

Patient information

Hemolytic disease of the newborn (HDN): ABO incompatibility

Context

The ICTMG's mission is to optimize patient outcomes through evidence-based international transfusion guidance development and relevant local implementation. In 2022, the ICTMG published a guideline of evidence-based recommendations for health-care professionals on the use of intravenous immunoglobulin in the management of Rh- and ABO-mediated HDN. To learn more about ICTMG, visit [ICTMG.org](https://www.ictmg.org).

This patient pamphlet is provided as an additional resource for patients and families. This pamphlet has been adapted with permission from the Hospital for Sick Children. To view this source material, please visit [AboutKidsHealth](https://www.aboutkidshealth.ca).

About HDN

What is HDN?

Hemolytic disease of the newborn (HDN) is a blood disorder in which the baby's red blood cells break down quickly, known as hemolysis.

This causes the release of a breakdown product, bilirubin, into the baby's bloodstream as well as the destruction of the red blood cells in the baby's body.

HDN causes a newborn baby's red blood cells to break down more quickly than they should. This occurs due to differences in blood type between mother and baby.

In ABO incompatibility, the breakdown of red blood cells causes an increase in substance called bilirubin, which causes jaundice, often seen as a yellow discolouration of the skin. Jaundice develops in the days after the baby is born, and problems before birth are exceptionally rare from ABO incompatibility.

What causes HDN?

We all have many circulating antibodies. Antibodies are proteins which act in the immune system. Many antibodies are used to fight infection, while others can target other parts of the body including the antigens on red blood cells.

During pregnancy, some antibodies can travel across the placenta into the baby's bloodstream. Many of these antibodies provide the baby with some protection against infections after the baby is born. If the baby and mother's blood group do not match, blood type antibodies can travel across the placenta and attach to the baby's red blood cells, causing quicker destruction of the red blood cells which leads to HDN.

The most common reason for HDN is ABO incompatibility; this may occur when the baby and the mother have incompatible blood groups (e.g., baby has A or B blood group and the mother has O blood group). Antibodies in ABO incompatibility occur naturally in the mother's body if she is O blood group and then travel across the placenta to the baby.

This type of HDN can range in severity from very mild, even undetectable, to moderate requiring some treatments. It is usually mild and is rarely severe.

Patient information

Hemolytic disease of the newborn (HDN): ABO incompatibility

About HDN

What are the risks to my newborn?

All newborn babies develop some jaundice, which is caused by the breakdown product of fetal red blood cells. Jaundice does not develop in babies before birth as the mother's blood circulation clears the breakdown product quickly. Jaundice is often seen as yellowing of the skin and eyes in the newborn baby. Babies with HDN develop higher bilirubin levels than babies without HDN.

High levels of bilirubin are toxic to the developing brain and can cause a condition called kernicterus. Kernicterus is damage to the brain's nerve cells and can cause neurological consequences including seizures and can lead to long-term hearing loss and cerebral palsy. This is why treatment is initiated quickly to lower bilirubin levels. Kernicterus is very rare, due to early recognition of risk factors and bilirubin testing.

Newborn babies with HDN are also at risk of developing anemia from the destruction of their red blood cells. Anemia is too few red blood cells, also known as low hemoglobin. People need red blood cells to carry oxygen and provide energy to parts of their body, including their heart and brain. Anemia is life threatening if the red blood cells are too low. Anemia can develop in severe cases of ABO incompatibility HDN.

When to seek medical attention

Seek medical attention if your baby:

- develops more jaundice or is very pale
- is very sleepy
- is not feeding well
- develops a high-pitched cry
- has any other concerns.

A person's blood group (or blood type) is classified based on special antigens on the surface of the red blood cell. The antigens are made of proteins, carbohydrates and/or lipids and vary from person to person. These antigens are inherited by our genes. There are many different antigens on a person's red blood cells. A small number of these can cause HDN if they do not match between mother and baby.

There are four major blood groups: A, B, AB, and O. A person's red blood cells may also contain a protein called the Rhesus (Rh) factor.

- If a person has the Rh factor, they are RhD positive (Rh+), sometimes people refer to this as a 'positive blood group'.
- If they do not have the Rh factor, they are RhD negative (Rh-), or a 'negative blood group'.

There are many more blood groups beyond the "ABO system" or the "Rh +/- system", however these are the most commonly discussed blood groups.

All babies inherit their blood group from both parents. Sometimes, the baby will have a blood group from their father which is different from their mother.

Patient information

Hemolytic disease of the newborn (HDN): ABO incompatibility

HDN treatment

How is HDN treated?

After the baby is born, they will have blood tests repeated over several days to determine how the hemolysis is progressing (assessing bilirubin levels and hemoglobin levels if necessary).

Depending on the severity of the jaundice, determined by how elevated the bilirubin levels are, there are a few different treatment options.

- Phototherapy is the most common treatment required and uses a special lamp and/or blanket of blue light to help the baby's body to get rid of the bilirubin. Phototherapy makes the molecules of bilirubin come together, allowing the kidneys to excrete them out of the body through urine. Usually, babies require this treatment for hours to days.
- If jaundice is severe and phototherapy is not enough to treat it quickly, an exchange transfusion may rarely be needed. Exchange transfusions remove the blood with critically high bilirubin levels and replaces it with donated red blood cells. If anemia is severe, red blood cell transfusions are sometimes required.
- Other therapies, including intravenous immunoglobulin (IVIG), a plasma-based blood product, can also be considered to dampen the immune process in some instances.

What happens next?

The antibodies that cause hemolysis are present in the baby for several months; however, initial treatment is usually only in the first few days, with ongoing monitoring in case further treatment is required.

Over time, the amount of antibodies is reduced and they become less active. This may take several months, so your baby will need follow-up appointments over this period.

The severity of HDN from ABO incompatibility is variable – ranging from very mild and not needing any treatment, to more significant requiring frequent blood tests, monitoring and some treatments in the first few weeks of life.

The majority of babies with this condition will have no long-term problems.

Your health-care team will discuss treatment options with you if they are needed for your baby.

Health-care professionals:

Share this pamphlet with your patients and scan the QR code to access the ICTMG's HDN guideline on [ictmg.org](https://www.ictmg.org).

