positive red blood cells

BODY SYSTEM
Immune system, blood, and pregnancy

MAIN SYMPTOMS
Usually none, fetal anemia, newborn jaundice, newborn sleepiness

WHAT CAUSES IT
Immune response to Rh-positive blood

HOW IT IS DIAGNOSED
Blood group and red-cell antibody tests

MAIN TREATMENT
Specialist monitoring, fetal transfusion, or planned delivery

CAN IT BE CURED?
No - anti-D antibodies usually persist

IS IT AN EMERGENCY?
Sometimes - reduced fetal movement or severe newborn illness

LONG-TERM OUTLOOK
Most pregnancies do well with specialist monitoring

Overview

Rh sensitization is an immune response that can happen during pregnancy. It mainly concerns the RhD antigen, a marker found on the surface of red blood cells.

If your blood is RhD negative and the fetus has RhD-positive blood, a small amount of fetal blood may enter your bloodstream. Your immune system may then make anti-D antibodies against those cells. This is called Rh sensitization, RhD alloimmunization, or Rh isoimmunization.

The antibodies do not usually make you unwell. However, they can cross the placenta and destroy an RhD-positive fetus's red blood cells. This can cause fetal anemia, meaning the fetus does not have enough healthy red blood cells to carry oxygen.

The condition does not affect every pregnancy. There is no risk from anti-D antibodies if the fetus is RhD negative. When the fetus is RhD positive, blood tests and ultrasound monitoring help the maternity team assess the risk.

Rh sensitization is different from simply having RhD-negative blood. Being RhD negative is a normal inherited blood type. Sensitization means that anti-D antibodies have already formed.

Symptoms

Rh sensitization itself usually causes no symptoms in the pregnant person. It is normally found through routine prenatal blood testing.

A mildly affected fetus may also have no visible signs on an ordinary ultrasound. More significant anemia may cause changes that can be detected through a specialized Doppler ultrasound, which measures blood flow.

Severe fetal anemia can sometimes lead to:

After birth, the breakdown of red blood cells can cause jaundice. This makes the baby's skin or whites of the eyes look yellow. The baby may also be pale, sleepy, feeding poorly, or breathing faster than expected.

Jaundice can be difficult to judge by skin color alone, particularly in babies with darker skin. Blood tests are used when there is concern.

- Fluid collecting under the skin or around organs, called hydrops fetalis
- An enlarged heart, liver, or spleen
- Reduced fetal movement
- Signs that the fetus is under strain

Causes and risk factors

Rh sensitization begins when an RhD-negative person is exposed to RhD-positive red blood cells. During pregnancy, the source is usually fetal blood crossing the placenta.

This exposure is most likely around birth, but it can also happen after:

Sometimes there is no obvious event. Very small amounts of fetal blood can cross the placenta without causing symptoms.

A previous RhD-positive pregnancy increases the possibility of sensitization if preventive anti-D immunoglobulin was not given, was given too late, or did not fully cover a larger transfer

of fetal blood. Sensitization can occasionally happen despite appropriate preventive care.

Other red-cell antibodies, such as anti-c or anti-K, can also affect a fetus. They are not prevented by anti-D immunoglobulin and may require a different monitoring plan.

- Vaginal bleeding during pregnancy
- Miscarriage, abortion, ectopic pregnancy, or stillbirth
- An injury to the abdomen
- Amniocentesis or chorionic villus sampling
- Procedures that turn or treat the fetus
- Manual removal of the placenta
- A blood transfusion containing incompatible red blood cells

Diagnosis

Routine prenatal blood tests check your ABO blood group, RhD type, and red-cell antibody screen. The antibody screen looks for antibodies that could affect a pregnancy.

If anti-D is found, the laboratory identifies the antibody and measures its amount or strength. Results may be reported as an antibody level or titer. A rising or higher result may suggest a greater risk, but it does not show on its own whether the fetus is anemic.

Anti-D immunoglobulin can temporarily cause a positive antibody result. The laboratory and maternity team use the timing of injections, earlier blood results, and changes over time to judge whether anti-D is preventive medication or true sensitization.

Testing may also determine whether the fetus is RhD positive. Depending on availability, this can involve:

If the fetus is RhD negative, maternal anti-D antibodies cannot attack its red blood cells.

When the fetus may be RhD positive, specialist ultrasound monitoring may be recommended. A middle cerebral artery Doppler measures how quickly blood moves through a vessel in the fetal brain. Faster flow can be a sign of moderate or severe anemia.

In selected cases, fetal blood sampling may confirm anemia. This is an invasive procedure and is generally considered when the result could lead directly to treatment.

- Testing the other biological parent's blood
- Cell-free fetal DNA testing using the pregnant person's blood

- Testing fetal cells obtained for another medical reason

Treatment and management

Anti-D immunoglobulin prevents sensitization; it does not remove anti-D antibodies once the immune system has made them. Established sensitization is managed by assessing and treating its effects on the fetus or newborn.

The care plan is based on the specific antibody, its level, previous pregnancy history, fetal RhD status, and ultrasound findings. It may include repeated antibody blood tests and specialist ultrasound scans.

If testing shows that the fetus does not carry the relevant blood-cell antigen, extra monitoring for that antibody may no longer be needed. If the fetus is at risk, Doppler scans can check for anemia without entering the uterus.

Moderate or severe fetal anemia may be treated with an intrauterine transfusion. During this procedure, compatible donor red blood cells are usually given into an umbilical cord blood vessel under ultrasound guidance. It is performed in a specialist fetal medicine center and may need to be repeated.

The timing of birth is planned around the antibody results, fetal monitoring, response to treatment, and stage of pregnancy. An affected pregnancy does not automatically require a cesarean birth.

After delivery, the baby's blood may be checked for anemia, bilirubin, blood type, and antibodies attached to red blood cells. Treatment can include phototherapy, which uses special light to lower bilirubin. More severely affected babies may need a blood transfusion or an exchange transfusion, in which small amounts of the baby's blood are replaced with compatible donor blood.

Complications

The main complication is hemolytic disease of the fetus and newborn. "Hemolytic" means that red blood cells are being broken down faster than the body can replace them.

Possible effects include:

Very high bilirubin after birth can injure the brain if it is not treated. Hospitals therefore monitor at-risk newborns closely rather than relying only on visible jaundice.

Severe untreated fetal anemia can be life-threatening. With prenatal screening, Doppler

monitoring, transfusion, and newborn treatment, many serious complications can be prevented or managed.

Rh sensitization does not usually cause long-term illness in the pregnant person.

- Fetal or newborn anemia
- Jaundice caused by increased bilirubin
- Hydrops fetalis from severe anemia and heart strain
- A need for transfusion before or after birth
- Premature delivery when earlier birth is safer

Prevention

Rh sensitization can often be prevented, but established sensitization cannot currently be reversed.

If you are RhD negative and have not developed anti-D antibodies, anti-D immunoglobulin may be offered during pregnancy. It contains antibodies that clear RhD-positive fetal cells before your immune system forms its own lasting response.

Preventive anti-D is commonly given around 28 weeks of pregnancy and again after birth if the baby is RhD positive. After delivery, it is most effective when given promptly, usually within 72 hours. Local schedules may include one or more routine pregnancy injections.

Anti-D may also be needed after an event that could allow fetal blood into your bloodstream, such as bleeding, pregnancy loss, abdominal injury, or an invasive prenatal procedure. Whether it is recommended after an early pregnancy loss can depend on gestational age, the type of event, and local guidance.

After delivery or a significant bleeding event, a test may estimate how much fetal blood entered your circulation. This helps determine whether additional anti-D immunoglobulin is needed.

Anti-D immunoglobulin only prevents antibodies against the RhD antigen. It does not prevent sensitization to other red-cell antigens, and it does not treat someone who is already sensitized to RhD.

Living with it and what to expect

Anti-D antibodies often remain in the immune system for many years and may be lifelong.

Their measured level can fall or even become undetectable, but the immune system may respond quickly after another exposure.

Future pregnancies are only at risk if the fetus is RhD positive. An RhD-negative fetus will not be affected by anti-D antibodies. Fetal DNA testing may be able to clarify this early in pregnancy.

If a pregnancy is at risk, you may have more blood tests and ultrasound appointments than usual. Some pregnancies need monitoring only. Others require fetal transfusion, planned early birth, or newborn treatment. A previous severely affected pregnancy can increase concern in a later RhD-positive pregnancy, even when the current antibody level is low.

Most people with Rh sensitization remain physically well and can continue normal activities unless there is another pregnancy-related reason to limit them. The extra appointments and uncertainty can still be stressful. Your maternity team can explain what each result means and what would change the plan.

Tell healthcare professionals and blood-bank staff that you have anti-D antibodies, including outside pregnancy. This information helps them select compatible blood if you ever need a transfusion.

When to get medical help

Contact your maternity unit promptly if you are RhD negative and have vaginal bleeding, an abdominal injury, or a procedure involving the pregnancy. If you are not sensitized, preventive anti-D may be time-sensitive.

If you have known Rh sensitization, attend planned blood tests and ultrasound appointments even when you feel well. Contact the maternity unit the same day if fetal movement is reduced or has changed from your baby's usual pattern. Do not wait for the next routine appointment.

After birth, seek prompt medical assessment if your baby develops worsening yellow coloring, poor feeding, unusual sleepiness, increasing paleness, or fast breathing.

Call emergency services if a baby is difficult to wake, has severe breathing difficulty, becomes limp or unresponsive, or has a seizure. These symptoms can have several causes and need immediate assessment.

Routine questions about antibody results, fetal RhD testing, or future pregnancy planning can usually be discussed at a scheduled prenatal or preconception appointment.

Common questions

Can Rh sensitization go away?

The antibody level may become very low, but true sensitization is generally considered lasting. Your immune system keeps a memory of RhD-positive cells and can make antibodies again after another exposure.

Will Rh sensitization make me sick?

Usually not. Anti-D antibodies are directed at RhD-positive red blood cells, while your own cells are RhD negative. The concern is their effect on an RhD-positive fetus or on blood-transfusion matching.

What happens if my baby is RhD negative?

Anti-D antibodies cannot affect an RhD-negative baby's red blood cells. If reliable testing confirms that the fetus is RhD negative, monitoring for anti-D-related fetal anemia may not be necessary.

Can I still receive an anti-D injection if I am already sensitized?

Anti-D immunoglobulin cannot remove antibodies that your immune system has already made. It is therefore not a treatment for established anti-D sensitization. Your team will focus on testing the fetus's risk and monitoring for anemia.

Does my partner's blood type matter?

It can help show whether an RhD-positive fetus is possible, but blood type alone may not give a definite answer. The fetus's RhD status may sometimes be checked using cell-free fetal DNA from your blood.

Can I have another healthy pregnancy?

Yes, many people with anti-D antibodies have healthy pregnancies. The plan depends on whether the fetus is RhD positive and whether anemia develops. Early prenatal care and specialist monitoring are important because each pregnancy can be affected differently.

Sources

- American College of Obstetricians and Gynecologists. Practice Bulletin No. 181: Prevention of Rh D Alloimmunization . Obstetrics & Gynecology . 2017;130(2):e57-e70.
- American College of Obstetricians and Gynecologists. Practice Bulletin No. 192: Management of Alloimmunization During Pregnancy . Obstetrics & Gynecology . 2018;131(3):e82-e90.

- Royal College of Obstetricians and Gynaecologists. The Management of Women with Red Cell Antibodies during Pregnancy, Green-top Guideline No. 65 . 2014.
- Society for Maternal-Fetal Medicine. Clinical Guideline #8: The fetus at risk for anemia-diagnosis and management . American Journal of Obstetrics and Gynecology . 2015;212(6):697-710.
- NHS. Rhesus disease . Reviewed October 2021.
- National Institute for Health and Care Excellence. Routine antenatal anti-D prophylaxis for women who are rhesus D negative, Technology Appraisal Guidance TA156 . 2008.