TEST

Indium-labelled WBC scan

An indium-labelled WBC scan tracks your own white blood cells to locate possible infection or inflammation

WHAT IT MEASURES
Where labelled white blood cells collect in the body

SAMPLE
Blood, removed and reinjected for imaging

FASTING NEEDED?
No, unless combined with another test

HOW LONG IT TAKES
Several hours, often with next-day images

RESULTS IN
Usually one to two days; varies by nuclear medicine department

USED FOR
Locating suspected infection or inflammation

MAIN LIMITATION
Sterile inflammation can look like infection

Overview

An indium-labelled WBC scan is a nuclear medicine imaging test. WBC means white blood cell. These cells are part of your immune system and often gather where there is infection or inflammation.

A sample of your blood is taken. White blood cells are separated from the sample and mixed with a small amount of radioactive indium-111. The labelled cells are then returned to your bloodstream through a vein.

A special camera detects where the cells collect. Images may cover your whole body or focus on one area. Some centres also use SPECT/CT, which combines the radioactive scan with detailed cross-sectional images.

The test can show an area of active inflammation, but it cannot by itself prove that infection is present or identify the germ causing it.

Why the test is ordered

The scan may be ordered when an infection is suspected but its location is uncertain. It can also help assess an area that is difficult to evaluate with ordinary X-rays or ultrasound.

Possible reasons include:

This is not usually the first test for every suspected infection. Blood tests, cultures, ultrasound, CT, MRI or other nuclear medicine scans may be more useful in some situations.

- Looking for the source of an unexplained fever
- Assessing possible infection around a joint replacement or vascular graft
- Investigating suspected infection in bone or soft tissue
- Checking whether abnormal findings on another scan represent active inflammation
- Looking for inflammatory activity in selected bowel or abdominal conditions

Who should have the test

You may be offered this scan when finding the exact site of inflammation could change your care. It is often considered when earlier tests have not provided a clear answer or when metal implants make some imaging harder to interpret.

Tell the nuclear medicine team before the scan if you:

Pregnancy does not automatically mean the scan cannot be done. The team will compare the expected benefit with the radiation exposure and consider other tests. If you are breastfeeding, you may need specific instructions about pausing feeding and handling expressed milk.

- Are pregnant, could be pregnant or are breastfeeding
- Have a very low white blood cell count
- Recently had surgery, a major injury or a blood transfusion
- Are taking antibiotics like amoxicillin or doxycycline , steroids or medicines that affect your immune system
- Recently had another test using radioactive material

How to prepare

Fasting is not usually needed. You can generally eat, drink and take your regular medicines

unless your imaging department gives different instructions.

Drink enough water unless you have been told to limit fluids because of a heart, kidney or other medical condition. Comfortable clothing without metal fasteners may make imaging easier.

Do not stop antibiotics, steroids or other prescribed medicines on your own. The team needs to know what you take because some medicines can change how white blood cells behave or reduce the amount of active inflammation.

The process takes much of the day and may require a return visit the next day. Arrange transport and time away from work or caring duties if needed. Sedation is not normally required.

What happens during the test

First, blood is taken from a vein, usually in your arm. The amount and exact collection method differ between imaging centres.

A specialist laboratory separates the white blood cells and labels them with indium-111. This preparation commonly takes a few hours. You can often leave the department during that time, but follow the instructions you receive.

The labelled cells are injected back into a vein. Because they are your own cells, they circulate and move toward areas where white blood cells are being recruited.

Imaging is usually performed several hours after the injection. Further pictures are often taken around 24 hours later, and occasionally later than that. Timing varies according to the body area and the question being investigated.

During imaging, you lie still on a table while a camera passes close to your body. The camera does not produce radiation; it detects the small amount coming from the labelled cells. Each set of pictures may take 30 to 60 minutes.

Understanding your results

There is no universal normal number or reference range for this scan. A nuclear medicine specialist examines the pattern, location and change in labelled white blood cell activity over time.

Some uptake is normally expected in organs such as the spleen, liver and bone marrow. Uptake in another area may suggest that white blood cells are gathering there.

An abnormal result does not always mean infection. Recent surgery, tissue injury and

non-infectious inflammatory conditions can also attract white blood cells. Results are interpreted alongside your symptoms, examination, blood tests, cultures and other imaging.

A scan without abnormal uptake makes some infections less likely, but it does not exclude every infection. Interpretation varies with age, sex, pregnancy status, medicines, white blood cell count, clinical context and the imaging methods used by the department.

What affects the results

Several factors can make the scan misleading even when the laboratory and camera have worked correctly.

Recent surgery, trauma, fractures and healing tissue may produce uptake without infection. Inflammatory diseases can do the same. Normal bone marrow activity near an implant can also be difficult to distinguish from infection; a separate bone marrow scan may sometimes help.

A low white blood cell count can make it difficult to collect enough cells and may reduce visible uptake. Conditions or medicines that alter white blood cell movement can also affect the pattern.

Antibiotics may reduce infection activity, while steroids and other immune-suppressing medicines may reduce the inflammatory response. This does not mean these medicines should be stopped. Their possible effect is considered when the images are read.

Slow-growing or long-standing infections may attract fewer white blood cells than acute infections. Infections that do not produce a strong white-cell response may therefore be missed.

Poor circulation can delay cells from reaching an infected area. Recent radioactive imaging may interfere with detection if the earlier material is still present. A recent granulocyte transfusion may affect circulating white cells; an ordinary red blood cell transfusion is less likely to matter, but should still be reported.

Technical factors include damaged or clumped cells, a low proportion of successfully labelled cells, movement during imaging and images taken too early or too late.

Accuracy and limitations

Accuracy differs by the body area, type of infection and method used to confirm the result. There is no single percentage that applies to every indium-labelled WBC scan.

The test can miss infection when few white blood cells reach the site. This may happen with

low-grade or long-standing infection, a low white blood cell count, reduced blood supply or treatment that has already lowered inflammation.

It can also show uptake when no infection is present. Common reasons include recent surgery, trauma, healing tissue, inflammatory disease and normal or expanded bone marrow activity.

The scan does not identify the organism causing an infection. A sample of fluid or tissue for culture may be needed for that. CT or ultrasound may be better for finding and draining an abscess. MRI often gives more detailed information about the spine, bone marrow and soft tissues. FDG PET/CT or another nuclear medicine test may be preferred for certain chronic infections or locations.

Risks and complications

A blood draw and injection can cause brief discomfort, a small bruise or light-headedness. Infection at the needle site is uncommon.

The test exposes you to a small amount of ionising radiation that remains in the body for several days and gradually disappears. The team uses controlled procedures to confirm that your labelled cells are returned to you and to prevent contamination.

Allergic reactions are very uncommon. The test does not normally require iodinated CT contrast, although contrast may be used if a separate diagnostic CT is planned.

Seek emergency help if you develop trouble breathing, swelling of your face or throat, or collapse after an injection. Contact the imaging department or your usual healthcare service for increasing redness, swelling, pain or discharge at an injection site; these concerns are not usually emergencies unless severe or rapidly worsening.

What happens next

A nuclear medicine specialist reviews the images and sends a report to the healthcare professional who requested the test. The report may describe whether uptake is expected, suspicious or uncertain.

Routine follow-up may involve discussing the report with your usual care team, comparing it with previous scans or arranging another imaging test. If infection remains possible, blood cultures, a tissue sample or fluid drainage may be needed.

Do not wait for a routine appointment if you become seriously unwell. Seek urgent medical assessment for symptoms such as confusion, severe breathing difficulty, fainting, rapidly

worsening pain or signs of severe infection.

Common questions

Can I drink coffee before the scan?

Usually, yes. Fasting is not normally required, so coffee is generally allowed. Follow different instructions if another test is planned at the same visit or you have been asked to restrict caffeine or fluids.

Does the time of day matter?

The biological result is not usually determined by the time of day. Timing matters mainly because blood preparation takes several hours and delayed images may be needed the same day and the following day.

Can I exercise beforehand?

Ordinary activity is unlikely to prevent the test. Strenuous exercise can temporarily change white blood cell numbers and movement, so tell the department if you recently completed unusually intense exercise and follow its instructions.

Can I take my antibiotics?

Keep taking prescribed antibiotics unless the healthcare professional managing them tells you otherwise. Antibiotics can reduce visible inflammation, but stopping them without medical advice may be unsafe.

Can I drive afterward?

Yes, in most cases. The scan does not usually involve sedation and should not affect driving. If another procedure includes sedation, you will need separate transport instructions.

Will I be radioactive around other people?

You will carry a small amount of radioactive material for a limited time. The department may give temporary advice about close contact with pregnant people or young children, travel security detectors, hydration and toilet hygiene.

Sources

- Society of Nuclear Medicine and Molecular Imaging: Procedure Standard for Indium-111 Leukocyte Scintigraphy for Suspected Infection or Inflammation, version 3.0

- European Association of Nuclear Medicine: Clinical indications, image acquisition and data interpretation for white blood cell scintigraphy
- American College of Radiology, SNMMI and Society for Pediatric Radiology: Practice Parameter for the Performance of Leukocyte Scintigraphy for Suspected Infection or Inflammation
- US National Library of Medicine DailyMed: Indium In-111 Oxyquinoline prescribing information
- Society of Nuclear Medicine and Molecular Imaging: Appropriate Use Criteria for Nuclear Medicine in Musculoskeletal Infection Imaging
- RadiologyInfo.org: General Nuclear Medicine