

Understanding Your Investigations

What X-rays, MRI Scans, Ultrasound and Blood Tests Actually Show

1 Why Investigations Are (and Aren't) Always Necessary

Not every musculoskeletal problem needs imaging — many conditions are diagnosed clinically through history and examination alone. Imaging shows structure; it does not always explain pain. Abnormal findings on scans are extremely common in people with no symptoms at all. Do not assume a finding causes your pain.

Studies show that over 50% of people over 40 with no knee pain have cartilage changes on MRI. Over 80% of people over 50 have disc changes on MRI with no back pain. An abnormal scan does not automatically mean that finding is causing your symptoms.

When Imaging IS Needed	When It May NOT Be Needed
Suspected fracture (trauma, stress fracture risk)	Typical tendinopathy with clear clinical diagnosis
Red flag symptoms (unexplained night pain, weight loss, fever)	Plantar fasciitis with classic presentation
No improvement after 6–8 weeks of appropriate treatment	Patellofemoral pain with clear biomechanical pattern
Pre-surgical planning	Most acute muscle strains
Significant swelling / effusion after trauma	Many cases of osteoarthritis

2 X-ray (Plain Radiograph)

Feature	Detail
What it shows	Bone structure, alignment, density, joint space, calcification, fractures
What it does NOT show	Soft tissue (tendons, ligaments, cartilage, muscles, nerves)
When it's used	Suspected fracture, joint space narrowing (OA), bone spurs, alignment assessment, Haglund's deformity
Radiation	Very low dose — equivalent to a few hours of background radiation
Limitations	Cannot diagnose tendinopathy, ligament tears, cartilage damage, or nerve compression

What 'joint space narrowing' means	The cartilage between bones appears thinner — an OA indicator. The cartilage itself is not visible but its absence shows as reduced space
------------------------------------	---

3 MRI (Magnetic Resonance Imaging)

Feature	Detail
What it shows	Soft tissue in detail — tendons, ligaments, cartilage, bone marrow, nerves, bursae
What it does NOT show	Cortical bone detail (X-ray is better); cannot be done with some metal implants
When it's used	Suspected ligament/tendon tear, stress fracture (earlier than X-ray), nerve compression, cartilage damage, surgical planning
Radiation	None — uses magnetic field and radio waves
Duration	20–60 minutes; loud; enclosed space (can request open MRI if claustrophobic)
Key limitation	Very sensitive — picks up many findings that are age-related and asymptomatic. Context matters enormously.
Bone marrow oedema	Increased signal in bone — can indicate stress reaction, contusion, or early stress fracture. Does NOT always mean fracture.

4 Ultrasound

Feature	Detail
What it shows	Tendons, ligaments, bursae, fluid, superficial soft tissue in real-time
What it does NOT show	Bone interior, cartilage depth, nerves in detail
When it's used	Tendinopathy assessment, plantar fascia thickness, bursal swelling, guiding injections, dynamic assessment (moving the tendon)
Radiation	None — uses sound waves
Advantages	Real-time; can assess movement; affordable; no claustrophobia; guided injection
Limitations	Operator-dependent; cannot visualise through bone
Plantar fascia thickness	Normal <4mm; >4mm supports plantar fasciitis diagnosis. Useful objective measurement.

5 Other Investigations

Investigation	What It Shows	When Used in MSK
---------------	---------------	------------------

CT scan	Detailed bone structure; fracture pattern	Complex fractures; surgical planning; coalition assessment
Bone scan (DEXA)	Bone density	Osteoporosis screening; stress fracture risk assessment
Blood tests (CRP, ESR)	Inflammation markers	Inflammatory arthritis (RA, gout, reactive arthritis); infection
Uric acid (blood)	Uric acid level	Gout diagnosis and monitoring
HbA1c / fasting glucose	Blood sugar control	Diabetes screening; relevant to healing capacity
Nerve conduction study	Nerve function and conduction speed	Tarsal tunnel syndrome, peripheral neuropathy, sciatica

6 Key Takeaways

KEY TAKEAWAY 1

An abnormal scan finding does not automatically mean that finding is causing your pain. Many changes seen on MRI and X-ray are normal age-related changes. Your clinician interprets findings in the context of your history and examination — not in isolation.

KEY TAKEAWAY 2

MRI is the most detailed tool for soft tissue (tendons, ligaments, cartilage, nerves) but is very sensitive and often picks up incidental findings. Ultrasound is excellent for tendons and can assess them dynamically. X-ray is best for bone.

KEY TAKEAWAY 3

Most MSK conditions do not need imaging for diagnosis or to begin treatment. If imaging is recommended, ask your clinician what they are specifically looking for and how the result will change your management.