CONDITION

Hemolytic transfusion reaction

A hemolytic transfusion reaction happens when transfused red blood cells are destroyed faster than expected.

WHAT IT IS
Destruction of red blood cells following a transfusion

BODY SYSTEM
Blood, kidneys, and circulation

MAIN SYMPTOMS
Fever, chills, back pain, dark urine

WHAT CAUSES IT
Immune attack on transfused red blood cells

HOW IT IS DIAGNOSED
Blood bank testing and blood and urine tests

MAIN TREATMENT
Stopping transfusion and supportive hospital care

CAN IT BE CURED?
Sometimes - resolves with prompt supportive care

IS IT AN EMERGENCY?
Sometimes - breathing problems or low blood pressure

LONG-TERM OUTLOOK
Most recover, but severe reactions can damage organs

Overview

A hemolytic transfusion reaction happens when red blood cells given during a transfusion are destroyed, or "hemolyzed," faster than they should be. It is usually caused by an immune response against substances called antigens on the transfused cells.

Antigens are markers on the surface of red blood cells. Your immune system can make proteins called antibodies that recognize certain antigens as foreign. If an antibody reacts with transfused cells, those cells may be damaged and removed from the bloodstream.

An acute hemolytic transfusion reaction begins during a transfusion or soon afterward, usually within 24 hours. It can become serious quickly because widespread red blood cell destruction may affect blood pressure, clotting, and kidney function.

A delayed hemolytic transfusion reaction develops later, often several days or weeks after the transfusion. It is usually less sudden. The main sign may be that your red blood cell count falls again after initially improving.

Not every fever or symptom during a transfusion is caused by hemolysis. Allergic reactions, non-hemolytic fever reactions, fluid overload, lung reactions, and bacterial contamination can cause similar symptoms. Medical assessment and blood bank testing are needed to identify the cause.

Symptoms

Symptoms of an acute reaction may begin after only a small amount of blood has been given. They can also appear later in the transfusion or shortly afterward.

Possible symptoms include:

If you are under general anesthesia, you cannot report symptoms. The first signs may instead be unexpected bleeding, low blood pressure, or dark urine.

A delayed reaction may cause fewer symptoms. You may notice tiredness, mild fever, yellow skin or eyes, dark urine, or shortness of breath with activity. Sometimes it is found only when a blood test shows that hemoglobin, the oxygen-carrying protein in red blood cells, has fallen.

These symptoms are not specific to a hemolytic reaction. For example, dark urine may have several causes, and tiredness after an illness or operation is common. The timing and test results help determine what is happening.

- Fever, chills, or flushing
- Pain in the back, side, chest, abdomen, or at the infusion site
- Shortness of breath, nausea, headache, or a feeling of unease
- Dark, red, or brown urine
- Dizziness, faintness, or low blood pressure
- Unusual bleeding or oozing from intravenous sites

Causes and risk factors

Most hemolytic transfusion reactions are immune reactions. An antibody in your blood recognizes an antigen on the transfused red blood cells and triggers their destruction.

The most dangerous acute reactions often involve incompatible ABO blood groups. Hospitals

use identification checks, blood typing, and compatibility testing to prevent this. An error involving identification, labeling, collection, or administration can allow incompatible blood to be transfused.

Delayed reactions are commonly linked to antibodies that formed after an earlier exposure to red blood cell antigens. This exposure may have happened during a previous transfusion or pregnancy. An antibody can fall to a level that routine testing no longer detects. A later transfusion can stimulate the immune system to produce it again.

Your risk may be higher if you have:

Rarely, transfused red blood cells may be damaged without an immune reaction. Examples include excessive heat or cold, mechanical damage from equipment, or contact with an unsuitable intravenous solution. Blood services and hospitals use handling procedures designed to prevent these problems.

- Had previous blood transfusions
- Been pregnant
- Previously developed a red blood cell antibody
- A condition requiring repeated transfusions

Diagnosis

If symptoms begin during a transfusion, staff stop the transfusion and check your identity, the blood unit label, and the transfusion records. The blood bank is notified so that the blood product and new blood samples can be examined.

Testing may include:

The blood bank may inspect the liquid part of the blood for free hemoglobin released from damaged red blood cells. Urine may also be checked for hemoglobin.

If fever or low blood pressure could be caused by bacterial contamination, cultures may be taken from you and the blood unit. Clinicians may also assess for other transfusion complications because several reactions can look alike at first.

With a delayed reaction, the diagnosis may be suggested by a new antibody, a positive direct antiglobulin test, rising bilirubin, or an unexpected fall in hemoglobin after transfusion. Previous transfusion records can be important, especially when an older antibody is no longer detectable on the current screening test.

- Repeating your ABO and Rh blood type

- Repeating the antibody screen and compatibility testing
- A direct antiglobulin test, which looks for antibodies attached to red blood cells
- A complete blood count to measure hemoglobin and other blood cells
- Bilirubin, lactate dehydrogenase, and haptoglobin tests for evidence of hemolysis
- Kidney function, urine, and blood-clotting tests

Treatment and management

If a reaction is suspected during a transfusion, the transfusion is stopped immediately. You should not try to wait and see whether symptoms settle. Staff keep intravenous access available and begin an assessment while contacting the blood bank and clinical team.

Treatment is based on the severity of the reaction. It may include intravenous fluids, oxygen, close monitoring of blood pressure and urine output, and support for heart, lung, or kidney function. Blood tests are repeated to follow hemolysis, anemia, kidney function, and clotting.

A severe acute reaction may require intensive care. Treatments may be needed for shock, abnormal bleeding, or a dangerous clotting problem called disseminated intravascular coagulation. Dialysis may be necessary if severe kidney injury prevents the kidneys from clearing waste and extra fluid.

A delayed reaction may need observation and repeat blood tests rather than intensive treatment. If anemia is significant, another transfusion may be considered. The blood bank then selects units that lack the antigen linked to your antibody and performs careful compatibility testing.

Treatment cannot restore red blood cells that have already been destroyed. Its goals are to stop further exposure, support the body while it clears damaged cells, treat complications, and prevent the same incompatibility during future transfusions.

Complications

Many reactions are recognized early and treated without lasting harm. The risk of complications is greater when red blood cell destruction is rapid or extensive.

Possible complications include:

Delayed reactions are often less severe, but they can reduce the benefit of a transfusion and cause anemia to return. Some people develop several antibodies over time. This can make it

more difficult and slower to find compatible blood for future transfusions.

- Worsening anemia
- Acute kidney injury
- Very low blood pressure and shock
- Abnormal clotting and bleeding
- Heart or breathing strain
- Rarely, failure of several organs

Prevention

You cannot personally prevent every hemolytic transfusion reaction. Prevention mainly depends on blood typing, antibody screening, compatibility testing, safe storage and handling, and careful identity checks before blood is given.

Tell the transfusion team if you have ever had a transfusion reaction or were told that you have a red blood cell antibody. This remains important even if later antibody screens are negative.

Keep any antibody card or transfusion record you are given. Show it when receiving care at another hospital. If possible, tell staff where and when the antibody was identified so they can request earlier records.

Before a transfusion begins, staff should confirm your identifying details. Participate in this check when you are able. Report fever, chills, pain, breathing difficulty, or any sudden change immediately rather than waiting until the transfusion is finished.

Living with it and what to expect

A hemolytic transfusion reaction is usually a single event rather than a continuing illness. Recovery after a mild or promptly treated reaction may occur over days. If anemia, kidney injury, or another complication develops, monitoring and recovery may take longer.

After an acute reaction, you may have repeated blood and urine tests until hemolysis has stopped and kidney function, blood counts, and clotting are stable. Follow-up after a delayed reaction usually focuses on whether your hemoglobin is recovering and whether symptoms such as jaundice or dark urine are settling.

Having a reaction does not automatically mean you can never receive blood again. Future transfusions may take more planning. The blood bank may need extra time to identify your

antibodies and locate antigen-negative, compatible units.

An antibody can remain medically important for life even if it later becomes too weak to appear on routine screening. Keep a personal record and make sure future hospitals know about it.

Most people do not have ongoing symptoms once the reaction and any anemia have resolved. Severe kidney or organ injury can lead to longer-term health effects, so follow-up is based on which complications occurred.

When to get medical help

During a transfusion, report any new symptom immediately. This includes fever, chills, pain, nausea, breathing difficulty, dizziness, or a sudden sense that something is wrong. Staff can stop the transfusion and assess you.

After leaving the hospital, contact the transfusion service or your healthcare team promptly if you develop fever, dark urine, yellow skin or eyes, increasing weakness, or unexpected shortness of breath in the days or weeks after a transfusion.

Seek emergency help for:

Routine follow-up may include planned blood counts and kidney tests when you otherwise feel stable. Do not wait for a routine appointment if symptoms are new, worsening, or severe.

- Severe trouble breathing
- Fainting, confusion, or extreme weakness
- Severe chest, back, or abdominal pain
- Very little or no urine
- Heavy or unexplained bleeding
- Signs of shock, such as cold clammy skin or marked dizziness

Common questions

How soon can a hemolytic transfusion reaction happen?

An acute reaction can begin during the transfusion or within 24 hours. A delayed reaction may appear several days or weeks later, sometimes after you have already left the hospital.

Does a reaction mean I received the wrong blood type?

Not always. ABO incompatibility can cause a severe acute reaction, but reactions may also

involve other red blood cell antigens. Delayed reactions can occur when an older antibody becomes active again despite routine compatibility testing.

Can I have another blood transfusion after this?

Often, yes. The blood bank may need extra testing and may select blood that lacks the antigen targeted by your antibody. Finding suitable blood can take longer, so tell future care teams about the reaction as early as possible.

Will the reaction go away on its own?

Some delayed reactions are mild, but every suspected reaction needs assessment. Acute reactions can worsen quickly and should never be watched without medical supervision. Supportive treatment helps protect the kidneys, circulation, and other organs.

How long does a delayed transfusion reaction last?

The timing differs with the amount of red blood cell destruction and your underlying health. Symptoms and blood test changes may continue for days or longer. Follow-up blood counts show whether the anemia is improving.

Is a transfusion reaction the same as a blood allergy?

No. An allergic transfusion reaction usually involves a response to proteins in the transfused plasma and may cause itching, hives, or swelling. A hemolytic reaction specifically involves destruction of red blood cells.

Sources

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