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Uses and abuses of MRI in the foot and ankle

John P. Negrine
FRACS

Foot and Ankle Surgeon Sydney



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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.

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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We spend \$3 Billion per year on
medical imaging

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



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Background

- Magnetic resonance imaging invented in 1971
- 1980 first clinically useful picture taken
- MRI is exploding 349 funded or partially funded 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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The corporates control the landscape



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Who are these corporates?

- Sonic healthcare (\$18.01) owns Castlereagh imaging
- Primary Healthcare (\$3.72) owns Healthcare imaging services
- Capitol Health (\$0.54) own Southern Radiology
- I-Med radiology owned by Swedish private equity looking to float this year



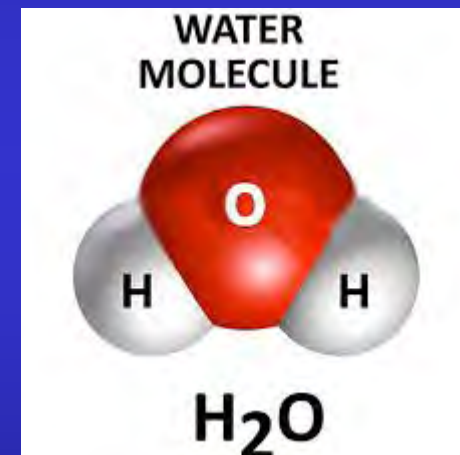
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How does MRI work?

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



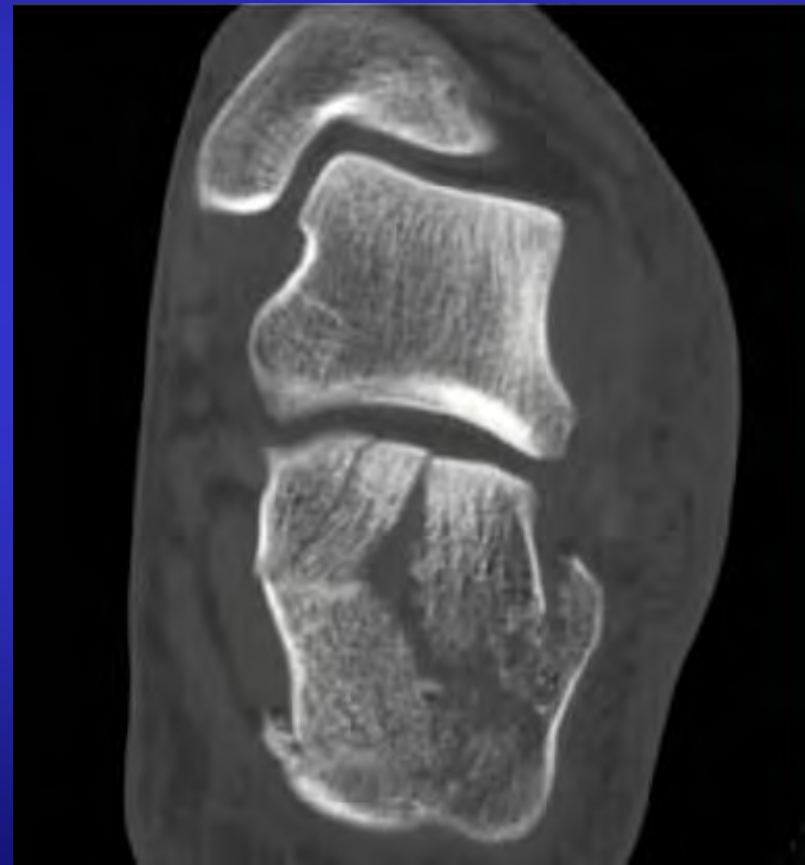
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Water poor = MRI bad

- 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

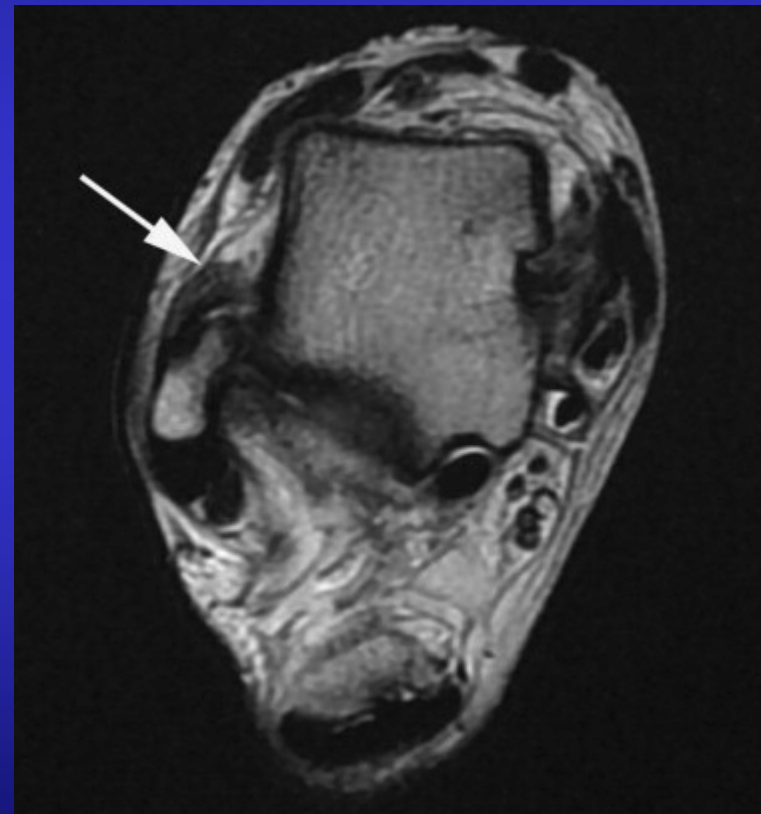
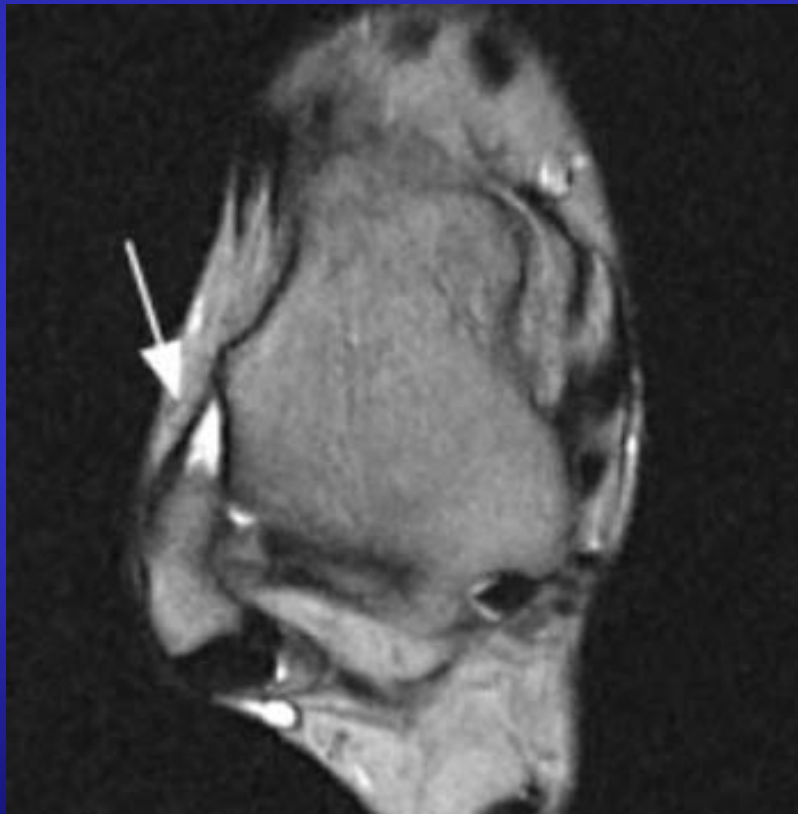


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Ankle sprain

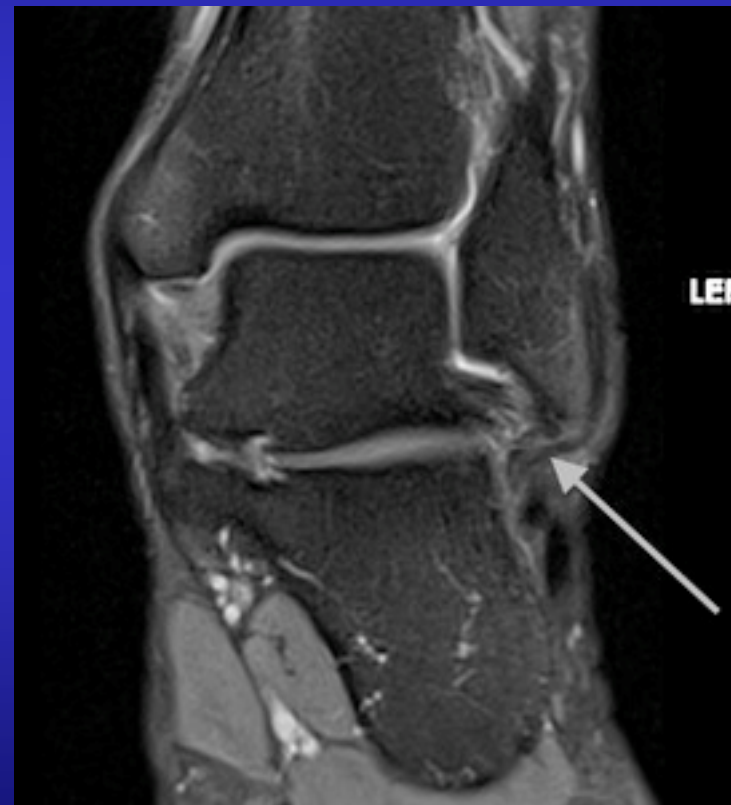
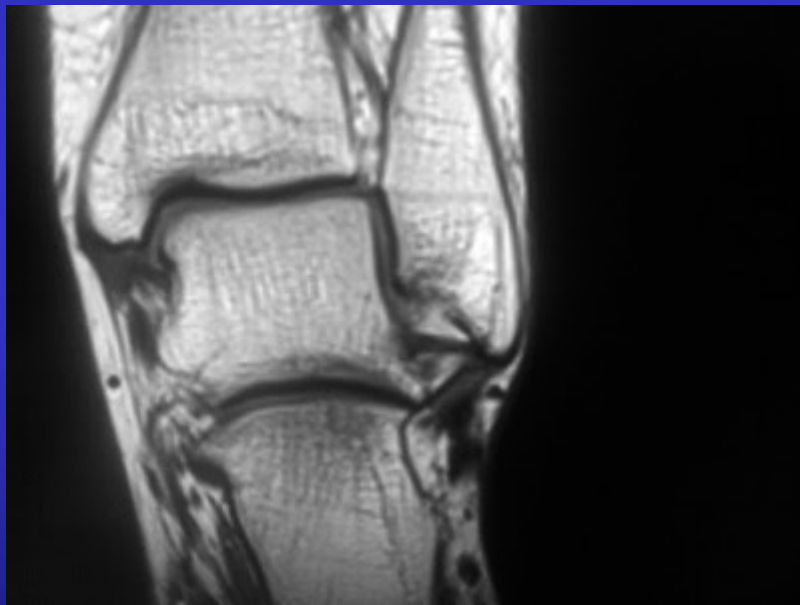


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Calcaneofibular ligament



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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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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-18's scrambled from Williamstown RAAF base to escort helicopter
- Helicopter lowers patient onto your roof



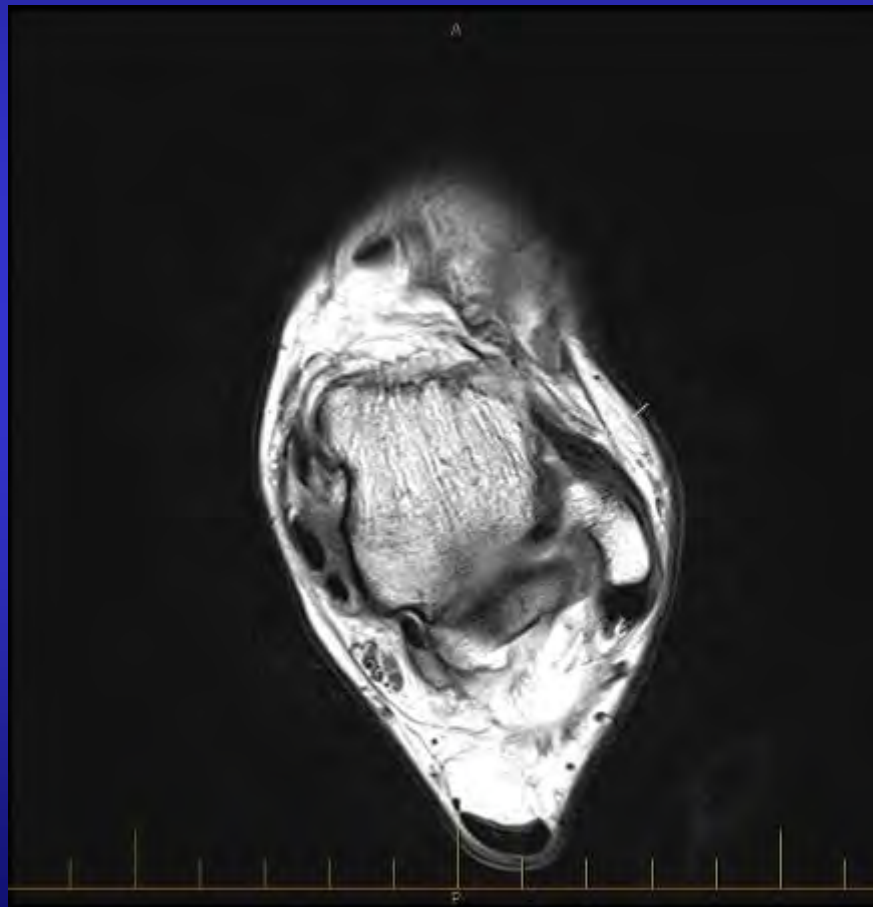


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The patient has a sprained ankle



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400 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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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



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Midfoot sprain

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



If plain xrays are normal

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



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

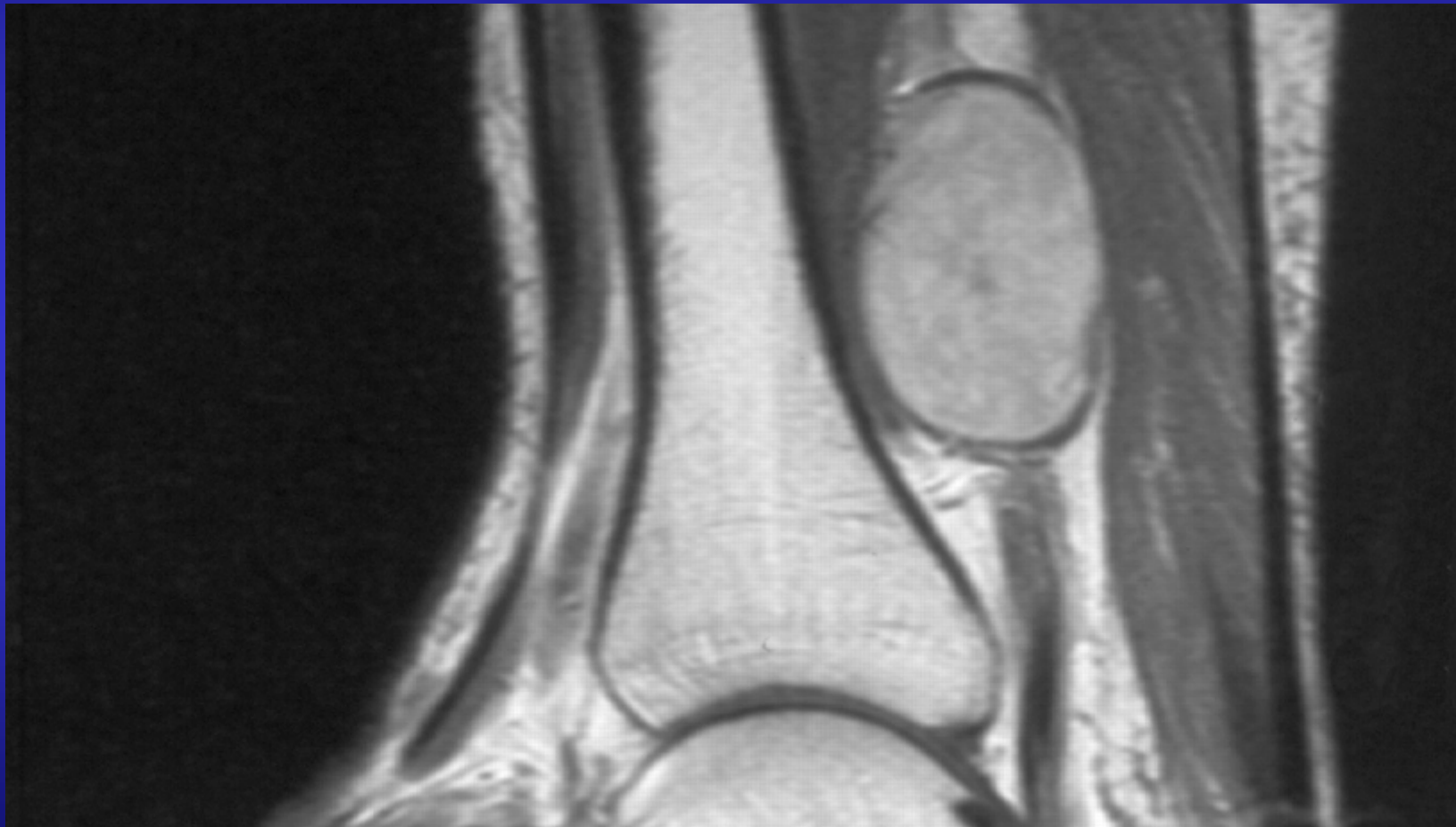


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ORTHOSPORTS is a leading provider of orthopedic services.

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Schwannoma

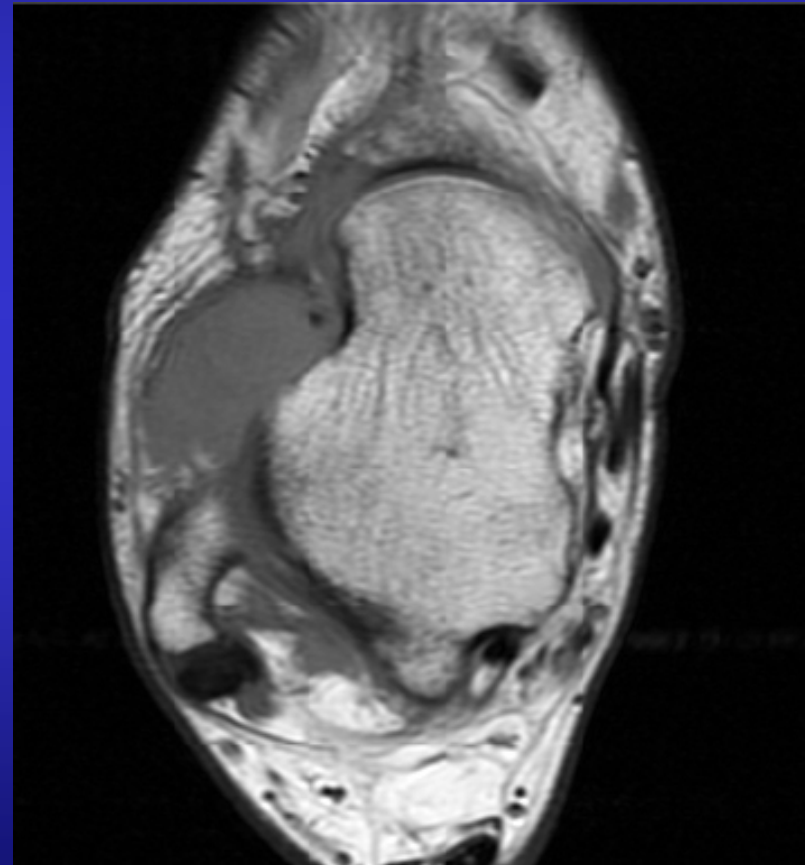


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Synovial sarcoma



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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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