NHS
Blood and Transplant

Blood Groups and Red Cell Antibodies in Pregnancy

During your pregnancy, you will be offered tests to find out your blood group, and to see if you have any antibodies to red blood cells. These tests are normally carried out at the beginning of your pregnancy and again in the last three months.

This leaflet explains why blood groups and antibodies are important in pregnancy. It also contains details about antibodies which can cause haemolytic disease of the fetus and newborn (HDFN), previously called *Rhesus* disease.

This patient information leaflet does not replace the guidance provided by your treating obstetrician/midwife. Your obstetrician/midwife should advise you of the options that exist for your treatment, advise of any alternative treatment and any associated risks. Your obstetrician/midwife should ensure that you are aware of the material risks of injury associated with this treatment. If you are unsure about any aspects of your treatment/care, ask your obstetrician/midwife to explain.

What are blood groups?

Red blood cells are the most common cells in your blood stream. They carry the oxygen you breathe around your body. Your red cells have natural proteins on the surface which make up your blood groups. These blood groups are inherited from your parents.

The four main blood groups are group O, group A, group B and group AB. But you also have another blood group called D (also known as *"RhD"*).

So, for example, you could be Group A, D positive, or Group A, D negative. In addition to ABO and D groups everyone has other, minor blood groups. Two of the minor blood groups that can be important in pregnancy are 'c' (little c) and 'K' (Kell).

What are red cell antibodies?

Antibodies are your body's natural defence against anything which is different from yourself. For example, a virus, vaccine or a different blood group. They are part of your immune system and protect your body against harmful invasions like infections.

You may form antibodies if blood cells with a different blood group from your own enter your blood stream. This can happen because of a blood transfusion or during pregnancy.

How are these antibodies made during pregnancy?

A few of your baby's blood cells may 'leak' into your blood during pregnancy. This usually happens when the baby is born.

If your baby's blood group is different from your own, your immune system may produce antibodies. This is rare. Only about three in 100 pregnant women develop antibodies, and most of these are harmless. The illustrations over the page show how this happens.

Important Patient Information

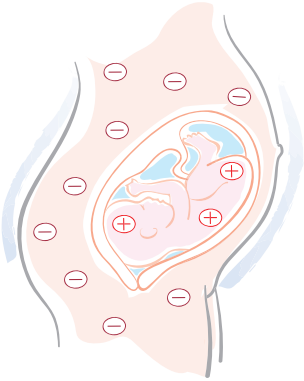
How red cell antibodies are formed during pregnancy

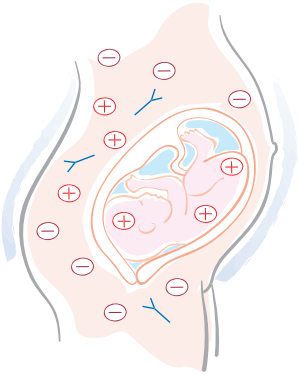
⊖ Mother's red blood cells

⊕ Baby's red blood cells

Mother's antibody

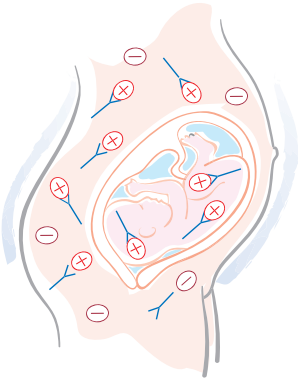
A. This baby has a different blood group from its mother. You can see this from the ⊖ in the mother and the ⊕ in the baby.





B. A baby's blood can cross through the placenta into its mother's blood. In this picture the baby's ⊕ blood is now in the mother, along with her own ⊖ blood. In rare cases, her body recognises these cells ⊕ are different and makes antibodies to fight them.

C. Antibodies can move across the mother's placenta into the baby's blood. The baby's blood cells can be damaged if they have the matching blood group.



Why are blood groups and red cell antibodies important when I'm pregnant?

There are **three** main reasons:

1. If you need a blood transfusion.

If you need a blood transfusion the blood selected for you must be the correct blood group. It must also be the correct match for any antibodies you have.

2. To ensure you and your baby get the right treatment.

If tests show that you have made antibodies to your baby's blood you may need extra treatment.

How could red cell antibodies affect my baby?

Antibodies are generally harmless, but they can move from your blood stream into your baby's blood. Your baby's red cells could be damaged if they have the blood group which matches these antibodies. The illustrations on the previous page show how this can happen.

In most cases the baby is not harmed. However, certain antibodies, particularly if they are strong, could destroy the baby's red cells. This condition is called haemolytic disease of the fetus and newborn (HDFN) previously called *Rhesus* disease. **HDFN can cause anaemia, jaundice and in severe cases brain damage or death, either while the baby is in the womb or after delivery.**

The antibody called anti-D causes the most common form of (HDFN). The antibodies remain in the mother's blood and they could also damage the red cells of a subsequent baby, if he or she has the same blood group as the first.

Is there a test to see if my baby would be affected by the antibodies I have?

Yes, there is a test called Fetal Blood Group Genotyping, to determine your baby's blood group type specific to the antibodies you have, however this test is not available for all antibodies. If your baby's blood type is the same as yours, your baby will not be affected by the antibody you have and you will not have to have the tests outlined in the next paragraphs. Please discuss having this test with your obstetrician or your midwife.

What will happen if I have antibodies to my baby's blood cells?

If you have antibodies you may be offered regular blood tests to measure the levels.

Your baby may be monitored by ultrasound scan during your pregnancy. This is just a precaution, and generally no treatment is needed. However, if the antibody levels rise very high, your baby may need to be delivered early. Your baby may also be tested soon after birth to make sure he or she is not anaemic.

Sometimes babies will need a blood transfusion in the womb. This is very rare and is performed in specialist hospital departments. This is called an intrauterine transfusion.

What are the risks to me and my baby if my baby needs a transfusion in the womb?

Your obstetrician will discuss with you the need of transfusing your baby in the womb, if the scan and laboratory tests show that your baby is at a high risk of HDFN. The risk to your baby, of **not** having this transfusion, is very high at this stage and could result in severe harm to your baby.

Any intervention incurs risks; please discuss these with your obstetrician prior to the procedure. It is not within the scope of this leaflet to outline these particular risks.

Which antibodies cause most problems?

Anti-D is the antibody most likely to cause problems as it is the commonest antibody that can cause *HDFN* in your baby. Anti-D can form if your blood group is D negative and your baby's is D positive. There is a way to prevent anti-D antibodies forming, see point 3. *To find out if you are D negative* in the next section.

Anti-c ('little c') and anti-K (Kell) are other antibodies which can cause HDFN.

3. To find out if you are D negative

If I am D negative, how am I affected?

It is important that you have a blood group test early in your pregnancy. If you are D negative you will be told about treatment during your pregnancy to prevent the formation of anti-D. This is important; if you form anti-D in this pregnancy it might affect a subsequent baby who has a D positive blood group.

How can I avoid making anti-D?

If you are D negative you can avoid making the antibody by receiving anti-D injections of a 'ready-made' antibody. This harmless antibody removes your baby's red cells from your blood before your own body is able to make an antibody to fight these red cells.

What are anti-D injections and what are its associated risks?

Anti-D injections are made from plasma. Plasma is the fluid part of blood, which transports blood cells around the body. The plasma used in anti-D injections is collected from specially selected blood donors. It is also known as 'prophylactic anti-D' or 'anti-D immunoglobulin'. It has been used successfully for over 30 years.

Can anti-D injection cause any adverse effects?

Common side effects: Soreness at the injection site is common. The soreness lasts for a few hours to a day or two.

Uncommon side effects: a mild fever, headache or rash. Very occasionally women can experience an allergic reaction to anti-D injections. If you have any concerns, please speak to your midwife or obstetrician.

Transmission of infection from anti-D injections has never occurred in the UK despite thousands of doses having been administered to pregnant women every year since the late 1960s. A very small risk of infection from the plasma donors cannot however be completely ruled out.

What is the failure rate of anti-D injections?

The failure rate is 0.37% according to the NICE Health Technology Assessment 2003.

Please speak to your midwife or obstetrician, if you have any concerns.

Do all D negative mothers need anti-D?

Anti-D injections are only needed if a D negative woman is pregnant with a D positive baby. In about one in three pregnancies, the baby will be D negative and the anti-D injection would be unnecessary.

By identifying the unborn baby's blood group we can ensure that only women who need it will receive anti-D.

Please see below: When will I need treatment?

When the unborn baby's blood group is known to be D negative, injections will not be needed. If healthcare staff do not know the baby's D blood group, then an anti-D injection would be recommended.

Please speak to your midwife or obstetrician, if you would like to have a test which determines your unborn baby's D group. Please note that this test is now available at most hospitals in England at the time of publication.

When will I need treatment?

If you are D negative and need anti-D injections (see above 'Do all D negative mothers need anti-D) you will need treatment at the following times:

During pregnancy – routine treatment

If you are D negative you should be offered 'anti-D' during the last three months of your pregnancy. This is called 'routine antenatal prophylaxis'. It is normally given as an injection at 28 and 34 weeks of pregnancy. However, you may be offered just one larger dose at 28 weeks.

During pregnancy – after an incident

There are some incidents which can cause your baby's cells to leak into your blood:

- Hospital treatment for miscarriage or threatened miscarriage
- Termination of pregnancy

- Injury to your abdomen, such as a seat belt injury or a fall
- Vaginal bleeding
- Some tests such as amniocentesis (when a small sample of the fluid surrounding your baby is taken)
- Turning your baby from breech (bottom first) position by a doctor or midwife.

You will need an injection of anti-D after any of these events when you are 12 weeks pregnant or more. You should receive the injection within three days of any of these incidents, but it can work up to ten days later. Your doctor or midwife will advise you. The injection will not affect your baby.

After childbirth

Your baby will be tested after birth. If the baby is D positive it is important that you are offered an injection of anti-D within three days of giving birth. Ask your midwife or obstetrician for more information.

What if I do not want to receive anti-D injections?

When you are offered anti-D injections, either during your pregnancy or following the birth of your baby, you can choose whether or not to accept them. Receiving the injections of anti-D is recommended in order to protect any more babies you might have against *HDFN*. Speak to your midwife or obstetrician if you need more information.

Further Information

If you have questions about the information in this leaflet, or if there are things that worry you, please ask your doctor or midwife.

You may also find these websites useful:

Antenatal screening in general:
https://legacyscreening.phe.org.uk/alloantibody

Routine antenatal anti-D prophylaxis:
www.nice.org.uk/nicemedia/pdf/TA156PublicInfo.pdf

Fetal RHD screening test or high-throughput non-invasive prenatal testing
https://www.nice.org.uk/guidance/dg25

A to Z of useful terms

Amniocentesis: a test sometimes carried out in pregnancy to check on the baby's progress in the womb. A small sample of the fluid surrounding your baby is taken for laboratory tests.

Anaemia: levels of red cells in the blood which are below normal.

Antibodies: are produced by your immune system to fight against infections or anything foreign which enters your blood.

Anti-D: an antibody which attacks red cells that are D positive. The most common cause of *HDFN*.

Anti-D immunoglobulin: ready-made anti-D which is given to stop you making your own anti-D.

Blood group: ABO and D are blood groups, e.g. A, D positive or A, D negative. Your blood group is made up of natural substances on the surface of your red blood cells.

Haemolytic disease of the fetus and newborn (HDFN): anaemia and jaundice in newborn babies caused by antibodies in the mother affecting the baby's red cells. This can cause anaemia, jaundice and in severe cases brain damage or death, either while the baby is in the womb or after delivery

Intrauterine transfusion: blood transfusion given to a baby in the mother's womb. Experts working in specialist hospital departments give these transfusions.

Jaundice: raised levels of waste products from the breakdown of red blood cells. It gives a yellow colour to a baby's skin and eyes.

Plasma: the liquid part of blood. Prophylactic anti-D is made from the plasma of specially selected blood donors.

Prophylactic anti-D: ready-made anti-D given to D negative women to stop them making anti-D. (See also anti-D immunoglobulin).

Prophylaxis: medicines given to prevent a harmful condition developing.

Red Cell Antibodies: antibodies are produced by your immune system to fight against infections or anything foreign which enters your blood. Red cell antibodies are your body's natural defence against red blood cells which are different from your own. Antibodies can destroy red blood cells.

***Rhesus* disease:** is now known as Haemolytic Disease of the Fetus and Newborn (HDFN) caused by the anti-D antibody.

***Rhesus* positive or *Rhesus* negative:** other names for 'D positive' or 'D negative' blood groups.

Routine antenatal prophylaxis: injections of ready-made anti-D offered to women who are D negative to stop them making anti-D. This is given during late pregnancy and after incidents which may cause your baby's red cells to leak into your blood.

Variant Creutzfeldt-Jakob Disease (vCJD): Since the emergence of vCJD in the UK the medical advice has been not to use UK blood in manufacturing for plasma products. Plasma is imported to treat patients born after 1st January 1996 as a risk reduction measure against the possible transmission of vCJD because as yet there is no specific test available for screening blood donors. This blood has been tested negative to UK standards for HIV, Hepatitis B and C. This measure is taken in line with advice from the Government Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO).

Data Protection

NHS Blood and Transplant keeps a record of all the tests it performs and any advice it offers to your healthcare team, to run its service effectively and safely. Your data will be held securely and in accordance with your rights under the Data Protection Act 1998.

Because of the rarity of HDFN, we ask hospitals for a few details about any baby that is affected, soon after the baby is born. We need this information to help us improve our knowledge, and give the best care possible to all mums and their babies.

Additional copies of this leaflet may be obtained from NHS Blood and Transplant. Call 0300 123 23 23.

NHS Blood and Transplant is a Specialist Health Authority within the NHS.

NHS Blood and Transplant

NHS Blood and Transplant (NHSBT) saves and improves lives by providing a safe, reliable and efficient supply of blood and associated services to the NHS in England and North Wales. We are the organ donor organisation for the UK and are responsible for matching and allocating donated organs. We rely on thousands of members of the public who voluntarily donate their blood, organs, tissues and stem cells.

For more information

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