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Uses and abuses of MRI in the foot and ankle 2025 update

John P. Negrine
FRACS
Foot and Ankle Surgeon Sydney



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Another day, another terrified patient coming in with an MRI reported as showing a “complete full thickness tear of the anterior talo-fibular ligament”



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Never start your talk with a graph or table



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Table A.1: MBS diagnostic imaging service and expenditure growth by financial year

Financial Year	Total Services	% Growth in services from previous financial year	Total Expenditure	% Growth in expenditure from previous financial year	Average cost of service	% Growth in average cost from previous financial year
2005–06	14 921 392	-	\$1 609 413 102	-	\$107.86	-
2006–07	15 654 585	4.9%	\$1 713 950 741	6.5%	\$109.49	1.5%
2007–08	16 524 741	5.6%	\$1 825 548 530	6.5%	\$110.47	0.9%
2008–09	17 331 366	4.9%	\$1 952 523 814	7.0%	\$112.66	2.0%
2009–10	18 153 146	4.7%	\$2 150 680 673	10.1%	\$118.47	5.2%
2010–11	19 075 218	5.1%	\$2 296 134 274	6.8%	\$120.37	1.6%
2011–12	20 325 296	6.6%	\$2 528 433 711	10.1%	\$124.40	3.3%
2012–13	21 393 931	5.3%	\$2 702 757 420	6.9%	\$126.33	1.6%
2013–14	22 804 378	6.6%	\$2 939 751 473	8.8%	\$128.91	2.0%

Source: The funding review (for data 2005–06 to 2009–10), and ANAO analysis of MBS data provided by Department of Health (2010–11 to 2013–14).

Note 9.3 per cent average annual growth in expenditure over three years to 2013–2014.



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Table A.6: Medicare services and expenditure on magnetic resonance imaging (MRI) by financial year

Financial Year	Total Services	% Growth in Services from previous financial year	Total Expenditure	% Growth in Expenditure from previous financial year
2005–06	346 308	16.8%	\$120 087 378	13.0%
2006–07	393 519	13.6%	\$135 953 901	13.2%
2007–08	423 749	7.7%	\$146 589 193	7.8%
2008–09	459 259	8.4%	\$159 159 841	8.6%
2009–10	510 510	11.2%	\$184 987 037	16.2%
2010–11	538 058	5.4%	\$200 824 744	8.6%
2011–12	590 936	9.8%	\$222 299 278	10.7%
2012–13	638 064	8%	\$245 503 346	11.8%
2013–14	828 719	29.9%	\$323 963 357	30.4%

Source: The funding review (for data 2005–06 to 2009–10), and ANAO analysis of MBS data provided by Department of Health (2010–11 to 2013–14).



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diagnostic radiology, these high technology forms of imaging are more expensive services. The average out-of-pocket costs per patient for these 3 groups were higher than ultrasound and diagnostic radiology. However, MRI showed a trend of a progressive reduction in average out-of-pocket costs in real terms across both hospital and non-hospital settings. Overall, MRI dropped from \$255 per patient in 2018-19 to \$219 in 2022-23.

Figure 5: Diagnostic imaging services by group, 2012-13 to 2022-23

Figure

Data table

Hospital status

All services

Diagnostic imaging services group

Magnetic Resonance Imaging

Measure

Provider fees (millions) (constant prices)



**We spent \$3 Billion per year on
medical imaging**

**10% of that bill is MRI grown 30%
between 2012 and 2014**



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2025

- \$5.8 billion/year on diagnostic imaging
- 13% of that MRI = \$754 million



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Breakdown

- **Ultrasound: made up 33%**
- **CT scans: accounted for 29%**
- **X-ray was 17%.**
- **MRI: was 13%.**
- **Nuclear medicine imaging: was 8%.**



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Increase in MRI From 2013 to 2023

- 100% increase in provider fees
- 100% increase in benefits paid by the government (our tax dollars!!)
- From 3 services per 100 people to 5.5



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Federal budget initiative

“Removing final barriers to access MRI”

- From 1 July 2025 “full medicare eligibility for any licenced machine”
- From 1 July 2027 all previously unlicensed machine get full eligibility
- Cost budgeted at \$162 million budget 2024/2025



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Background

- Magnetic resonance imaging invented in 1971
- 1980 first clinically useful picture taken
- MRI is exploding 530 scanners in Australia
- The rise in the cost of diagnostic imaging is staggering and ?unsustainable
- A new 3T latest model scanner costs approx. \$3 million



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Who owns diagnostic imaging?

- IMED – Permira British Private equity
- Lumus – Affinity equity partners Hong Kong Based
- PRP- Industry superannuation fund
- Castlereagh- sonic healthcare ASX \$27.98
- Integral diagnostics ASX \$2.65
- Spectrum – Privately owned
- Scan Medical – Privately owned



Corporates agenda



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Exam Date: 26/02/15 Report Collection: Patient Films
ACC No: 1237425 Folio: 155841-1
Location: Miranda (Kingsway)

Phone No: 8522 4000

MIRANDA MEDICAL CENTRE
573 KINGSWAY
MIRANDA NSW 2228
Fax: 9526 1343
Patient: MRS [REDACTED]
DOB: 01/01/1962

+-----+
| Exam: RIGHT ACHILLES TENDON ULTRASOUND |
+-----+

Clinical History
Pain and swelling of the right Achilles.

Findings
There is dystrophic calcification within the distal Achilles close to its insertion into the calcaneus. The tendon at this level is slightly thickened and of low echotexture. There is a small amount of retrocalcaneal bursitis, but there is no evidence of peritendinopathy. No destruction to the Achilles is noted. Incidental note is also made of calcific insertion of Achilles tendon to the left calcaneus as well.

Sonographer: Sonya Boman
Secretary: otl/bs

We now have 2 brand new State of the Art 3T MRI scanners at our new [REDACTED] Kingsway Practice. These are the only wide bore scanners in the Shire area and provide improved patient comfort, superb image quality and reduced exam time.

Dr J [REDACTED]
Electronically Signed Fri 27/02/2015 8:37 am

Folio: 155841-1 [REDACTED]



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Upselling investigations



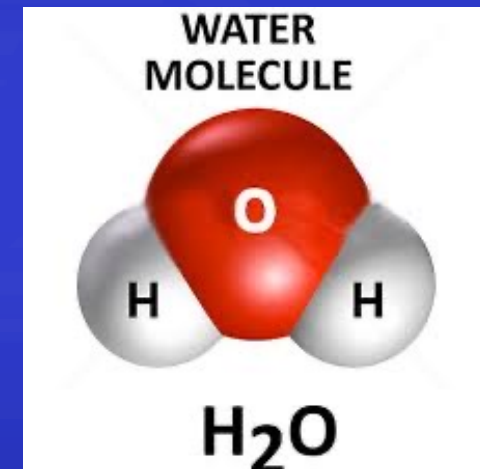
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How does MRI work?

1. The patient is placed in a magnetic field
2. The protons (hydrogen ions) line up
3. A radiofrequency is buzzed across
4. The protons “rattle”
5. The protons give off an energy
6. That energy is put into a computer to create a picture



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Water rich = MRI good

- Cartilage
- Brain/Nerve
- Ligament
- Muscle
- Fat
- Fluids



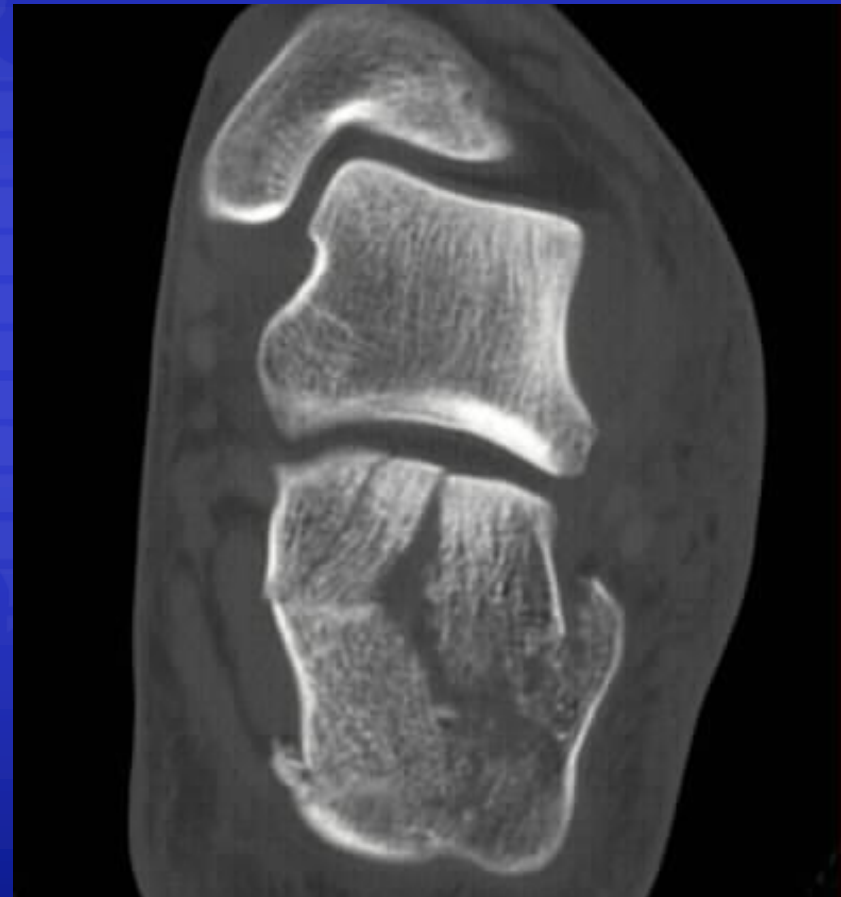
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Water poor = MRI bad

- Bone is much better imaged with CT scanning



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Quality of MRI images

- Variable around the town
- Quality of the machine
- Power of the magnet (3 Tesla)
- Use of extremity coils
- Skill of the reporting Radiologist – interest in foot and ankle

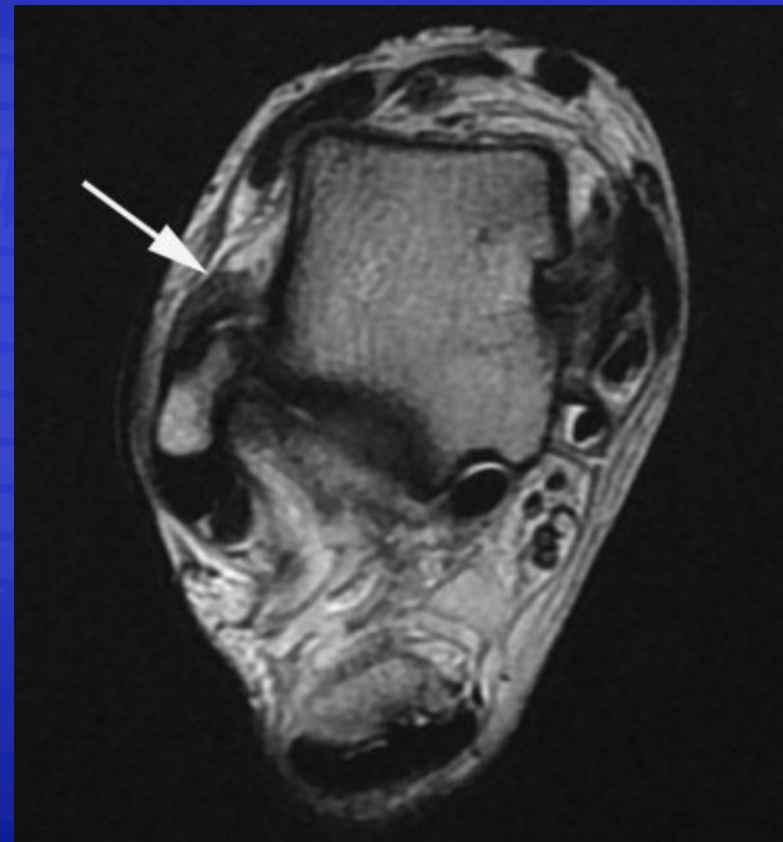
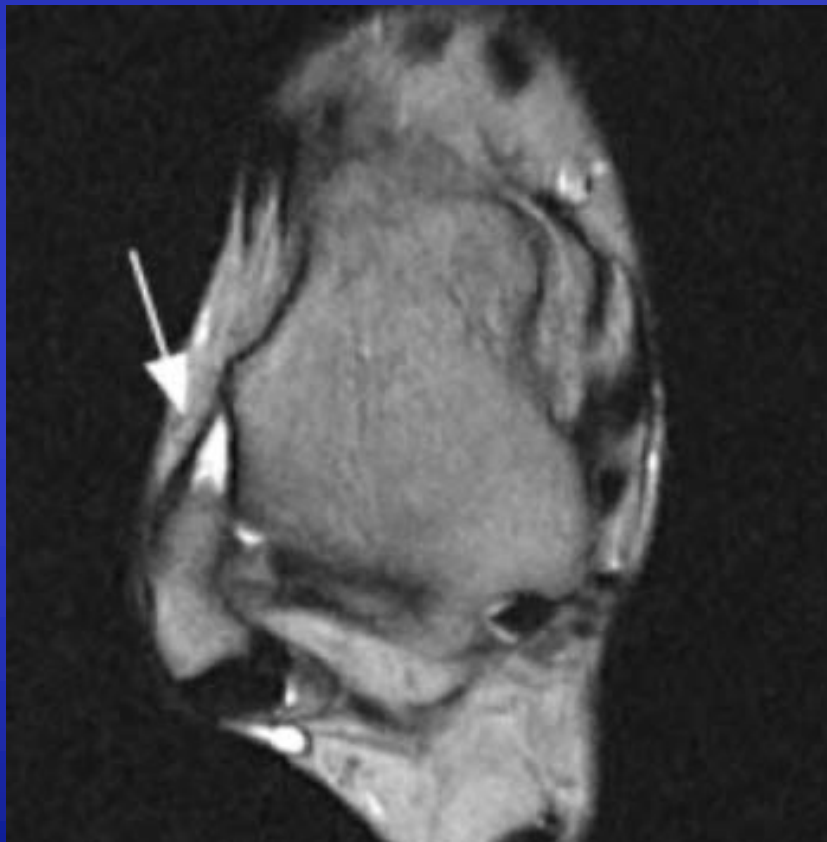


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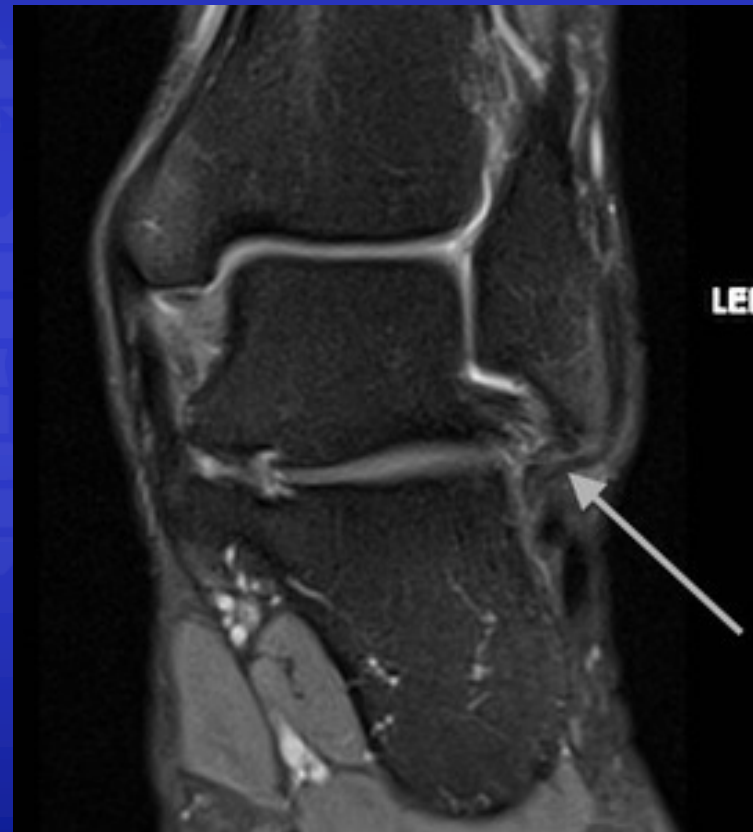
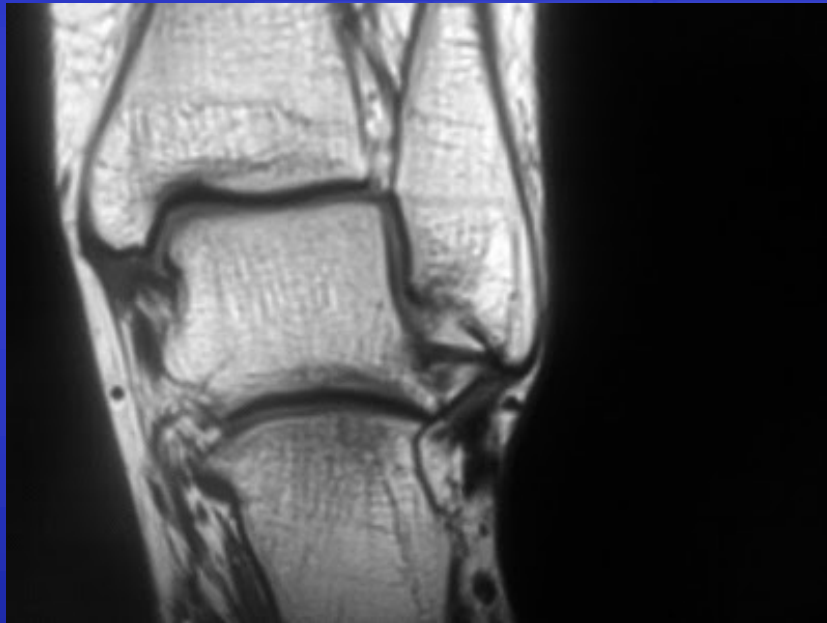
Ankle sprain



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Calcaneofibular ligament



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Ottawa Rules 1992

- Ankle X-ray is only required if there is any pain in the malleolar zone and any one of the following:
- Bone tenderness along the distal 6 cm of the posterior edge of the tibia or tip of the medial malleolus, OR
- Bone tenderness along the distal 6 cm of the posterior edge of the fibula or tip of the lateral malleolus, OR
- An inability to bear weight both immediately and in the emergency department for four steps.



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- Why did a sprained ankle in 1992 go from not needing an xray to needing an MRI scan in 2025?



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So what is my point?

Don't order a test unless you know
how to handle the result



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25 year old man

- Inversion injury playing soccer
- Hears a snap
- Comes off the field
- Ankle swollen
- Tender anterolateral gutter
- Plain x-rays normal



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Can't walk 24 hours later

- MRI complete rupture anterior talo-fibular ligament
- Bone bruise medially
- No chondral damage



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Patient is very worried

- Urgent helicopter transfer organised
- Four F-35's scrambled from Williamstown RAAF base to escort helicopter
- Helicopter lowers patient onto your roof

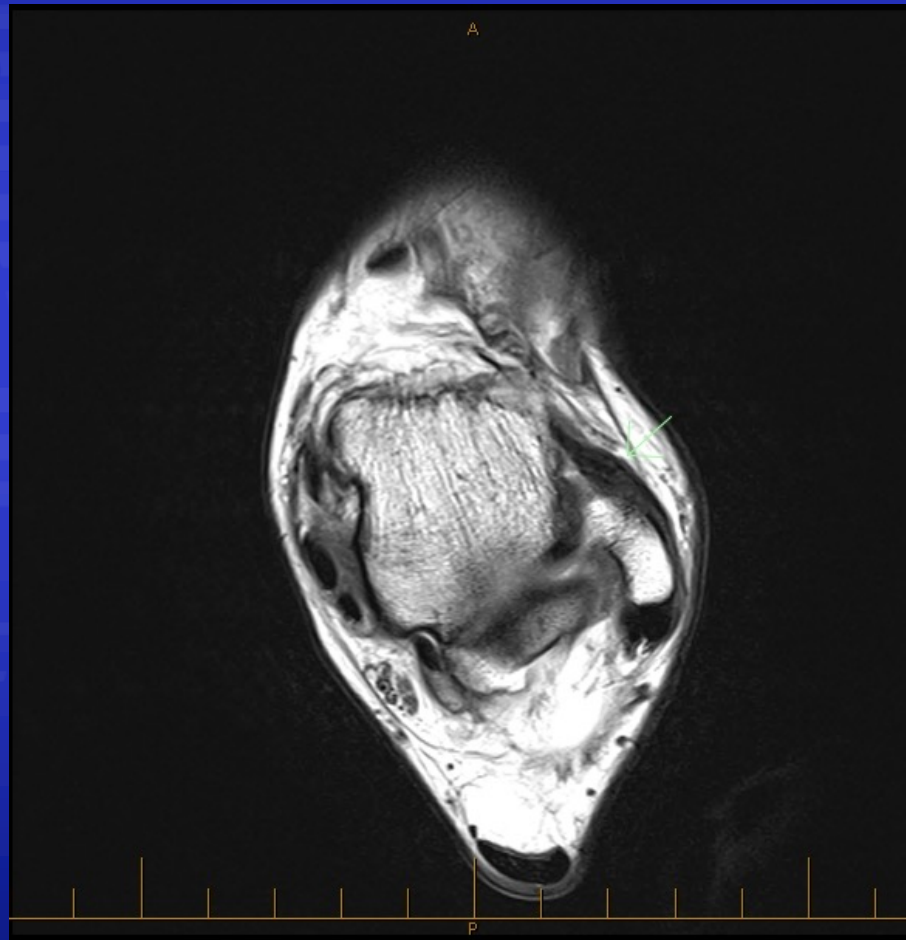




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The patient has a sprained ankle



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500 people sprain their ankles in Sydney every day

- Most have “normal” xrays
- Most don't need surgery
- Most will get better regardless of whether or not they see you or me!
- Medicine is a study of probability
- MRI in this situation was not indicated



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How long will it take to recover?

- Bad sprain – 6 weeks till running, walk, cycle and swim earlier
- More minor sprain still takes some weeks
- NB: Magnetic resonance has not been shown to speed ligament healing



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Remember what Kerry Packer said:

“The secret to success in
any business is to
underpromise and over
deliver”



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He also famously said:

‘I don’t think the government is
spending my money that wisely
that I want to be giving them
anymore”



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When do I order an MRI for a sprained ankle?

- Failure to progress despite good treatment at 6 weeks
- What is the commonest reason patient is not progressing?? Synovitis and irritation rather than locking from a detached osteochondral fracture
- Nerve pain
- Syndesmosis injuries controversial



57 yo man forefoot pain



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Midfoot sprain

- Lisfranc injury
- Suspect – talk to the patient and examine them
- Standing films
- Treat



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If plain xrays are normal

- I prefer to examine under anaesthesia to determine stability
- MRI confirms injury but does not guide treatment



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60 year old lady

- Works as a real estate agent
- 2 years of cramping burning pain in her feet
- Worse in tight/high heeled shoes
- Examination markedly tender at 3/4 interspaces with alteration of sensation at adjacent borders of 3/4 toes



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MRI

- Reported as no neuroma
- Patient gives up work as told “there is nothing that can be done for her”
- Can’t stand in heels for house inspections



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Patient sees foot and ankle surgeon

- From history and examination
- Bilateral 3/4 neuromas diagnosed
- Surgery successful
- Patient happy



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Diagnosis of neuroma



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Moral of the story

- Neuroma is a clinical diagnosis
- I use MRI when the clinical picture is not clear or typical
- Will pick stress fracture/tumour/arthropathy



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Great MRI examples PVNS

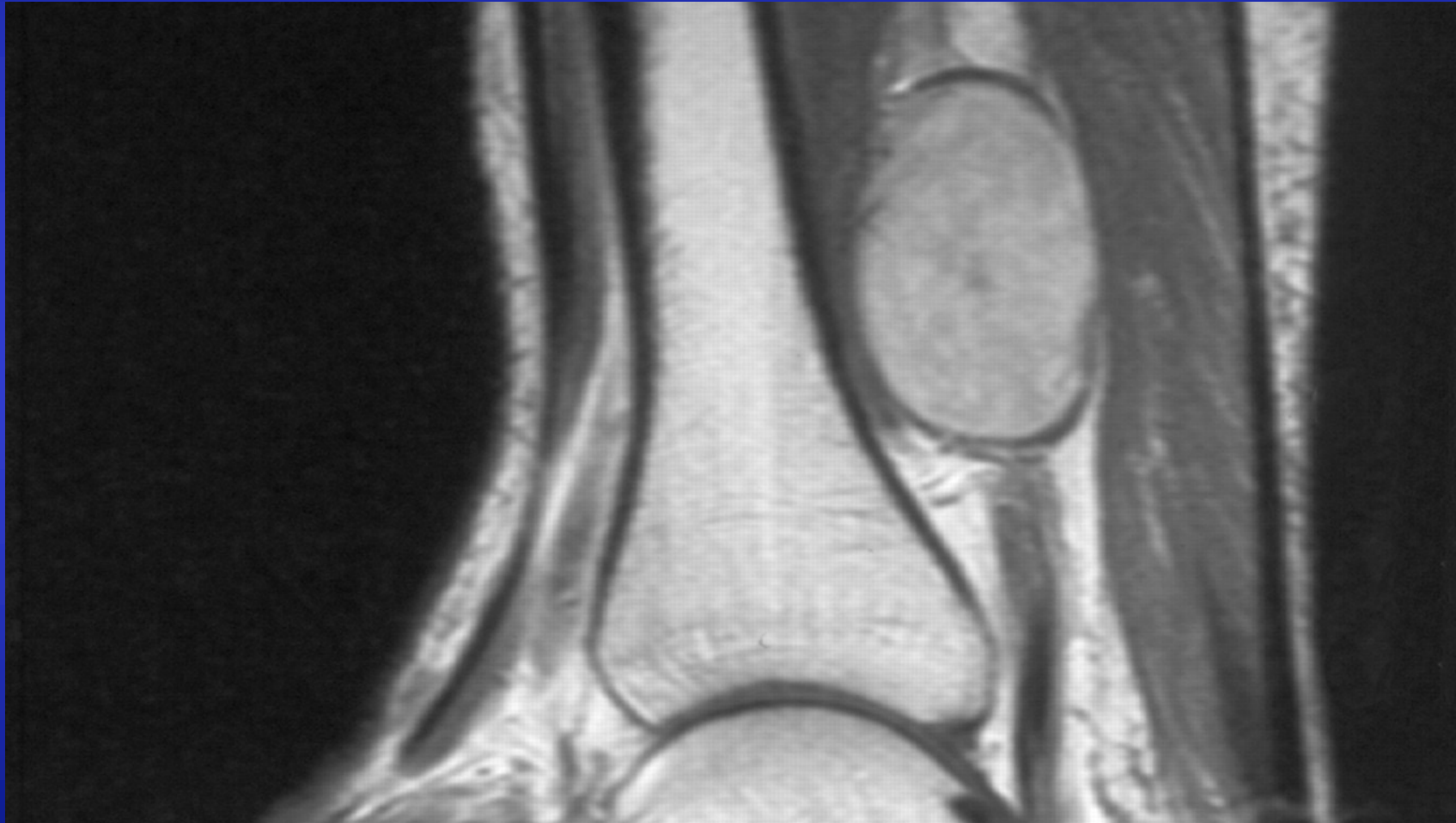


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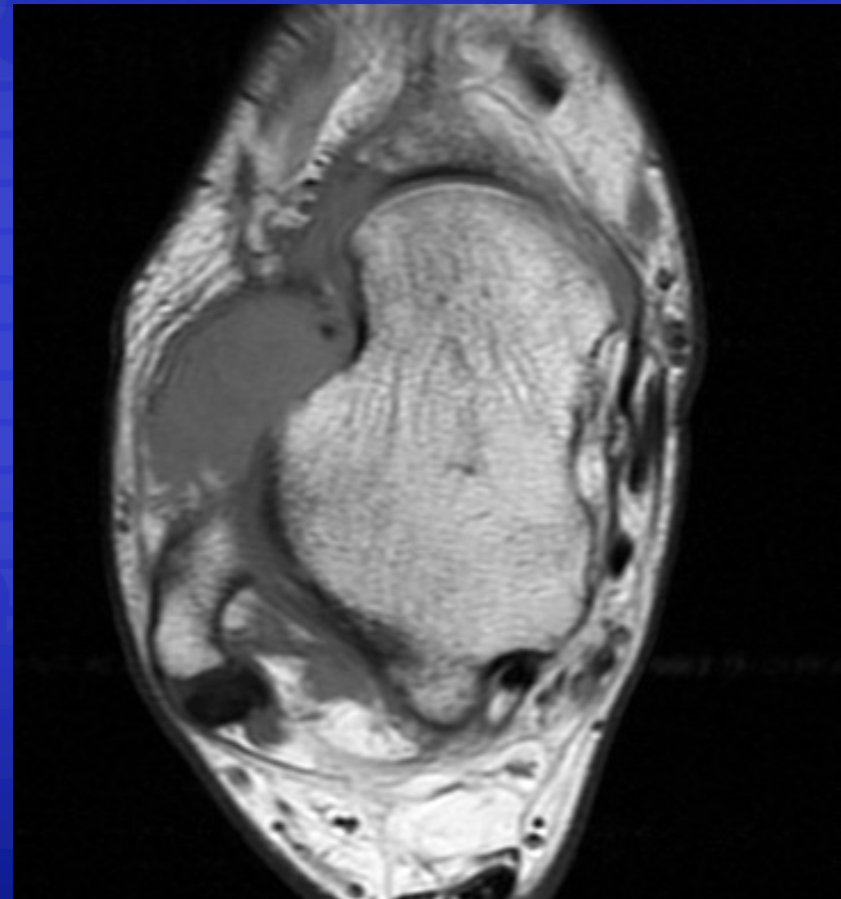
Schwannoma



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Synovial sarcoma



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In summary

- History and Examination are as important as any investigation
- “You see what you look for and recognise what you know”
- Don’t forget plain x-rays
- There is a big push from the public and the corporates to order more MRI scans
- Think about how it will affect your treatment
- Unnecessary investigations should be avoided as they waste precious health resources



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