PROCEDURE

Thrombolytic therapy

Thrombolytic therapy uses medicine to dissolve a dangerous blood clot and restore blood flow.

PURPOSE
Dissolve a blood clot and restore blood flow

PROCEDURE TYPE
Therapeutic - bedside infusion or interventional radiology catheter treatment

WHERE IT IS DONE
At the bedside or in an interventional radiology suite

ANAESTHESIA
None for infusion; local or moderate sedation for catheter treatment

HOW LONG IT TAKES
Seconds to 24 hours, based on delivery method

PREPARATION
Urgent scans, blood tests, medication and bleeding review

RECOVERY
Hospital monitoring; no driving until the treating team clears you

MAIN RISKS
Major bleeding, brain bleeding, allergic reaction, blood vessel injury

RESULTS
Response assessed during treatment and with follow-up tests

Overview

Thrombolytic therapy is an emergency treatment that uses medicine to break down a blood clot. It is sometimes called clot-busting treatment or fibrinolysis.

Blood clots can suddenly block blood flow to the brain, heart, lungs, or a limb. Restoring circulation quickly may limit permanent tissue damage and improve the chance of recovery. The potential benefit must be balanced against the risk of serious bleeding.

The medicine may be given into a vein through an intravenous, or IV, line. This is called systemic thrombolysis because the medicine travels through the bloodstream.

In some situations, a thin tube called a catheter is guided through a blood vessel to the clot. Medicine is delivered directly into or beside the clot. This is called catheter-directed

thrombolysis and is usually performed by an interventional radiology or heart specialist.

Why the procedure is performed

Thrombolytic therapy may be considered for a blood clot causing an immediate threat to an organ or limb. Common situations include:

Timing matters. The treatment is most useful before prolonged loss of blood flow causes permanent damage. The safe treatment window differs according to the condition, test results, medicine, and method used.

Thrombolytic therapy does not treat bleeding strokes. Brain imaging is therefore required before thrombolysis for a suspected stroke.

- An ischaemic stroke caused by a clot blocking blood flow to the brain
- A heart attack caused by a blocked heart artery, when timely angioplasty is unavailable
- A severe pulmonary embolism, which is a clot in the lungs causing unstable circulation
- A large clot threatening blood flow through an arm, leg, catheter, or vascular graft

Who should and should not have it

You may be offered thrombolytic therapy when tests show, or strongly suggest, a dangerous blood clot and the expected benefit is greater than the bleeding risk. Your team will consider when your symptoms began, how unwell you are, the clot's location, and whether another treatment can restore blood flow more safely.

Thrombolysis is not right for every clot. It is generally avoided when there is active major bleeding or bleeding in the brain. It may also be avoided or delayed because of:

Pregnancy, recent childbirth, liver disease, kidney disease, cancer, and previous surgery require individual assessment. They do not automatically rule out treatment in every situation.

Each thrombolytic medicine has its own safety restrictions. Because the decision is time-sensitive, the team may assess risks and discuss consent at the same time as scans and blood tests are being arranged.

- Recent major surgery, serious injury, or significant head trauma
- A previous brain haemorrhage or certain brain abnormalities
- Very high blood pressure that cannot be brought under control

- A known bleeding disorder or very low platelet count
- Recent bleeding from the stomach, bowel, urinary tract, or another organ
- Use of an anticoagulant like warfarin or apixaban , or blood thinner, with evidence of a strong ongoing effect
- Suspected tearing of the aorta, called aortic dissection

How to prepare

Thrombolytic therapy is usually given during an emergency, so there may be little time to prepare. The treating facility's own instructions take priority.

Tell the team, if you can, about:

Tests may include blood tests, an electrocardiogram, and imaging of the brain, chest, heart, or blood vessels. These help confirm the likely cause and assess bleeding risk.

Fasting is not normally required before an IV dose in an emergency. If catheter treatment or sedation is planned, you may be told not to eat or drink. Essential emergency treatment is not usually delayed simply because you have eaten.

- Blood thinners, antiplatelet medicines, and when you last took them
- Recent surgery, injury, bleeding, injections, or medical procedures
- Previous stroke, brain bleeding, stomach ulcers, or bleeding disorders
- Pregnancy or recent childbirth
- Medicine allergies and serious medical conditions
- The exact time symptoms started or when you were last known to be well

What happens during the procedure

Your identity, symptoms, medicines, weight, test results, and bleeding risks are checked. Monitoring equipment is attached to measure your heart rhythm, blood pressure, breathing, and oxygen level.

For systemic thrombolysis, a healthcare professional gives the medicine through an IV line. Some medicines are given as a single injection. Others are infused over a set period. You remain awake, and anaesthesia is not normally needed.

For catheter-directed treatment, the specialist numbs the skin over a blood vessel, often in the

groin or arm. A catheter is guided toward the clot using X-ray imaging. Thrombolytic medicine is then delivered through the catheter. Treatment may continue for several hours, with repeat imaging to check the clot.

The team limits unnecessary needle punctures and watches closely for bleeding. Further scans, heart tracings, blood tests, or blood vessel images may be performed during or soon after treatment.

Recovery and what to expect afterward

The medicine itself does not usually cause pain. You may have discomfort from the original condition, an IV site, or the catheter entry site. Tell staff about new pain, especially a severe headache, chest pain, abdominal pain, or back pain.

Eating depends on the reason for treatment. After a stroke, you may need a swallowing check before eating or drinking because stroke can affect safe swallowing. After catheter treatment, food may be delayed until sedation has worn off.

Activity is restricted at first. You may need bed rest and frequent neurological, circulation, and blood pressure checks. If a catheter entered through the groin, you may need to keep the leg straight for a period. Avoid strenuous activity until your team says it is safe.

Do not drive yourself home. The underlying stroke, heart attack, pulmonary embolism, medicines, or sedation may make driving unsafe. Ask when you may legally and safely resume driving.

Returning to work depends mainly on the illness being treated and whether complications occurred. Recovery may take days to months after a stroke, heart attack, or major pulmonary embolism. Your follow-up team can give advice based on your progress and type of work.

Risks and possible complications

Bleeding is the main risk. Minor bleeding or bruising can occur around IV lines, catheter sites, gums, or recent wounds. More serious bleeding may occur inside the stomach, bowel, chest, abdomen, or another organ.

Bleeding in or around the brain is uncommon but potentially life-threatening. It may cause a sudden severe headache, vomiting, drowsiness, seizures, or new neurological symptoms.

Other possible complications include:

Additional treatment may be required if bleeding occurs or the clot does not respond.

- An allergic reaction or swelling involving the face, lips, or tongue
- Low blood pressure
- Abnormal heart rhythms when blood flow returns after a heart attack
- Movement of clot fragments into smaller blood vessels
- Blood vessel damage, infection, or bleeding after catheter treatment
- Failure to dissolve the clot or reopening followed by another blockage

Results and follow up

The team watches for improvement while treatment is being given. Signs of response might include improved speech or strength after a stroke, more stable circulation after a pulmonary embolism, or improved heart tracing and chest pain after a heart attack.

A response cannot always be judged from symptoms alone. Repeat brain imaging, blood vessel imaging, heart tests, or blood tests may be needed within hours or over the following days.

Follow-up focuses on why the clot formed and how to reduce the chance of another one. This may involve antiplatelet or anticoagulant medicine, cholesterol treatment, heart rhythm assessment, rehabilitation, or treatment of an underlying blood vessel problem.

Keep routine appointments even if you feel better. Ask when to restart regular medicines, especially blood thinners, because the timing must account for bleeding risk.

Alternatives

The alternatives depend on where the clot is and how stable you are.

For an ischaemic stroke caused by a large artery blockage, mechanical thrombectomy may be possible. A specialist removes the clot through a catheter. It can restore blood flow without relying on medicine to dissolve the whole clot, but it is available only for suitable blockages and requires specialist facilities. Some people receive both treatments.

For a heart attack, coronary angioplasty is usually preferred when it can be performed promptly. A catheter opens the artery, often with a stent. It avoids systemic clot-dissolving medicine but requires a cardiac catheter laboratory and may not be available quickly enough.

For a stable pulmonary embolism, anticoagulants are usually used instead of thrombolysis. They stop the clot from growing while the body gradually breaks it down. They work more slowly but carry less risk of major bleeding. Catheter clot removal or surgery may be

considered for selected severe cases.

Supportive treatment and antiplatelet or anticoagulant medicine may be used when thrombolysis is unsafe. This reduces bleeding risk but may not reopen the blocked vessel quickly. Choosing no clot-removing treatment can allow the blockage and organ damage to progress.

When to call your healthcare team

While you are in hospital, tell staff immediately about new pain, bleeding, weakness, numbness, confusion, breathing trouble, or swelling.

After discharge, call emergency services for:

For non-urgent concerns, contact your healthcare team during routine hours. These include persistent minor bruising, questions about activity or medicines, and uncertainty about follow-up appointments.

- New stroke signs, such as facial drooping, arm weakness, or speech difficulty
- Sudden severe headache, seizure, fainting, or unusual drowsiness
- Chest pain, severe shortness of breath, or coughing up blood
- Bleeding that is heavy or will not stop
- Vomiting blood or passing black, bloody, or red stools
- Rapidly increasing swelling or bleeding at a catheter site

Common questions

Will I be asleep?

Not for standard IV thrombolysis. You normally remain awake. Catheter-directed treatment may use local anaesthetic and moderate sedation, which makes you relaxed but not necessarily unconscious.

Can I drive home afterward?

No. You will be monitored in hospital, and you must not drive yourself home. Ask your team when driving can safely resume.

How painful is thrombolytic therapy?

The IV medicine is not usually painful. An IV or catheter may cause brief discomfort. Pain from

the clot-related condition may continue while the treatment begins to work.

When will I know whether it worked?

The team may see signs of improvement during treatment or within hours. Follow-up scans and other tests are often needed to confirm whether blood flow has improved.

Can the clot come back?

Yes. Thrombolysis removes or reduces the current clot but may not remove the reason it formed. Follow-up medicines and treatment of the underlying cause help reduce recurrence.

Will I still need blood thinners?

Possibly. This depends on the type of clot, bleeding risk, and follow-up tests. Your team will decide when it is safe to begin or restart them.

Sources

- US Food and Drug Administration. Activase prescribing information
- Powers WJ, et al. 2019 guidelines for the early management of acute ischaemic stroke. Stroke . 2019;50:e344-e418
- National Institute for Health and Care Excellence. Stroke and transient ischaemic attack in over 16s: diagnosis and initial management, NG128
- National Institute for Health and Care Excellence. Acute coronary syndromes, NG185
- National Institute for Health and Care Excellence. Venous thromboembolic diseases: diagnosis, management and thrombophilia testing, NG158
- Konstantinides SV, et al. 2019 ESC guidelines for acute pulmonary embolism. European Heart Journal . 2020;41:543-603