

# Neonatal Alloimmune Neutropenia (NAIN) information

## What are granulocytes and neutrophils?

Blood contains cells and a clear fluid known as plasma. The most common cells are red blood cells that carry oxygen. There are also white blood cells that fight infection, and small cells called platelets that help blood to clot and so stop bleeding. Granulocytes are white blood cells that have an essential role in defending the body against infections. Normally, most granulocytes in your blood are a specific type called neutrophils. If the number of neutrophils in your blood is reduced, this is called neutropenia. There are different causes of neutropenia. For example, your body may not produce as many, or may remove neutrophils more quickly from your blood. Whatever the cause, if you have neutropenia you may be at risk of infection from organisms that would not normally cause a problem.

## What are neutrophil antigens (neutrophil 'blood groups')?

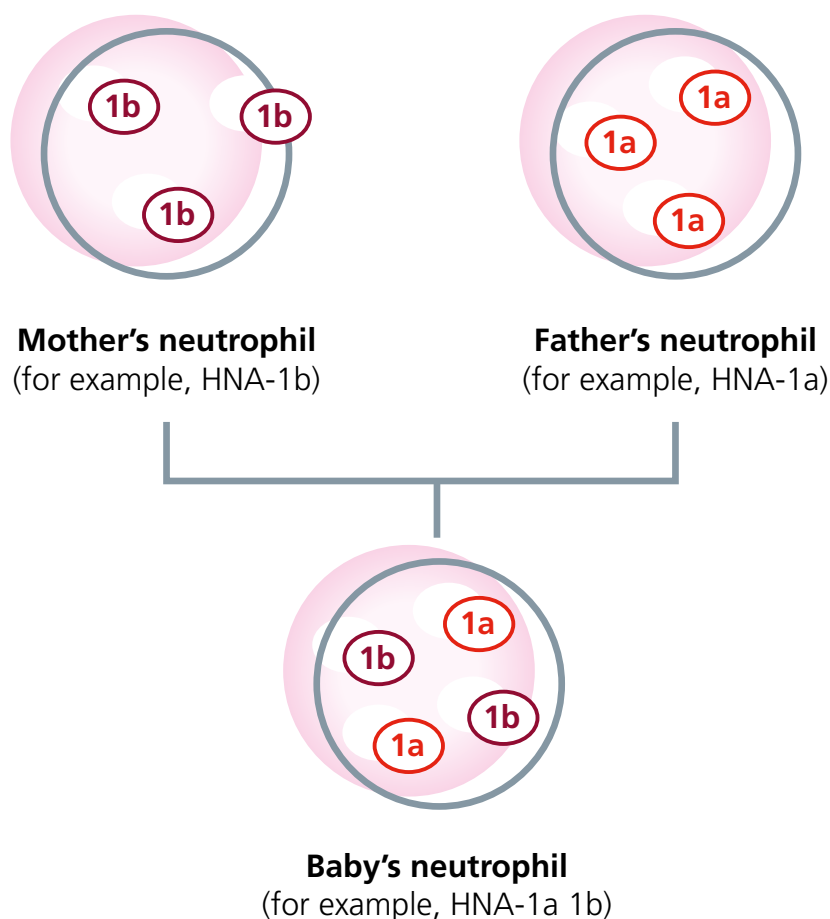
Every neutrophil has natural proteins and sugars on its surface, which are known as human neutrophil antigens, or HNAs. These are similar to the 'ABO blood group antigens' on red cells. There are many different types of neutrophil antigens and scientist are discovering new groups all the time.

## How are human neutrophil antigens inherited?

You inherit HNAs from both your parents. The diagram below illustrates how HNAs are inherited. The example given shows a mother who only has HNA-1b on her cells and a father who only has HNA-1a on his cells. The baby has inherited HNA-1a from the father and HNA-1b from the mother. Other HNAs could be inherited in the same way.

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### How neutrophil groups are inherited?



**The baby inherits a neutrophil group from the mother and one from the father.**

### What are antibodies?

Antibodies are an important part of your body's immune system, which helps you fight disease. They are formed when your immune system comes into contact with a substance – for example, a virus, a vaccine, a different blood group such as ABO or HNA.

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### What is neonatal alloimmune neutropenia (NAIN)?

NAIN develops when a mother produces antibodies against the human neutrophil antigens (or HNAs) that are present on the baby's neutrophils but not on hers. These antibodies can cross the placenta, attack and destroy the baby's neutrophils. This does not usually cause a problem while the baby is in the womb and if the mother stays healthy and free from infection. However, after the baby is born, it may be more at risk from infections if it has a low neutrophil count.

There are number of treatments for this condition. In mild cases, you may not need treatment other than taking more care in keeping the baby clean. In other cases, we may give antibiotics to the baby either to prevent infections or to treat an infection. In some cases, we may give the baby a drug (granulocyte colony stimulating factor, or GCSF) to increase the number of granulocytes being produced in the bone marrow.

Usually, the baby's own granulocyte count will begin to increase in one or two weeks. But sometimes the neutropenia can last for up to six months.

### What does it mean to me as a mother if I have neutrophil antibodies?

Having neutrophil antibodies in your blood will not affect your normal daily life or your health, but there is a chance that any children you have in the future may also be affected by neutropenia shortly after they are born. To assess this risk, we would need to take a blood sample from the father. Your doctor will tell you about the risks for any babies you have in the future.

### Are there any other things I should consider?

Having neutrophil antibodies in your blood means that you cannot be a blood donor because these antibodies can destroy the granulocytes of the person receiving the blood. Your doctor will issue you with a card which describes which antibodies are in your blood, and you should carry this with you in your wallet or purse. Doctors should be aware that you have these antibodies. But if you have to go to hospital or to your GP in the future, you should always show your card to them at the start of the consultation.

### Are there any long-term effects for my baby?

After the neutropenia and any infections have been successfully treated, there will not be any long-term effects for your baby.

## Further information and support

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

Because NAIN is a rare condition, we ask hospitals for a few details about any baby that is affected by it, soon after the baby is born. We need this information to help us improve our knowledge, and so give the best possible care to all mothers and babies.

**This patient information leaflet does not replace the guidance provided by your treating clinical team. Your treating clinical team should advise you of the options for treatment, advise of any alternative treatment and associated risks. Your treating clinical team should ensure that you are aware of the material risks associated with the treatment advised.**

**It is the responsibility of the requester submitting your sample, to ensure informed consent has been obtained for all tests, including genetic tests in accordance with current guidance and legislation.**

**If you are unsure about any aspects of the treatment/care, ask your treating clinical team to explain.**

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