



Red Blood Cell Alloimmunisation

Red Blood Cell Alloimmunisation is important to diagnose in pregnancy because it can lead to a serious complication called haemolytic disease of the newborn.

Babies with this condition may require intensive care, blood transfusions and other medical therapies. Approximately 15 per cent of women will require preventative treatment during pregnancy and childbirth. Fortunately, only about one in a hundred of all pregnant women will actually be affected by this condition and need special care during pregnancy.

What is alloimmunisation?

Your body has the natural ability to recognise any germs in your bloodstream and to produce protective immune factors called antibodies. These antibodies help to destroy germs and defend you from infections. Once you develop these antibodies, your body can quickly recognise that particular germ and produce antibodies targeted against it. This process is called immunisation.

Your immune system can have a similar antibody reaction if cells from a different person enter your blood stream. For example, if you were to have a transfusion of blood that was of a different blood group to your own, your body might produce antibodies to that blood group because your immune system considers it 'foreign'. This process is called alloimmunisation.

What is haemolytic disease of the newborn?

Babies may have a different blood group to their mother because they can inherit a different one from their father. In this case, if the woman has antibodies directed against a 'foreign' blood group, her antibodies might cross the placenta and destroy the unborn baby's blood cells.

This is potentially a very serious problem that may result in severe anaemia (low blood count) and heart failure in the unborn baby or newborn.

Doctors can give blood transfusions and other treatments to help a newborn affected by this condition. However, in very serious cases, babies may die before they are born, or shortly after birth. Future pregnancies for the mother may also be at risk because the mother retains these antibodies for many years.

How does red blood cell alloimmunisation develop?

A woman may become alloimmunised because of a previous blood transfusion. However, it most commonly occurs because of a previous pregnancy. This is because very tiny amounts of baby's blood may cross the placenta into the mother's bloodstream during birth and stimulate an antibody reaction in the mother. These antibodies may then affect the next pregnancy.

Approximately 85 per cent of pregnancy alloimmunisation involves the Rhesus blood group. You will hear people talking about whether they are a 'positive' or 'negative' blood group. They are generally referring to the Rhesus blood group. If the mother is Rhesus 'negative' and her unborn baby is Rhesus 'positive', the woman is at risk of developing antibodies against the baby's blood cells.

The Rhesus 'anti-D' antibody is the most common type of anti-red blood cell antibody. There are other red blood cell groups that can also be a problem but these are rare.





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Diagnosis

All pregnant women should have a blood test at their first antenatal visit to check their blood group and to look for the presence of anti-red blood cell antibodies. About one per cent of women will have anti-red blood cell antibodies detected in pregnancy and require further follow up.

Women who do not have anti-red blood cell antibodies but have a Rhesus 'negative' blood group will need further blood tests at 28 weeks gestation and at the time of delivery. Their doctor or midwife will offer them preventative treatment as explained below. About 15 per cent of women in our population fall into this group.

Prevention of alloimmunisation in Rhesus negative women?

We can prevent many cases of red blood cell antibodies by giving women of childbearing age carefully matched blood transfusions.

We can also prevent most of the alloimmunisation that occurs during pregnancy. We cannot prevent the baby's red blood cells from entering the mother's circulation, but it is possible to block the immune response of the mother. We use a treatment that clears the baby's red blood cells away before the mother's immune system has time to develop antibodies. We often call this treatment the 'anti-D' injection. This anti-D immunoglobulin is collected from healthy blood donors and is very safe to use in pregnancy.



The 'anti-D injection'

All Rhesus negative women should be offered an injection of anti-D immunoglobulin at 28 weeks and 34 weeks gestation, even though the baby's blood group is usually unknown before birth. The midwife or doctor will test the baby's blood group at birth using the umbilical cord blood and if the baby is Rhesus positive, they will give the mother another dose of anti-D immunoglobulin.

The unborn baby's blood is also more likely to enter the mother's circulation and trigger antibody production in the following situations:

- any vaginal bleeding (such as a threatened miscarriage)
- an injury to the woman's abdomen (such as a fall, or car accident)

- any needle test into the womb during pregnancy, such as amniocentesis
- following an attempt to 'turn' a breech baby (external cephalic version, ECV)

Rhesus negative women may require additional doses of anti-D if they experience any of these situations.

The use of the anti-D injection prevents almost all cases of this serious problem. Unfortunately, it cannot prevent all cases.

Antenatal care for women with red blood cell alloimmunisation

If a woman has already formed antibodies to red blood cells, this process cannot be reversed and she will not benefit from anti-D injections.

In these cases, the first step is to determine whether the unborn baby's blood group places it at risk of anaemia. Sometimes a blood test on the father of the baby can help predict the blood group of the baby. However, it is only possible to be certain of the baby's group by taking a sample of fluid from around the baby using a needle. This procedure, called an amniocentesis, can be performed from 15 weeks gestation.

In some locations, a maternal blood test can diagnose the baby's blood group, but this is not widely available in Australia. If it appears that the unborn baby is at risk, the woman will need special monitoring during her pregnancy.

The higher the amount of antibody in the mother's blood, the higher the risk to the baby. Women with red blood cell antibodies will have regular blood tests throughout the pregnancy to check these levels. A prior history of any affected babies is also very important in determining the risk to the current pregnancy.

Low risk women

These women may not require any treatment other than a planned birth a week or so before the due date.

Medium risk women

Women at medium risk may need regular ultrasound examinations in addition to regular antibody measurements. These ultrasound examinations look for signs of anaemia in the unborn baby.

High risk women

Some women are at high risk because of a previously affected baby, high antibody levels, or an abnormal ultrasound finding. These women may require invasive testing and fetal therapy. An ultrasound-guided blood sampling and fetal blood transfusion may be required if the unborn baby is very premature and shows signs of severe anaemia. This procedure requires particular expertise and is performed by a highly trained specialist.

Unborn babies who are in danger of getting sick in the womb may need to be born before 37 weeks gestation. The timing of birth involves balancing the risks of early birth against the risks of ongoing anaemia for the baby.

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