CONDITION

Rh incompatibility

Rh incompatibility occurs when an Rh-negative pregnant person carries an Rh-positive fetus

WHAT IT IS
Maternal and fetal Rh blood types differ

BODY SYSTEM
Blood and pregnancy

MAIN SYMPTOMS
Usually none, newborn jaundice, pallor, swelling

WHAT CAUSES IT
Immune reaction to Rh-positive fetal blood

HOW IT IS DIAGNOSED
Blood type, antibody screen, and fetal or newborn testing

MAIN TREATMENT
Anti-D prevention, monitoring, and transfusion when needed

CAN IT BE CURED?
No - sensitization usually remains lifelong

IS IT AN EMERGENCY?
Sometimes - breathing difficulty in a newborn

LONG-TERM OUTLOOK
Usually excellent with prevention and timely treatment

Overview

Rh incompatibility can occur during pregnancy when you have Rh-negative blood and the fetus has Rh-positive blood. Rh refers to proteins on the surface of red blood cells. The most important is called the RhD antigen.

Different blood types do not usually cause a problem by themselves. The concern is Rh sensitization , also called Rh alloimmunization. This happens when your immune system has encountered Rh-positive red blood cells and made antibodies against them.

These antibodies can cross the placenta and destroy an Rh-positive fetus's red blood cells. This is called hemolytic disease of the fetus and newborn , or HDFN. It can lead to anemia, meaning too few healthy red blood cells, before or after birth.

Rh incompatibility is not an infection and does not usually make the pregnant person ill. With blood testing, anti-D immune globulin and specialist monitoring when needed, serious complications can often be prevented or treated.

Symptoms

Rh incompatibility itself usually causes no symptoms in the pregnant person. You cannot tell whether you are Rh-negative or have developed Rh antibodies from how you feel.

If antibodies are affecting the fetus, anemia may develop. This is usually detected through monitoring rather than symptoms you can feel. Severe anemia can cause the fetal heart to work harder and may lead to fluid collecting in the body, known as hydrops fetalis .

After birth, an affected baby may have:

Jaundice happens when red blood cells break down and release bilirubin, a yellow pigment. A newborn's liver may not remove bilirubin quickly enough. High bilirubin levels require prompt assessment because, in severe cases, bilirubin can harm the brain.

Many babies with an Rh-negative parent have no symptoms. A fetus who is also Rh-negative is not affected by RhD incompatibility.

- Yellow skin or eyes from jaundice
- Pale skin because of anemia
- Unusual sleepiness or poor feeding
- Fast breathing or difficulty breathing
- Swelling or a larger-looking abdomen

Causes and risk factors

You inherit your Rh type from your biological parents. Rh incompatibility is therefore not caused by anything you did during pregnancy.

Sensitization begins when Rh-positive red blood cells enter the bloodstream of someone who is Rh-negative. Even a small amount may prompt the immune system to make anti-D antibodies.

Exposure can happen:

A first Rh-positive pregnancy is often unaffected because sensitization commonly happens near delivery. However, this is not guaranteed. Earlier sensitization may follow a previous

pregnancy, pregnancy loss, transfusion or an event during the current pregnancy.

Once your immune system has made anti-D antibodies, it usually remembers them permanently. In a later Rh-positive pregnancy, antibody production may begin sooner and can be stronger.

Other red blood cell antibodies can also cause HDFN. These are not all prevented by anti-D immune globulin, which is why the antenatal antibody screen checks for more than anti-D.

- During birth, when fetal and maternal blood are more likely to mix
- After miscarriage, abortion or ectopic pregnancy
- With vaginal bleeding during pregnancy
- Following an injury to the abdomen
- During procedures such as amniocentesis or chorionic villus sampling
- During attempts to turn a breech fetus from outside the abdomen
- After an Rh-incompatible blood transfusion

Diagnosis

Blood tests early in pregnancy identify your ABO blood group, RhD type and any red blood cell antibodies. The antibody test may be called an antibody screen or indirect antiglobulin test.

If the screen is negative and you are Rh-negative, it means no relevant antibodies were found at that time. Repeat testing and preventive anti-D immune globulin may be offered according to local pregnancy protocols.

If antibodies are found, the laboratory identifies which antibody is present and measures its level or strength. A positive result does not show by itself that the fetus is anemic. It helps the maternity team decide whether further assessment is needed.

Testing may also establish whether the fetus could be Rh-positive. Depending on local availability and your circumstances, this may involve testing the biological father's blood or analyzing fetal DNA circulating in your blood. Paternity should not be assumed when planning testing.

A fetus at risk of anemia may be monitored with ultrasound. A special Doppler ultrasound measures blood flow in the middle cerebral artery, a vessel in the brain. Faster flow can be a sign of anemia.

In selected cases, fetal blood may be sampled directly through the umbilical cord. This invasive procedure can confirm anemia and may be performed when an intrauterine transfusion is

being considered.

After birth, tests may include the baby's blood type, hemoglobin level and bilirubin level. A direct antiglobulin test, sometimes called a direct Coombs test, looks for antibodies attached to the baby's red blood cells.

Treatment and management

Management depends on whether sensitization has already happened and whether the fetus or newborn is affected.

If you are Rh-negative and have not made anti-D antibodies, anti-D immune globulin , also called Rh immune globulin, can reduce the chance of sensitization. It contains antibodies that remove Rh-positive fetal cells from your circulation before your immune system forms a lasting response.

Anti-D may be offered routinely during pregnancy, after events that could mix fetal and maternal blood, and after birth if the baby is Rh-positive. The timing and number of doses follow local protocols and the circumstances of the exposure.

Anti-D immune globulin prevents sensitization; it does not remove antibodies that your body has already made. If you are already sensitized, care focuses on monitoring and treating fetal anemia.

Monitoring may include repeated maternal blood tests and Doppler ultrasounds. If significant fetal anemia develops, treatment options include:

An affected newborn may need phototherapy. This uses special light to help the body clear bilirubin. Treatment may also include a red blood cell transfusion. Severe anemia or rapidly rising bilirubin can require an exchange transfusion, in which small amounts of the baby's blood are gradually replaced with compatible donor blood.

Some babies need blood tests for several weeks after going home because anemia can appear or continue after the early jaundice has improved.

- Intrauterine transfusion, which gives compatible blood through the umbilical cord
- Planning birth at a hospital able to provide specialist newborn care
- Delivery when remaining in the uterus is judged riskier than being born

Complications

The main fetal complication is anemia caused by antibody-driven destruction of red blood cells. Mild anemia may require monitoring only. More severe anemia can strain the heart.

Hydrops fetalis is a serious form of illness in which fluid collects in at least two areas of the fetus's body. It may be accompanied by heart failure. Without effective treatment, severe fetal anemia can lead to pregnancy loss or stillbirth.

After birth, continued red blood cell breakdown can cause anemia and jaundice. Very high untreated bilirubin can enter the brain and cause permanent injury, known as kernicterus. Prompt bilirubin testing and treatment make this complication preventable in many cases.

A baby who received intrauterine transfusions may still develop delayed anemia. Follow-up blood tests help identify this before it becomes severe.

Anti-D antibodies generally do not damage the pregnant person's own Rh-negative red blood cells. However, having red blood cell antibodies can make it more complicated to find compatible blood if a transfusion is ever needed.

Prevention

You cannot prevent being Rh-negative or determine which Rh type a fetus inherits. However, sensitization to RhD can often be prevented.

If you are Rh-negative and not already sensitized, receive antenatal testing and discuss anti-D immune globulin as part of routine pregnancy care. Tell the maternity team promptly about bleeding, abdominal injury, pregnancy loss or an invasive pregnancy procedure because an additional dose may be appropriate.

After birth, the baby's Rh type can be checked. Anti-D is generally offered after an Rh-positive birth according to local guidance.

Anti-D cannot prevent problems once anti-D sensitization has occurred. It also does not prevent HDFN caused by other red blood cell antibodies. Regular antibody screening remains important even if you have received anti-D.

Keep a record of any known antibodies and mention them before future pregnancies or blood transfusions. Blood banks need this information even if an antibody later becomes difficult to detect on routine testing.

Living with it and what to expect

Most Rh-negative people who receive recommended screening and preventive care do not

become sensitized. Rh incompatibility alone does not usually change day-to-day life or prevent a healthy pregnancy.

If anti-D antibodies are present, they usually remain for life. Future pregnancies are not automatically affected. A fetus who is Rh-negative will not be harmed by anti-D antibodies, while an Rh-positive fetus may need closer monitoring.

The effect can differ between pregnancies. A previously affected pregnancy may increase concern in a later Rh-positive pregnancy, but it does not predict the exact course. Early referral allows monitoring to begin before anemia becomes severe.

Specialist visits and repeated ultrasounds can take time and may be emotionally difficult. Ask the maternity team to explain what each antibody result or scan means, since a positive antibody test does not always mean the fetus is currently unwell.

Babies treated for HDFN often recover, but some need repeat bilirubin checks, blood counts or transfusions during the first weeks or months. Follow-up is especially important after an intrauterine transfusion or severe newborn jaundice.

When to get medical help

Arrange routine pregnancy care early if you know you are Rh-negative, have previously had anti-D antibodies, or had a pregnancy affected by fetal or newborn anemia. Bring records from earlier pregnancies if they are available.

Contact your maternity service promptly if you are Rh-negative and:

Seek urgent assessment if fetal movement is reduced or has changed from its usual pattern. This symptom has many possible causes, but it should not wait for a routine visit.

A newborn needs urgent medical assessment for jaundice during the first 24 hours, rapidly worsening yellow color, marked sleepiness, poor feeding or increasing paleness.

Call emergency services if a baby has difficulty breathing, is hard to wake, has a seizure, becomes limp or develops blue or gray lips or skin.

- Have vaginal bleeding
- Experience a blow or injury to the abdomen
- Have a miscarriage, abortion or suspected ectopic pregnancy
- Undergo a pregnancy procedure
- Think you missed a planned anti-D appointment

Common questions

Does being Rh-negative mean my baby is in danger?

No. Rh-negative blood is a normal inherited blood type. A problem is possible only if the fetus is Rh-positive and you develop antibodies that cross the placenta. Screening and anti-D prevention greatly reduce this risk.

Can Rh incompatibility affect my first pregnancy?

Yes, although later pregnancies are more commonly affected. Sensitization may have occurred during an earlier pregnancy loss, transfusion or an event during the current pregnancy. This is why antibody testing is performed even during a first known pregnancy.

What if both biological parents are Rh-negative?

If both are confirmed RhD-negative, the fetus is expected to be RhD-negative and RhD incompatibility should not occur. Testing decisions may still account for uncertainty about biological parentage or unusual Rh variants.

Can anti-D immune globulin harm the baby?

Anti-D has been widely used to prevent Rh sensitization. It is a blood-derived product and can cause temporary soreness or mild reactions in some people. Your care team can explain how it is made, screened and used within your local health system.

Can I have another baby after becoming sensitized?

Yes. Sensitization does not prevent pregnancy, but an Rh-positive fetus may need specialist monitoring. Pre-pregnancy or early pregnancy review can clarify which antibody you have and how a future pregnancy may be followed.

Is Rh incompatibility the same as ABO incompatibility?

No. ABO and Rh are different blood group systems. ABO incompatibility can also break down a newborn's red blood cells, but it is often less severe and is managed according to the baby's anemia and bilirubin levels.

Sources

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