TEST

Magnetic resonance angiography

Magnetic resonance angiography uses MRI to create detailed pictures of blood vessels and blood flow.

WHAT IT MEASURES
Blood vessel shape, narrowing, blockage, and blood flow

SAMPLE
None

FASTING NEEDED?
Sometimes, for sedation or local contrast protocols

HOW LONG IT TAKES
Usually 20 to 60 minutes

RESULTS IN
Usually several days; varies by laboratory or radiology service

USED FOR
Diagnosis, monitoring, and selected screening

MAIN LIMITATION
Motion and flow artefacts can hide or mimic narrowing

Overview

Magnetic resonance angiography, or MRA, is a type of magnetic resonance imaging. It uses a strong magnet and radio waves to make pictures of arteries and, in some cases, veins. Angiography means imaging of blood vessels.

MRA can show whether a vessel is narrowed, blocked, enlarged, torn, or unusually shaped. It may be used to examine vessels in the brain, neck, chest, abdomen, kidneys, pelvis, or limbs.

Some MRA scans use an injected contrast medicine containing gadolinium. Contrast makes certain vessels easier to see. Other MRA methods use the movement of blood to create images and need no injection.

MRA does not use ionizing radiation. This is different from CT angiography and catheter angiography, which use X-rays.

Why the test is ordered

An MRA may be ordered when symptoms, an examination, or another test suggests a possible blood vessel problem. It can also monitor a condition that is already known.

Reasons include looking for:

MRA may help plan surgery or another procedure. In selected people, it may be used to screen for an aneurysm or inherited blood vessel condition. It is not generally used as a routine blood vessel screening test for everyone.

- Narrowing or blockage of an artery
- An aneurysm, which is a weakened area that bulges outward
- A dissection, meaning a tear within an artery wall
- Unusual connections or formations of blood vessels
- Reduced blood supply to an organ or limb
- Changes after surgery or treatment involving blood vessels

Who should have the test

You may be offered MRA if your healthcare team needs detailed vessel images without using X-rays. It can be especially useful when repeated imaging may be needed or when contrast used for CT is unsuitable.

MRA is not appropriate for every person or every blood vessel. CT angiography is often quicker and may provide clearer information in an emergency. Ultrasound may be a simpler first test for vessels in the neck or limbs. Catheter angiography may be preferred when very small vessels must be assessed or treatment may be carried out at the same time.

Tell the imaging team about any implanted device, metal fragment, previous surgery, kidney condition, pregnancy, or past contrast reaction. Many modern implants can be scanned under specific conditions, but their exact model and settings may need to be checked.

How to prepare

Follow the instructions from your imaging centre. Contrast alone does not always require fasting. You may be asked not to eat for several hours if sedation is planned or if the centre uses a fasting protocol.

Tell the team before the appointment if you:

A kidney function blood test may be needed before gadolinium contrast, particularly if you

have kidney disease or risk factors for it.

Unless the imaging centre tells you otherwise, take your usual medicines. Remove jewellery, hearing aids, removable dental work, piercings, and clothing containing metal. Do not bring metal objects into the MRI room.

- Have a pacemaker, implanted defibrillator, medicine pump, nerve stimulator, or cochlear implant
- Have surgical clips, vascular stents, metal fragments, or other implants
- Have kidney disease, dialysis, or a previous kidney transplant
- Are pregnant or could be pregnant
- Have had a reaction to MRI contrast
- Find enclosed spaces difficult

What happens during the test

You will lie on a padded table. A frame called a coil may be placed around the body area being scanned. The table then moves into the MRI scanner, which is shaped like a wide tunnel.

The scanner makes loud tapping, buzzing, and knocking sounds. You will receive ear protection. You must keep as still as possible, and you may be asked to hold your breath briefly for some images.

If contrast is needed, a small plastic tube is placed into a vein, usually in your arm or hand. The gadolinium contrast is injected during the scan. You may briefly notice coolness at the injection site.

The scan usually takes 20 to 60 minutes. More complex studies can take longer. You can communicate with the radiographer throughout the test. If needed, sedation may be arranged in advance to help you remain still or manage claustrophobia.

Understanding your results

A radiologist, a doctor trained to interpret medical images, reviews the scan. The report describes the vessels examined and any areas that look narrowed, blocked, enlarged, torn, or unusual.

A report may give the location and estimated severity of narrowing. It may also compare the findings with an earlier scan. Words such as "artefact" mean that movement, metal, or the way

blood flowed affected part of the image.

There is no single normal MRA measurement that applies to every vessel. Interpretation varies by scanner, imaging method, age, sex, pregnancy status, medicines, anatomy, and clinical context. The importance of a finding also depends on your symptoms and why the scan was requested.

An abnormal-looking area does not always mean that treatment is needed. Some findings require monitoring, while others need another test to confirm what the MRA shows.

What affects the results

Movement is one of the most common causes of blurred or incomplete images. Breathing, swallowing, coughing, or moving a limb can affect vessels near the moving area.

Blood flow itself can also mislead the scan. Very slow, turbulent, or complex flow may create an apparent gap or make a narrowed area look more severe than it is. Irregular heart rhythms can interfere with techniques that time images to the heartbeat.

Metal clips, coils, stents, joint replacements, and other implants may distort the magnetic field. This can hide part of a nearby vessel even when the implant is safe for MRI.

For contrast-enhanced MRA, poor injection timing or movement during the injection can reduce vessel detail. Kidney function affects whether gadolinium is appropriate, although it does not usually change the vessel anatomy being examined.

Recent surgery or a procedure involving a vessel can alter its appearance. Medicines that change blood vessel width or blood flow may also influence some specialised examinations, but ordinary daily medicines rarely make a routine MRA unusable.

Accuracy and limitations

MRA is good at showing many medium-sized and large blood vessels, but its accuracy differs by body area, scanner, technique, and the question being asked.

It can report narrowing where there is none, particularly when blood flow is slow or turbulent. It can also make a real narrowing appear more severe. These are false-positive results.

MRA can miss abnormalities in very small vessels or areas affected by movement or metal. A short narrowing, a small aneurysm, or disease beyond a severe blockage may be difficult to see. These are false-negative results.

A repeat scan or another test may be needed when the images are unclear or do not match

your symptoms. CT angiography can provide faster images and may be better in some emergencies. Ultrasound can measure flow in accessible vessels. Catheter angiography generally provides finer detail and allows treatment during the same procedure, but it is invasive and uses X-rays.

Risks and complications

MRI does not expose you to ionizing radiation. The magnetic field can, however, move unsafe metal objects, heat certain implants, or interfere with implanted electronic devices. Careful safety screening reduces these risks.

If an intravenous line is used, you may have a small bruise or feel faint. Discomfort usually settles quickly.

Gadolinium contrast can cause nausea, headache, or an allergic-like reaction. Serious reactions are uncommon. A rare condition called nephrogenic systemic fibrosis has been linked mainly to certain gadolinium agents in people with severe kidney failure; current contrast selection and kidney screening reduce this risk.

Small amounts of gadolinium may remain in the body after a scan. The clinical importance of retention is not established for most people, but contrast should be used only when it is expected to add useful information.

Sedation has separate risks, including slowed breathing and impaired coordination. If you receive it, you will be monitored and will need to follow instructions about travelling home.

What happens next

Most people can return to their usual activities immediately. If you received sedation, you may need supervision and should not drive for the period specified by the imaging team.

Your referring healthcare professional will review the report with your symptoms, examination, and other tests. Routine next steps may include no further action, monitoring with another scan, medicine changes, or referral to a vascular or neurological specialist.

A result that needs prompt attention is usually communicated directly to the team that requested the scan. Do not wait for a routine appointment if you develop sudden face drooping, weakness on one side, difficulty speaking, a sudden severe headache, severe chest or back pain with fainting, or a suddenly cold and painful limb. Seek emergency medical help.

Common questions

Can I drink coffee before an MRA?

Usually, unless your appointment instructions require fasting or you are having sedation. Coffee may be restricted for certain specialised blood-flow studies, so follow the instructions for your scan.

Does the time of day matter?

Usually not. Timing may matter if the scan must coordinate with medicines, dialysis, sedation, or another procedure.

Can I exercise beforehand?

Ordinary activity is generally acceptable. Avoid strenuous exercise immediately beforehand if it leaves you breathless, uncomfortable, or unable to lie still.

Will I need contrast?

Not always. Some MRA methods create vessel images from moving blood. Contrast may be used when it is expected to improve detail or answer a specific question.

Can I drive home afterward?

Yes if you have not received sedation and feel well. Do not drive after sedation; arrange transport and follow the centre's instructions.

What if I am claustrophobic?

Tell the imaging centre before the appointment. A wider scanner, extra support, or planned sedation may help. An open MRI may not provide the image quality needed for every MRA.

Sources

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