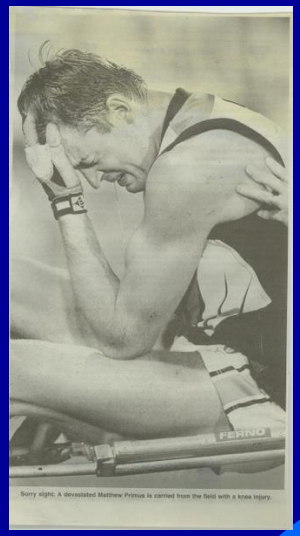
ACL INJURY IN SPORT



The most feared ligament in sport ?

An Aussie perspective

Dr Peter A Larkins

MBBS,B.MED SCI (HONS),FACSEP,FASMF, FFSEM (UK)

SPECIALIST SPORTS & EXERCISE PHYSICIAN

EPWORTH SPORTS & EXERCISE MEDICINE GROUP

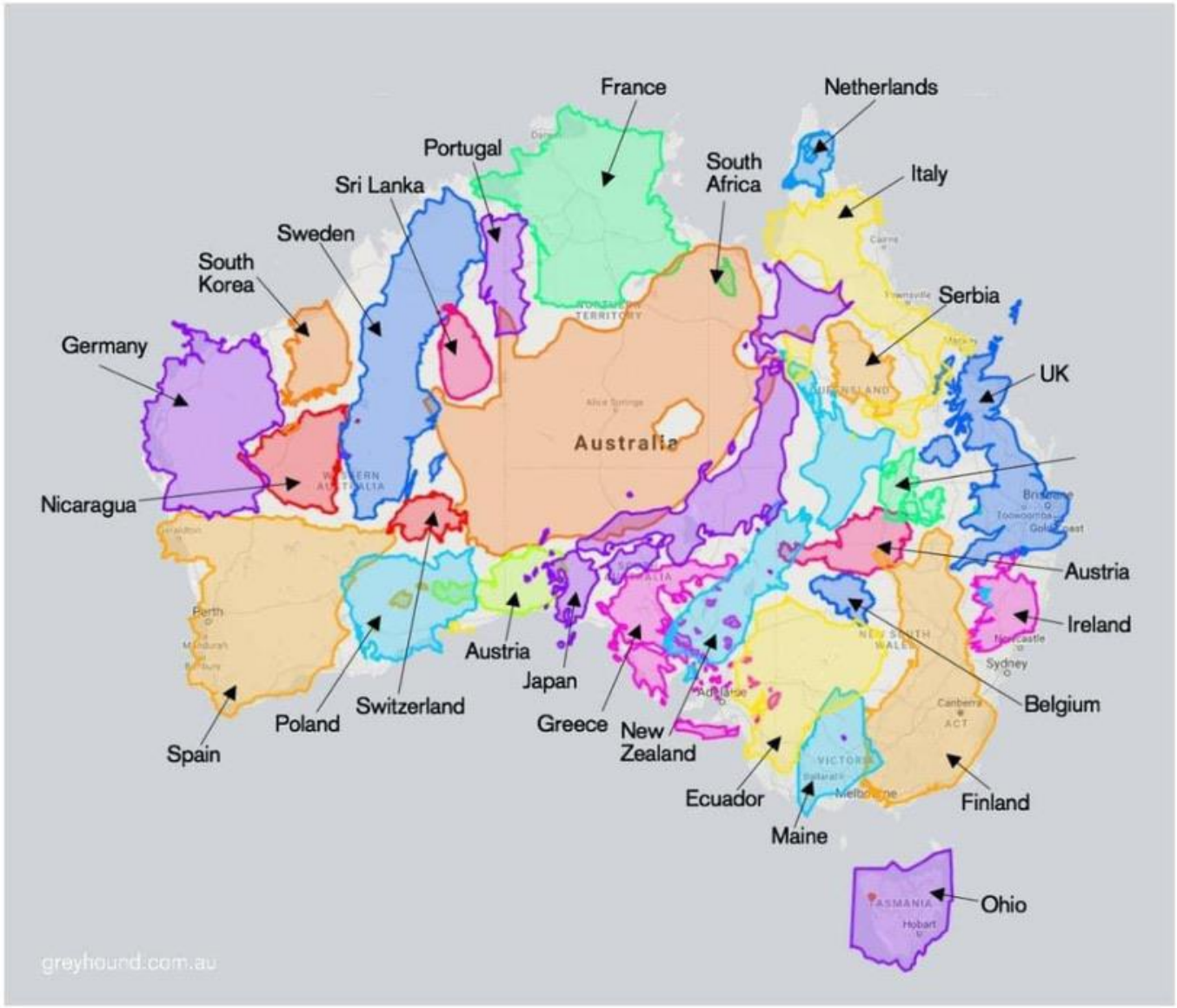
X = @doclarkins *= drpeterlarkins* *peter a. larkins*

drpeterlarkins.com

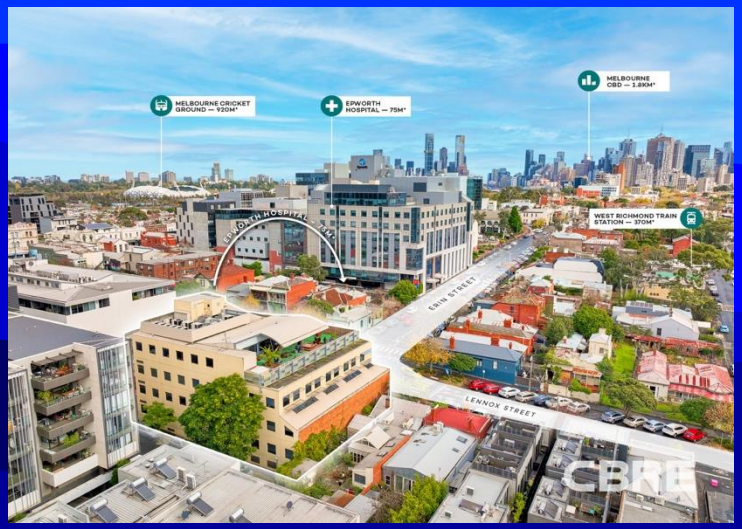
Epworth Sports+Exercise Medicine Group

PAL 2002

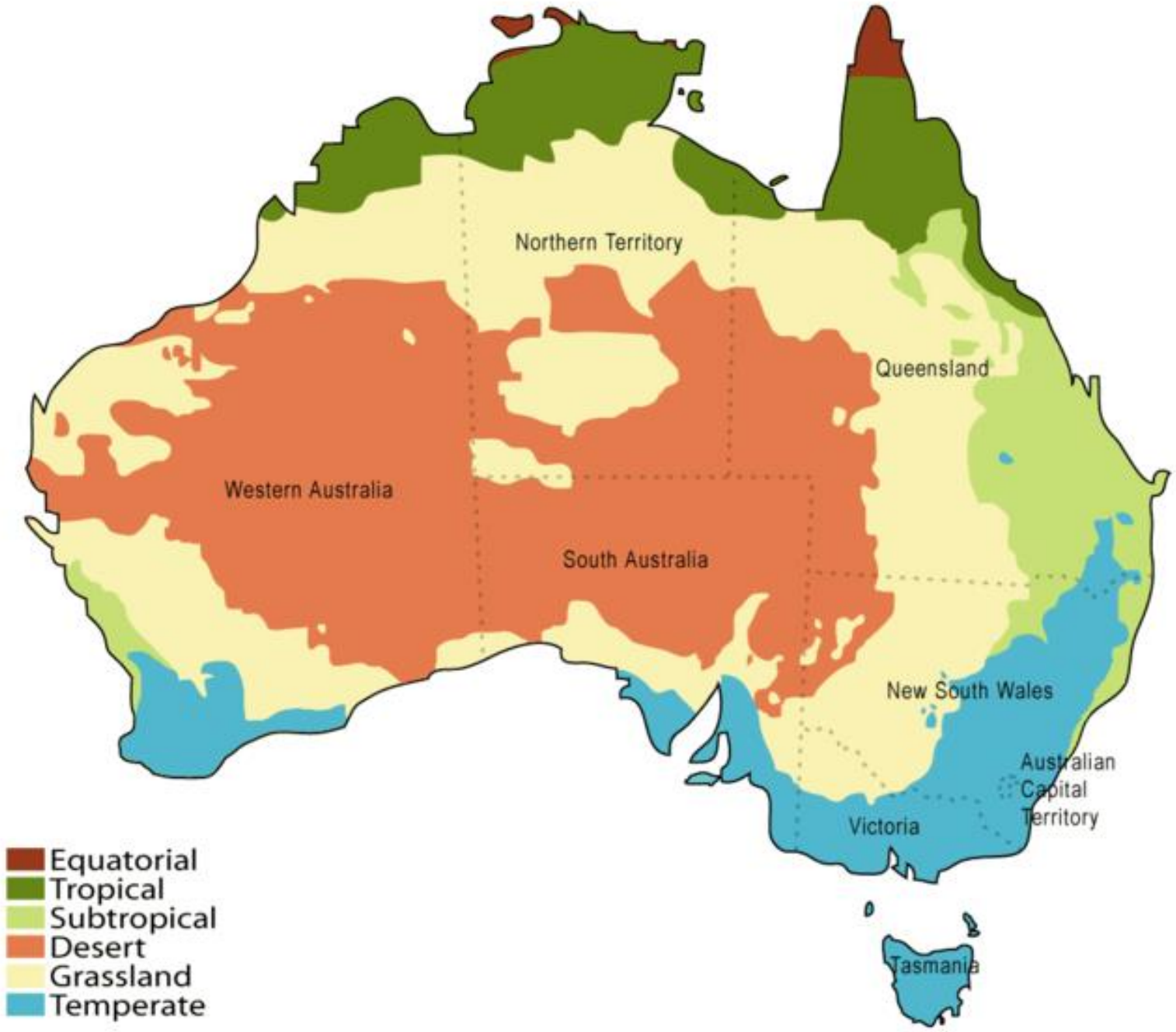
The true size of Australia 🤯



Here is Australia!!!


MELBOURNE CRICKET GROUND — 920M*
EPWORTH HOSPITAL — 75M*
MELBOURNE CBD — 1.8KM*
WEST RICHMOND TRAIN STATION — 370M*
ERIN STREET
LENNOX STREET
CBRE


Epworth
32 Erin Street
Epworth Centre
Bethesda Wing
EMERGENCY


Northern Territory
Queensland
Western Australia
South Australia
New South Wales
Australian Capital Territory
Victoria
Tasmania
Equatorial
Tropical
Subtropical
Desert
Grassland
Temperate

MOST POPULAR SPORTS *

* (BASED ON FANS / BROADCAST VIEWING) *

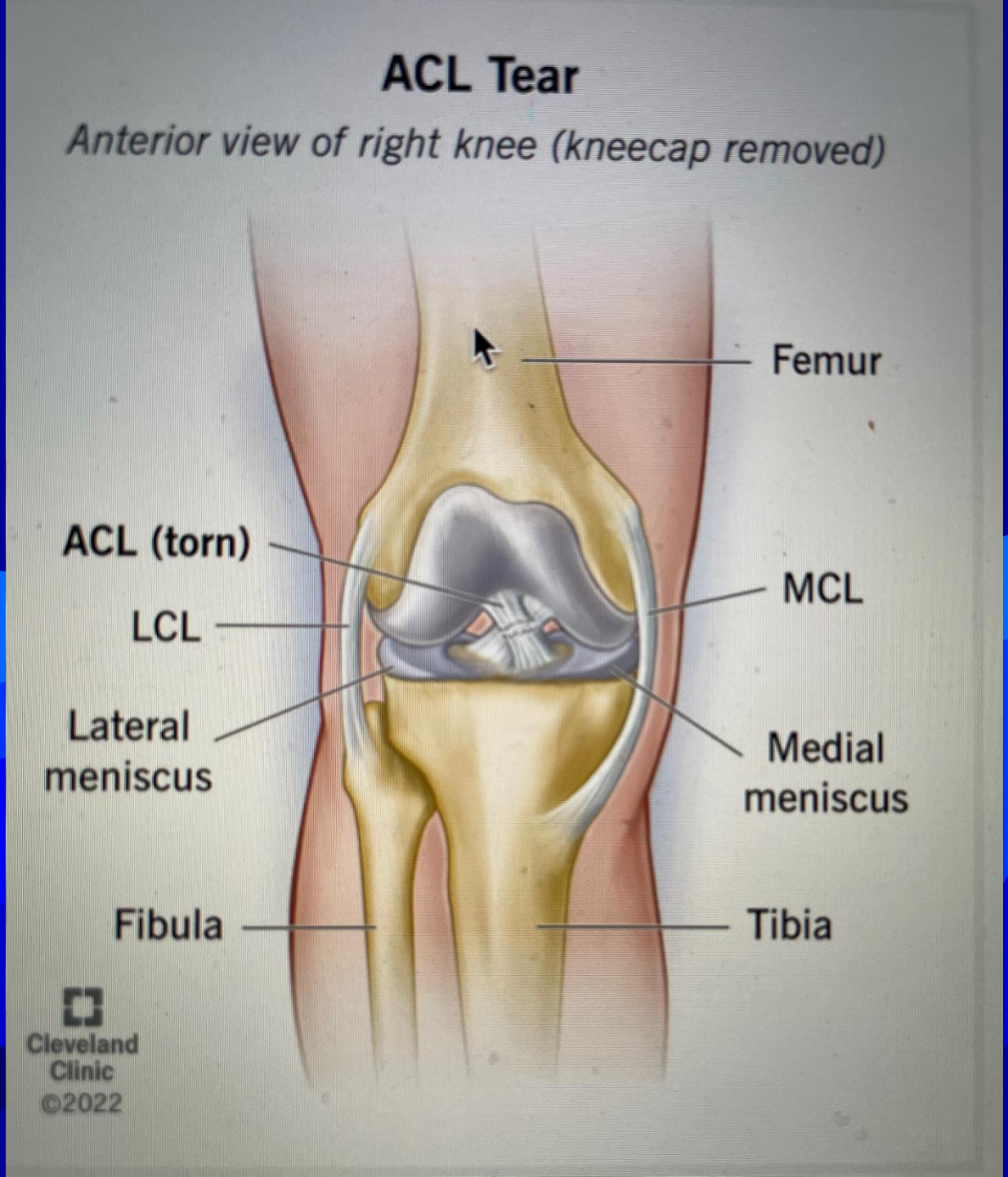
- AUSTRALIA
- Aussie Rules
- Cricket
- Rugby League
- Golf
- Rugby Union
- Soccer
- Tennis
- Basketball
- Netball
- Horse Racing

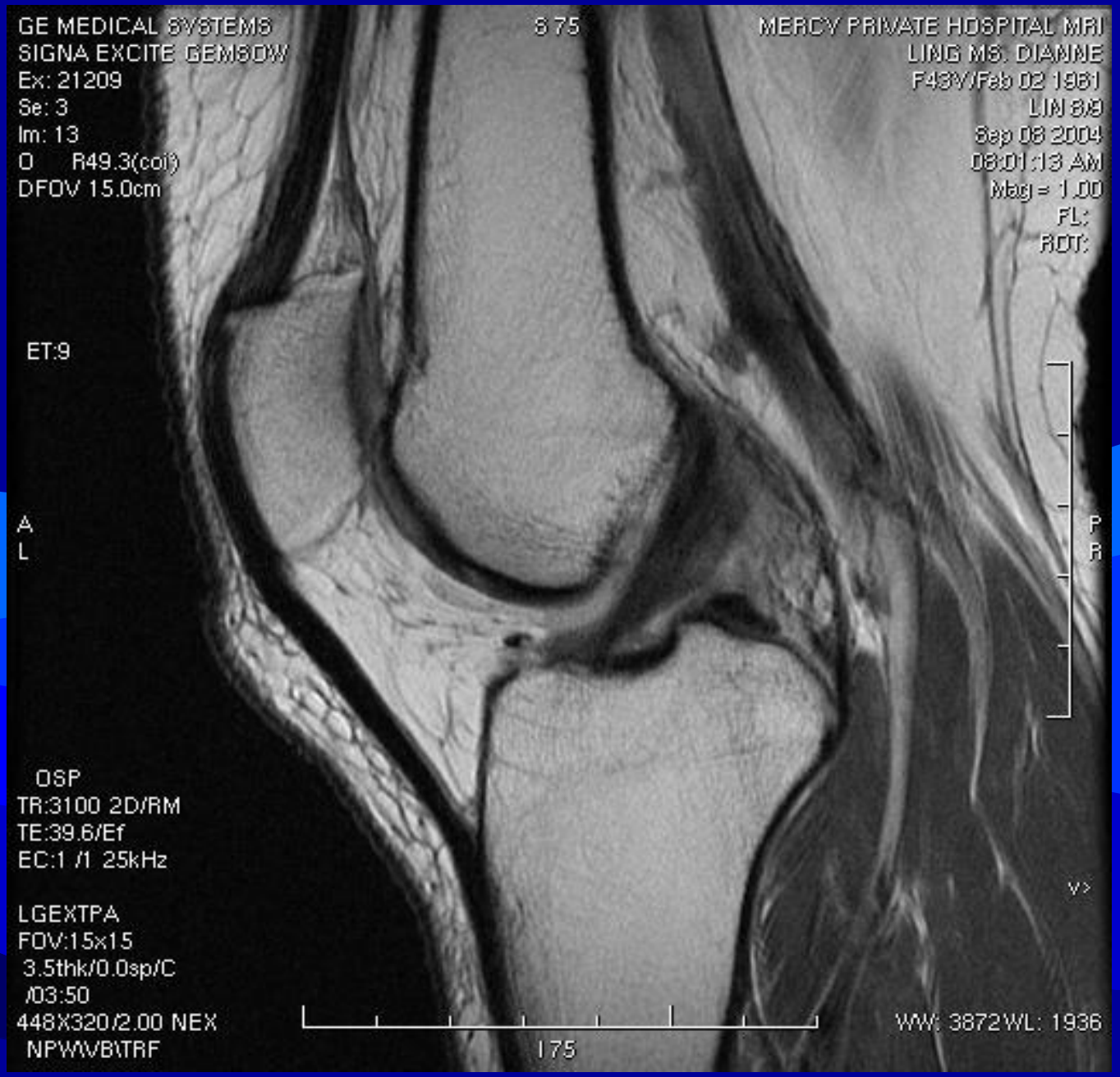
- WORLD
- Football (soccer)
- Cricket
- Hockey
- Tennis
- Table tennis
- Volleyball
- Basketball
- Baseball
- Rugby union
- Golf

WHY IS THE ACL SO FAMOUS ?

- ROTARY STABILISER
- PROPRIOCEPTIVE SIGNAL
- PTOA RISK AFTER INJURY
- LIMITATION ON SPORT/ LIFESTYLE
- FINANCIAL COSTS
- REHABILITATION VARIABLE
- CAREER ENDING/ ALTERING

Dr Peter Larkins


ACL Tear
Anterior view of right knee (kneecap removed)
Femur
ACL (torn)
MCL
LCL
Lateral meniscus
Medial meniscus
Fibula
Tibia
Cleveland Clinic
©2022


GE MEDICAL SYSTEMS
SIGNA EXCITE GEMSOW
Ex: 21209
Se: 3
Im: 13
O R49.3(coi)
DFOV 15.0cm
S 75
MERCY PRIVATE HOSPITAL MRI
LING MS. DIANNE
F43Y/Feb 02 1961
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Sep 08 2004
08:01:13 AM
Mag = 1.00
FL:
ROT:
ET:9
A
L
P
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OSP
TR:3100 2D/RM
TE:39.6/Ef
EC:1 /1 25kHz
LGEXTPA
FOV:15x15
3.5thk/0.0sp/C
/03:50
448X320/2.00 NEX
NPW\V\B\TRF
175
WW: 3872 WL: 1936

A faulty part from an independent supplier leads to the creation of a multibillion-dollar sports medicine profession.

Trends in Australian knee injury rates: An epidemiological analysis of 228,344 knee injuries over 20 years

Nirav Maniar,[a,b]* Evert Verhagen,[c] Adam Leigh Bryant,[d] and David Andrew Opar [a,b]

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[b]Sports Performance, Recovery, Injury and New Technologies (SPRINT) Research Centre, Australian Catholic University, Fitzroy, Victoria, Australia
[c]Amsterdam Collaboration on Health and Safety in Sports, Department of Public and Occupational Health, Amsterdam UMC and Amsterdam Movement Sciences, Amsterdam, the Netherlands
[d]Centre for Health, Exercise and Sports Medicine, The University of Melbourne, Parkville, Victoria, Australia

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Published online 22 March 2022
https://doi.org/10.1016/j.lanwpc.2022.100409

Summary

Background Acute knee injuries are a key predisposing risk factor for knee osteoarthritis. Public health interventions require in-depth epidemiological evidence to determine which knee injuries are problematic in critical age and sex demographics.

Methods Descriptive epidemiological analysis of longitudinal data on knee injuries (July 1998 – June 2018) from the National Hospital Morbidity Database in Australia were studied. The main outcomes where the population-related knee injury frequency, incidence per 100,000 and annual growth rate (%) over the 20-year observation period. Age-group and sex differences were also studied to determine demographic-specific trends.

Findings 228,344 knee injuries were diagnosed over the 20-year analysis period. Significantly rising annual incidences were observed for total knee injuries, anterior cruciate ligament (ACL) injuries and knee contusions in males and females. Posterior cruciate ligament (PCL) injuries and knee dislocations were also rising in females, but not males. Greater annual growth rates were observed for females compared to males for total knee injuries, knee contusions, PCL injuries and knee dislocations. Demographic analysis revealed that the highest annual growth rate in injury incidence (10.4%) was observed for ACL injuries in females aged 5–14 years old.

Interpretation Increasing annual incidence of knee injuries was observed over the 20-year period. Males have a higher incidence of knee injury per capita than females, but the gap appears to have narrowed over the 20-year analysis period. Younger Australians show a precipitous rise in the annual number of ACL injuries, particularly for females aged 5–14 years. These trends warrant urgent intervention.

Funding None.

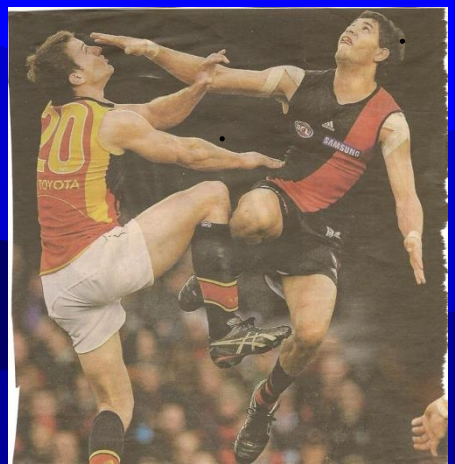
Introduction

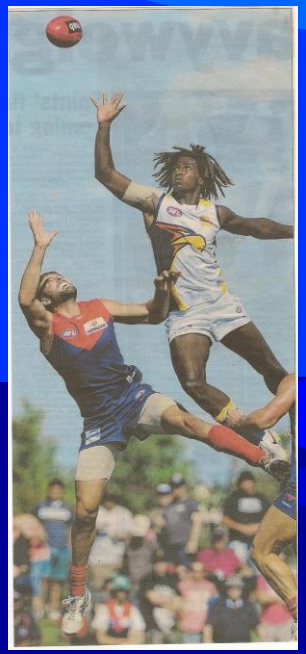
Osteoarthritis is a highly burdensome condition and a major cause of disability, psychological stress, and poor quality of life.[1] In Australia, the healthcare costs of osteoarthritis have been estimated to exceed AUD$3.5 billion annually.[2] Whilst osteoarthritis can affect numerous joints, knee osteoarthritis accounts for approximately 85% of the global burden of the disease.[3] conservatively or surgically,[4] total knee replacements are increasing rapidly in Australia.[5] Thus, primary prevention of knee osteoarthritis is critical to manage the increasing burden on the healthcare system.[1]

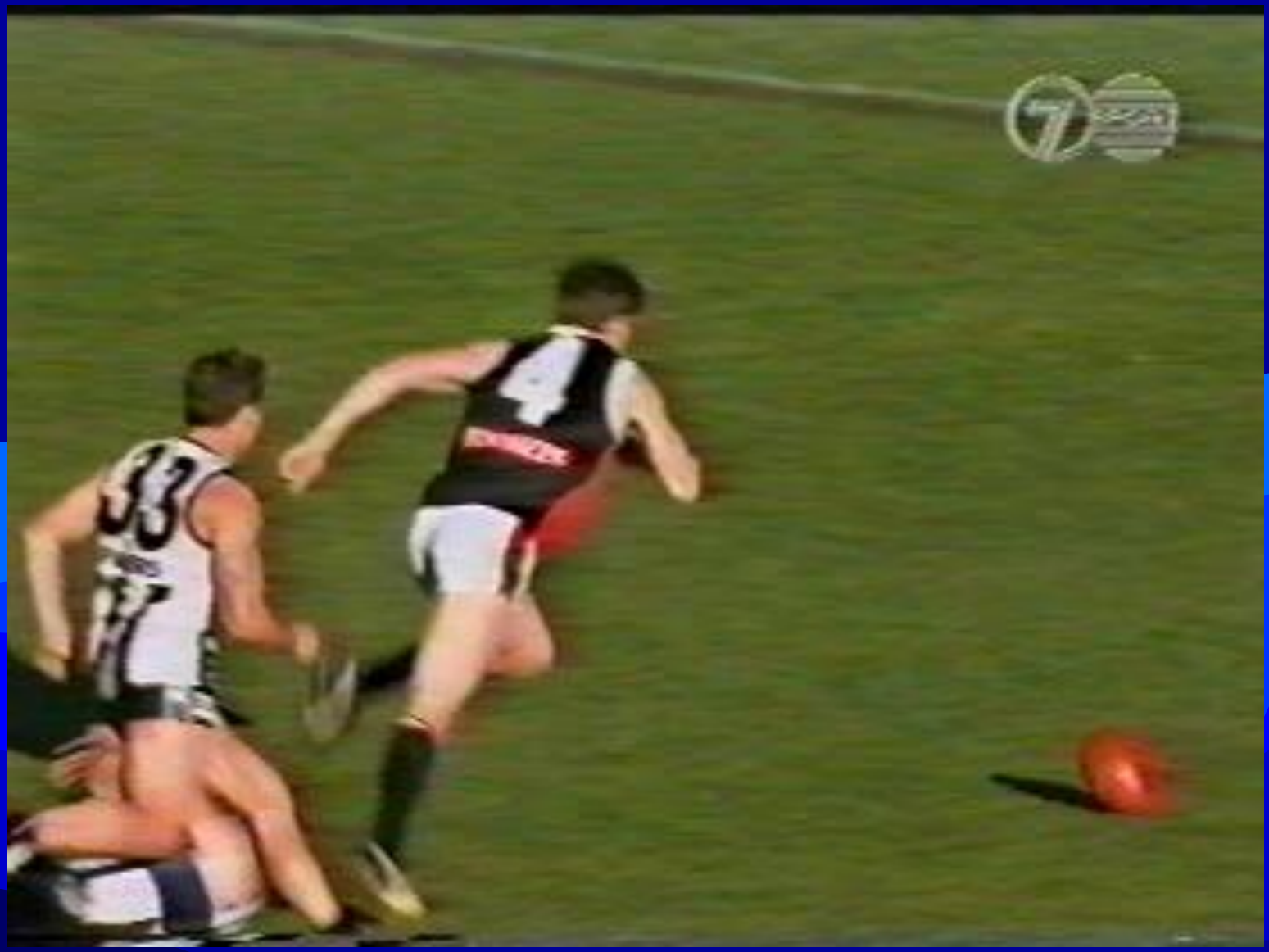
Whilst the causes of knee osteoarthritis are multifactorial, traumatic knee injury has been identified as a key predisposing factor.[6] Knees with a previous anterior cruciate ligament (ACL) injury or meniscus injury have

AFL INJURY SURVEY

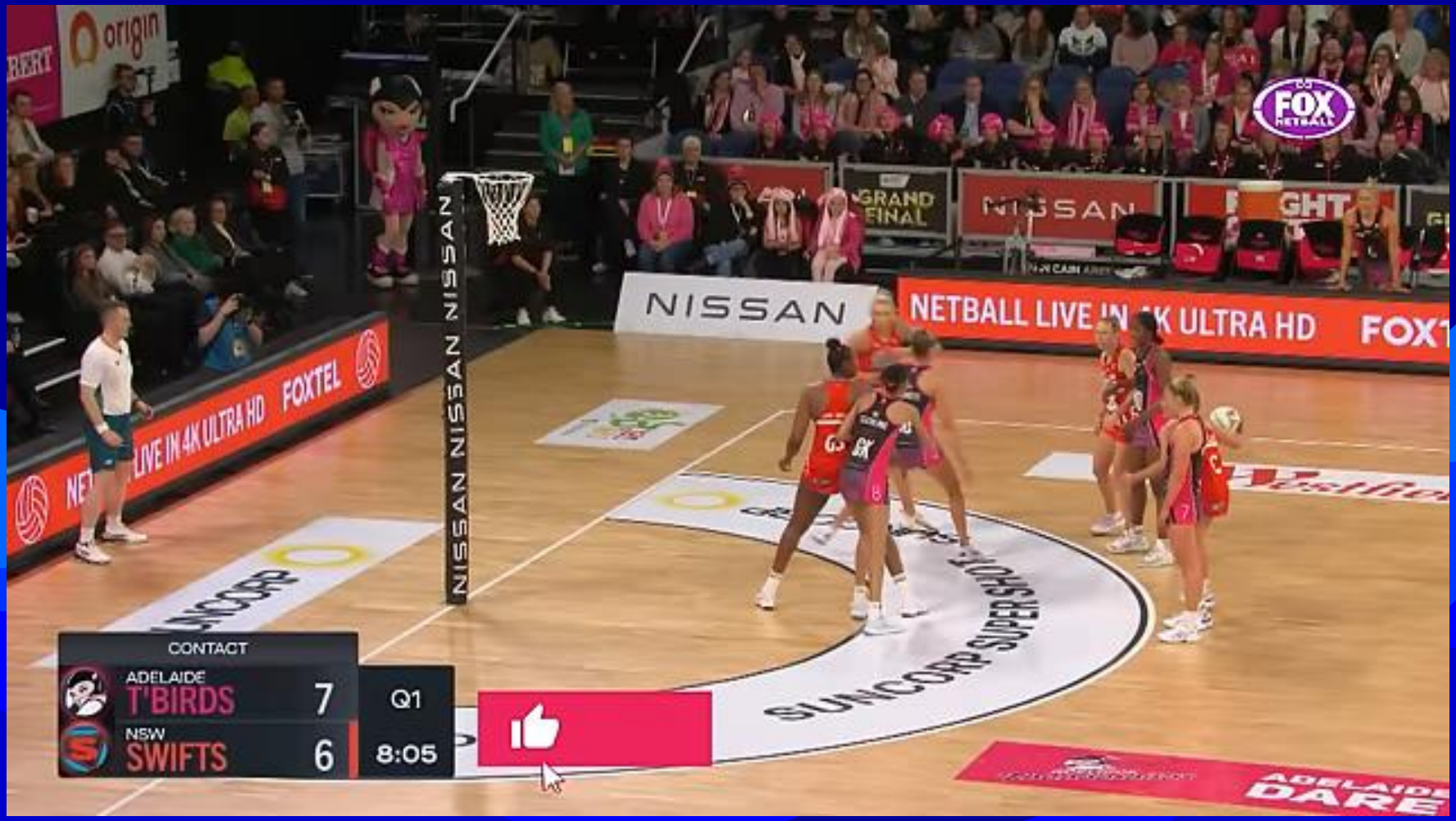
- continuous since 1992
- 18 clubs (42 players on club list)
- longest professional football code data
- research
- intervention / prevention







PAL 2002


origin
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NISSAN NISSAN NISSAN
NETBALL LIVE IN 4K ULTRA HD
FOXTEL
SUNCORP SUPER NETBALL
CONTACT
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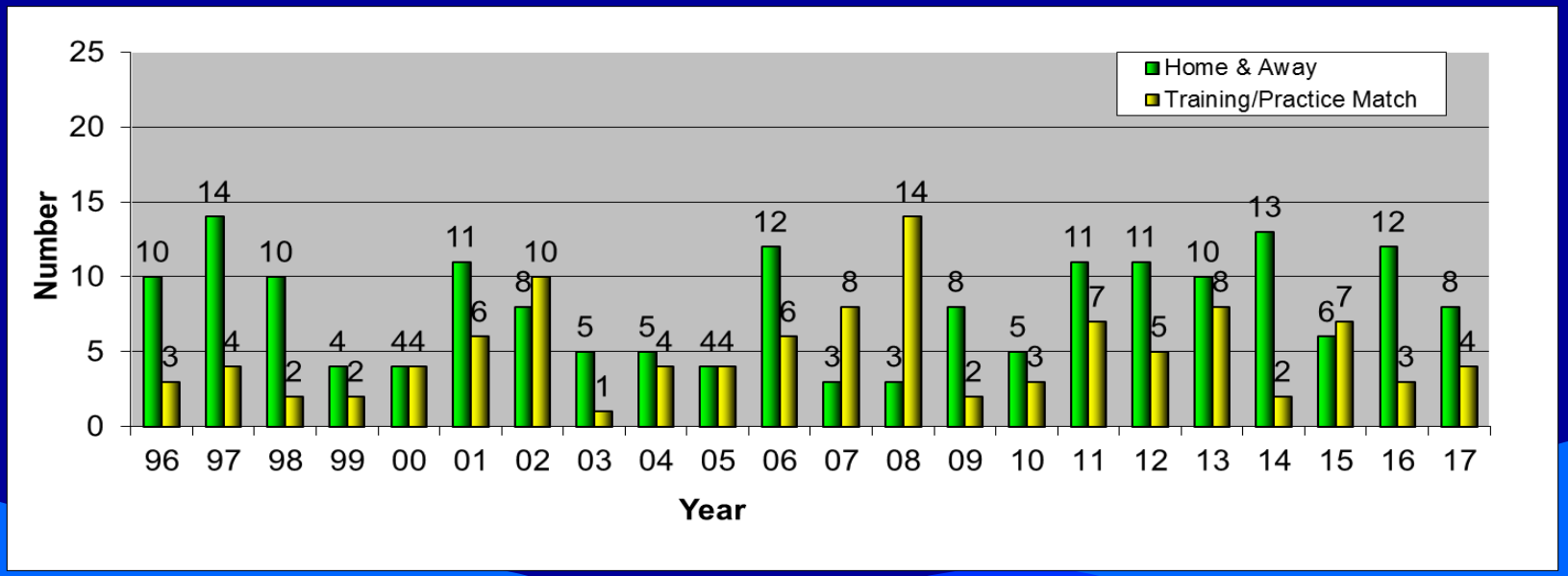
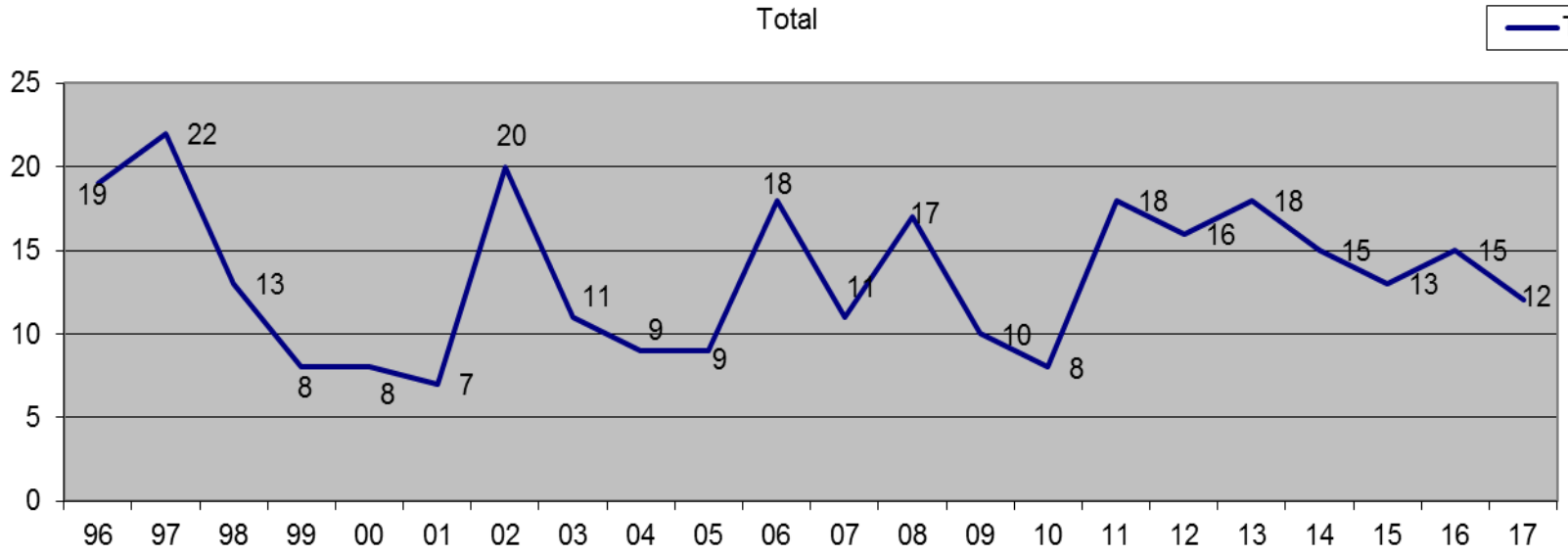
NSW SWIFTS 6
Q1
8:05

ACL INJURY IN AUSSIE RULES





Published online 2021 Mar 31. doi: 10.2147/OAJSM.S250414 PMID: 33833597

Anterior Cruciate Ligament Injuries in Australian Rules Football: Incidence, Prevention and Return to Play Outcomes

Kate E Webster,[1] Timothy E Hewett,[2] and Julian A Feller[1,3]

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Abstract

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Australian Rules football is the most popular of the various codes of football played in Australia. During the game players perform frequent landing, cutting and pivoting manoeuvres that expose them to substantial risk for anterior cruciate ligament (ACL) injury. Recent years have seen the introduction of a professional women's league that has resulted in an exponential growth in the participation of women and girls in this sport. Unfortunately, there is a corresponding growth in ACL injury rates in female players. This review summarizes the incidence of ACL injury in both men's and women's Australian Rules football and reviews potential causative factors and risk reduction strategies. The final section takes an in depth look at return to sport outcomes after ACL reconstruction surgery in these populations. Whilst an ACL injury does not mean the end of a player's career in Australian football, it certainly presents a significant challenge in terms of return to preinjury levels of form and high rates of secondary and tertiary ACL injury are also a significant concern.

Keywords: Australian football, knee injury, ACL, injury prevalence, return to play

Introduction

Go to:

Australian Rules football is a field-based, athletically demanding team sport that attracts a broad spectrum of participants; from children and adult communities to the national professional competitions that are known as the Australian Football League (AFL) and the Australian Football League Women's (AFLW). Australian Rules football is the most popular of the various codes of football played in Australia (including Australian Rules, soccer, rugby union and rugby league) and the number of participants is estimated to exceed 1.7 million.[1] Since the start of the AFLW in 2017, female participation in football has seen a rapid growth in the number of women's clubs in Australia, with clubs having increased 137% (from 960 to 2281 clubs), in just two seasons.[2]

Australian Rules is played on natural grass with an oval leather ball, usually during the winter months. Two teams contest play over 4 periods of 20 minutes in the men's competition and 15 minutes in the women's competition, plus time on field for stoppages, with the objective to score more points than the opposition team to win. Teams consist of a total of 22 players with 18 allowed on the field at any one time in the men's competition and 16 in the women's competition. The typical playing field is larger than other codes of football (approx. 165 x 135m) and most of these fields are also used for cricket in the summer months. Various game modifications are made at the

ACL INJURY IN AUSSIE RULES

- 13.5 ave per season over 22 AFL years
- Most clubs “budget” for 1 per team / season
- AFLW 15 in 6 weeks (2022)
- If extrapolate → 26 game season → 75 ACL !!

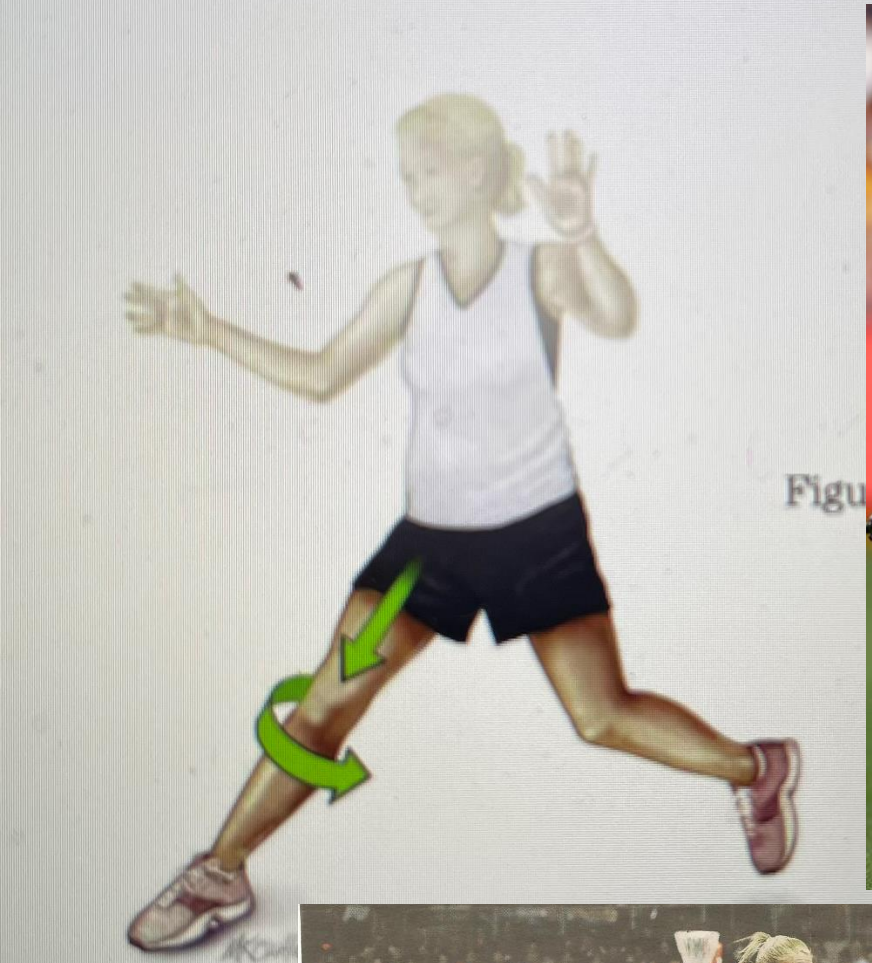

Figu


Photo: @michaelcwillson
AFL PHOTOS
aflphotos.com.au

ARE WOMEN MORE INJURY PRONE?

- Comparison sports data – both genders play
- Soccer, hockey, basketball, volleyball, tennis
- Similar patterns in many categories
- Stand out differences evident

Inside Huntington's painful ACL battle ... on repeat

RIPPING UP THE JOINT OVER AND OVER AGAIN

Erin Smith

Pain, surgeries, gruelling rehab process and extreme strain on your mental health – AFLW player Isabel Huntington says the impact of an ACL rupture doesn't get any less after the second or third time.

Huntington, 24, has torn her ACL three times in the space of six years.

Joining the triple-ACL club this year alongside the AFLW player is Matildas fringe player Holly McNamara – who tore her ACL for the third time playing in the A-Leagues just days after being called into the national squad.

Sydney FC midfielder Taylor Ray is back in the A-Leagues this season after her third rupture.

Huntington said thoughts of giving up the game started to creep into her head during her second rehab stint and grew louder during her most recent injury.

"There are certainly periods where you think you're not going to be able to get back or at the very least get back to the level that you were playing at, it's a pretty dark and lonely time throughout those periods," she said.

"Particularly the third one, not as many people have come back from three successfully, so you have less and less inspiration in terms of athletes that have successfully done it.

"It's also about how much the body can tolerate, it's obviously straining, it's really hard and mentally challenging, the impact on your life is massive.

"So there were doubts. But it's a pretty proud moment when you get to run out there again, with your fingers crossed it will be sweet from here on out."

Leading knee surgeon Dr Chris Vertullo said research had proven the female anatomy made women five to eight times more likely to suffer an ACL injury than men. Sport specific programs have been formed with the aim of reducing the risk of an ACL injury but Huntington said the part-time nature of elite women's sport made it unrealistic.

"You don't get the time to have a good look at your body or for individual tailoring and access to sports medicine that can break down your individual risk and things you need to work on," Huntington said. "It's pretty much a one size fits all when you have such little time.

"There are certainly intrinsic factors that we have to roll with but when you look at the research so much of it's just been done primarily on male subjects over the years and all of the studies we are referencing in terms of preventive things, even your rehab itself and risk factors are based on male athletes.

"Studies take time but I think we need to invest hard in terms of research and getting to the bottom of it and finding some answers. It's a stressful thing trying to balance work, study and professional sport."

The Dogs-turned-Giants player tore her ACL for the first time aged 17.


GWS Giants' Isabel Huntington is tackled by Port's Amelie Borg last season. Main picture: AFL Photos

"My first one was in 2016, then I got back and in my second game back I did my other knee," Huntington said. "It was a few years between my second and my third, which I did (January 2022)."

CODE INSIGHT
Supported by Harvey Norman
Read more at codeinsight.com.au

She needed an extended time off to recover from the third tear – taking 20 months, instead of the usual 10-12 months.

"I think I was trying to be pretty stoic about it when I did my first one at 17, as we all would be," Huntington said. "I have had a lot more breakdowns and ups and downs mentally with it in my more recent ones. But I've learned that's OK, it's normal and I've had people to lean on for support in those moments, which has been massive.

"You go through waves, that FOMO (fear of missing out) element is huge. At the start you sort of get all of the support and everyone's getting around you and sending lovely messages, which is obviously really heartwarming, but then it dries up pretty quickly and that's when it gets tough.

"I found personally the late stages of rehab the hardest because you've been doing the same thing for 12 months in the gym and it's so repetitive and you feel so close yet so far as well and you've got all those issues with 'can I be the player that I was before?'

"So that's probably been the most difficult part."

Huntington made her return to the field in September, after delaying several times for a niggle and her confidence to return. The 24-year-old is looking forward to a full pre-season and season with the Giants this year.

NDER STORM
ERFUL KNOCK MAKES
EY FORM SIDE, PAGE 64
IS WNBL'S NO
OUR EARLY SEASON PLAYER
RANKINGS ARE OUT, PAGE 65

AFLW CUT DOWN AT THE KNEE

Doc concerned as three stars fall

NICK SMART

A SPIKE in knee ACL injuries in the AFLW – in comparison to other sports played by women – has been described as "really concerning" by a leading sports doctor following a weekend of carnage.

It was confirmed on Monday that Western Bulldogs star Izzy Huntington and Collingwood co-captain Brianna Davey had sustained ACL injuries in round 1 of the season.

It is Huntington's third ACL rupture at the age of just 22.

"We are absolutely devastated for Izzy," Bulldogs general manager of women's football Debbie Lee said. "She is a much-loved figure at the Kennel and everyone is well aware of her injury battles, so we're just heartbroken for her."

At Collingwood, this is Davey's second ACL tear on the same knee she injured in 2018. The Magpies star has also torn her medial ligament.


KATE LUTKINS
AWAITING SCAN RESULTS CLUB FEARING ACL INJURY

"We are all heartbroken for Bri," Magpies women's football boss Jess Burger said.

"It's very hard to see our captain go down with such a cruel injury, let alone someone who is at the top of their game.

"There is no doubt her injury has been felt not just within our team, but across the entire AFLW community."

Brisbane Lion Kate Lutkins is also believed to have suffered a serious knee injury from the opening round, but is waiting on confirmation.

Renowned sports medico Peter Larkins said it was an ongoing issue and particularly for AFLW players.

"When I gave a talk last year, I talked about how the knee ACL surge was happening in women's sport, and women have a five or six times higher incidence of knee ACL's than men," Dr Larkins said.

"Except in the AFL where it has been 10 times higher since 2016. AFL even has higher problems than soccer or netball or basketball, or, in other words, the sports that women still play and injure their knees.

"So, there is something specific about the demands and the changes of direction, but things like the muscular strength around the knee is different in women.

"Things like the anatomy, the shape of the leg, the hormonal changes are the same in every sport, and so the AFL incidents are really concerning.

"The data I showed last year was the 2020 data, which in the AFL men's season over the past 22 years we've averaged 13.5 ACL injuries across all the men's clubs.

"In the women's season we had 14 ACL's in five weeks."

Dr Larkins said there were techniques AFLW clubs could use to lessen the risk of serious knee injury.

"You can't change the game, so you've got to change the individual factors around strength, landing techniques, learning how to fall when they're tackled," he said.

nicholas.smart@news.com.au

son delay as much of Bombers' crew grounded by Covid

Back on track: What to expect as clubs return to training

DR PETER LARKINS

Why the female knee ACL surge ?

- Most sports – X 5-6 incidence
- AFLW – X 10 incidence 2016 --> 2020
- Muscular strength 30 – 40 % deficit
- Background in sport – young age exposure
- Pre- season prep
- Prevention programs *
- Hip- knee alignment (“Q angles”)
- Hormonal ? – (highly individual)

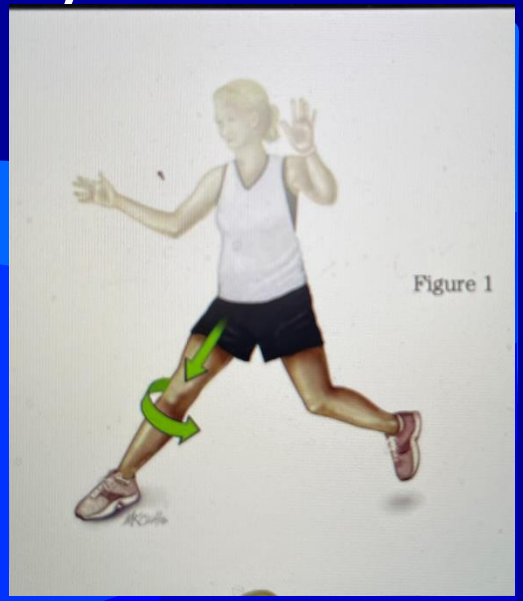
BOY vs GIRL

(are there any differences..??)

- Anatomical & Physiological
- Muscular strength – androgens vs oestrogen
- Body fat - Lean Mass %
- Blood composition
- Temperature regulation - sweat
- Lung capacity – O_2 capacity
- Pelvis --> Hip –> Knee angles
- Hormonal – androgens rule (testosterone)

Features of Acute ACL Injury

- Awkward landing
- Contact & non contact mechanisms (50/50)
- Hyperextension
- Hit from lateral side
- Sudden change of direction (pivot)
- Crack or snap
- Sensation of “coming apart” movement
- Collapse
- Variable pain *
- Posterolateral
- Rapid swelling *



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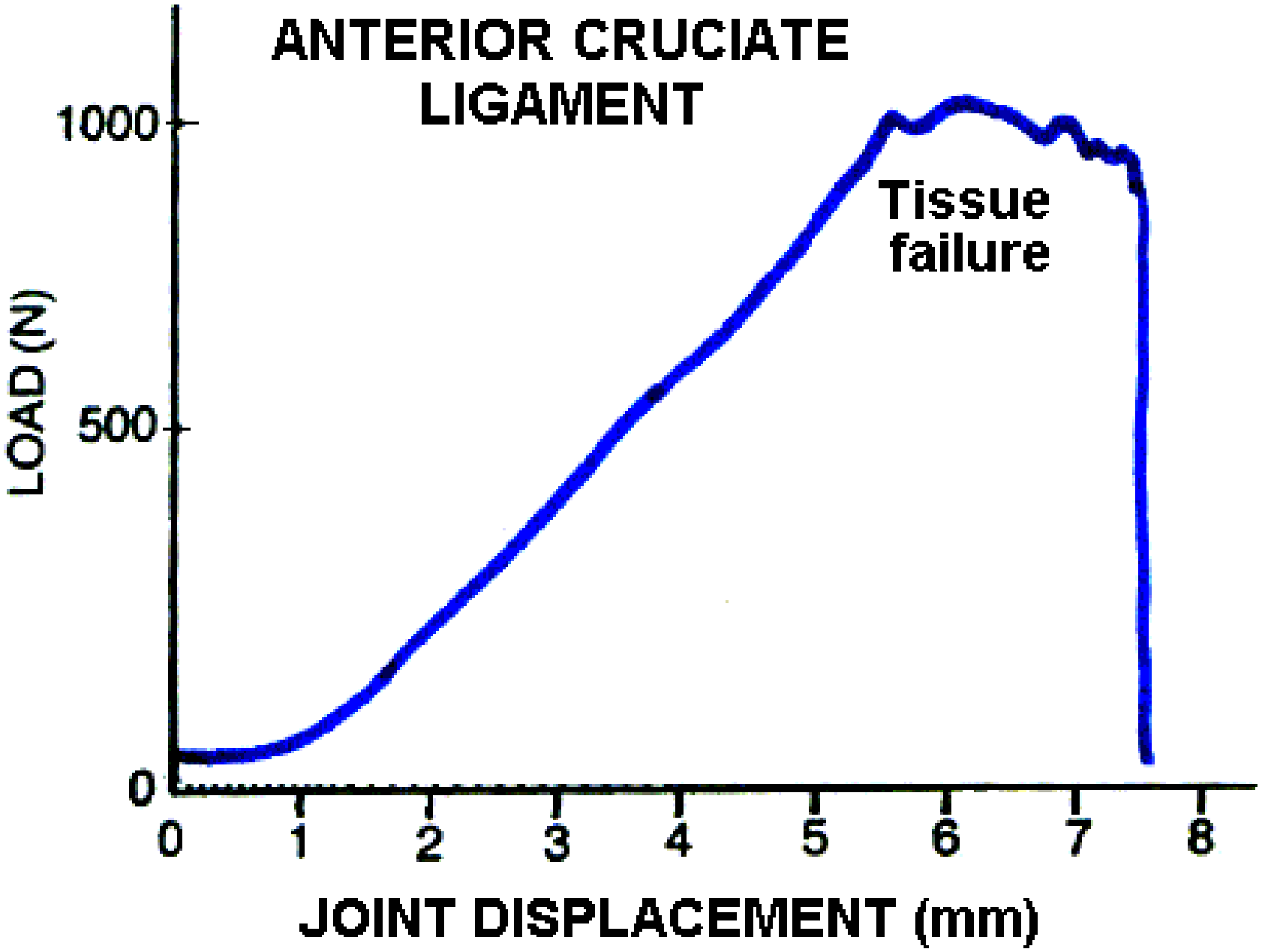
ANTERIOR CRUCIATE LIGAMENT
1000
500
0
LOAD (N)
Tissue failure
0
1
2
3
4
5
6
7
8
JOINT DISPLACEMENT (mm)

ISSUES

- Contact vs non-contact
- Dominant vs non dominant
- Family history
- Venue
- Victoria vs interstate (weather)
- Surface – grass composition
- Weather conditions
- Footwear
- Conditioning – inter and pre-season
- Player build & position
- Prevention programs? ✓

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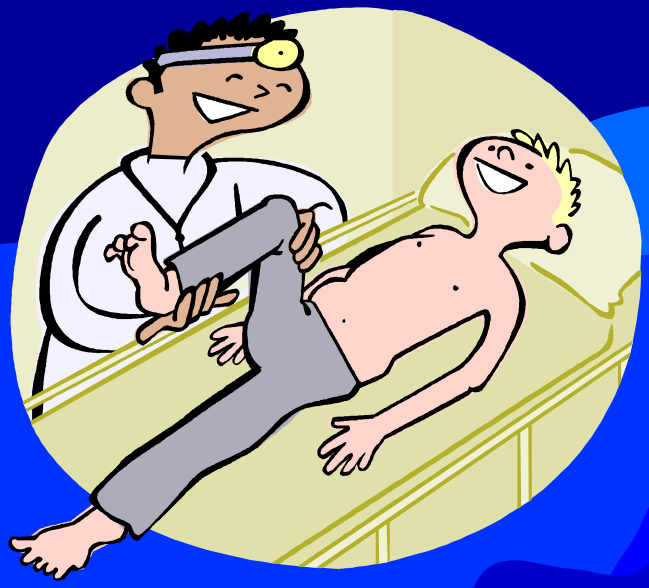
Causes of Haemarthrosis

- **ACL tear**
- **Patellar dislocation**
- **Intra-articular fracture**
- **Osteochondral injury**
- **Meniscal detachment (peripheral)**
- **Haemorrhagic Synovitis**
- **Miscellaneous other**

PHYSICAL EXAM

- HAVE STRUCTURED SYSTEMATIC APPROACH -

- OBSERVATION
- EFFUSION
- ROM
- PATELLA
- COLLATERALS
- CRUCIATES
- JOINT LINES
- OTHER PALPATION



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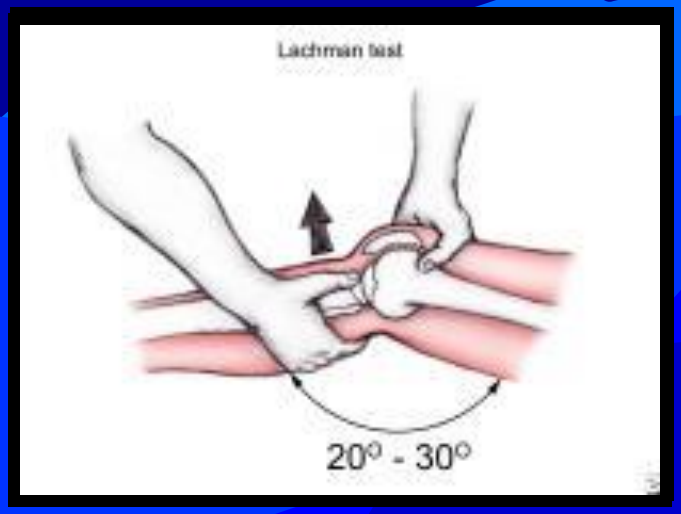
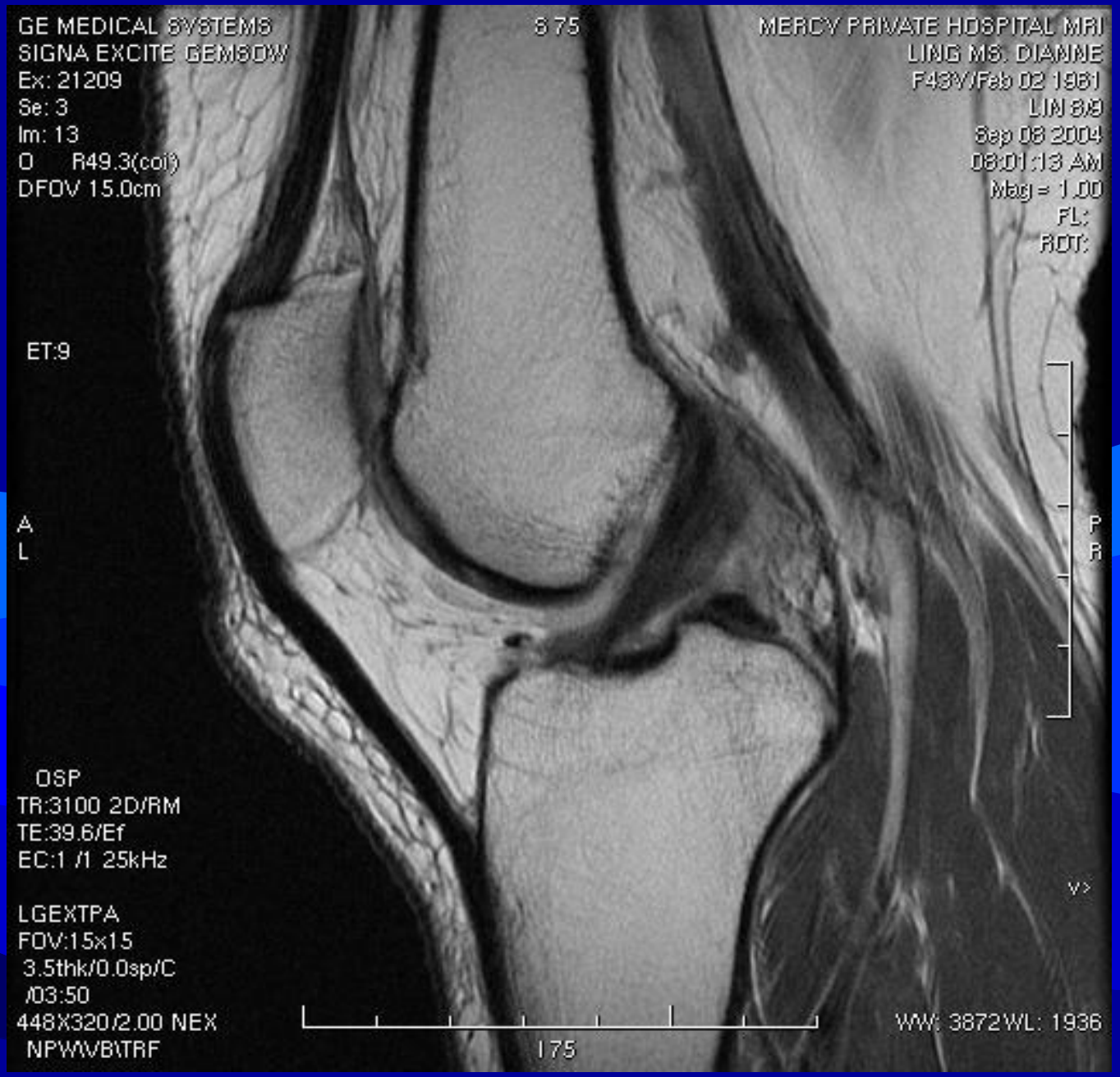
LACHMAN TEST FOR ACL

ACL physical examination tests [2,61]

Test	Sensitivity (%)	Specificity (%)
Lachman	84–86	91–100
Pivot shift	27–95	97–99
Anterior drawer	9–93	23–98



Firm, Soft or Absent End Point


GE MEDICAL SYSTEMS
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O R49.3(coi)
DFOV 15.0cm
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MERCY PRIVATE HOSPITAL MRI
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Mag = 1.00
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ET:9
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OSP
TR:3100 2D/RM
TE:39.6/Ef
EC:1 /1 25kHz
LGEXTPA
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448X320/2.00 NEX
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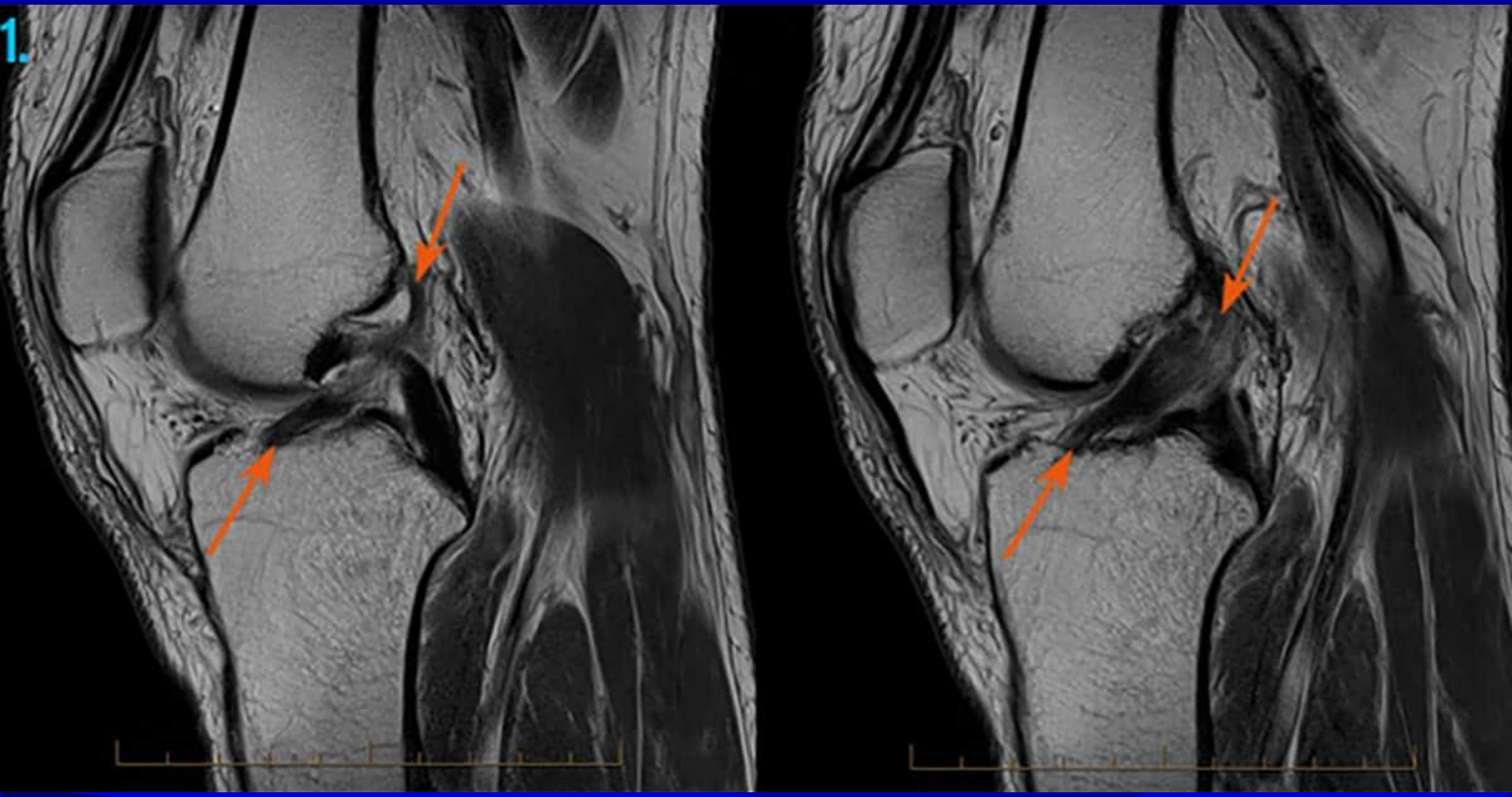
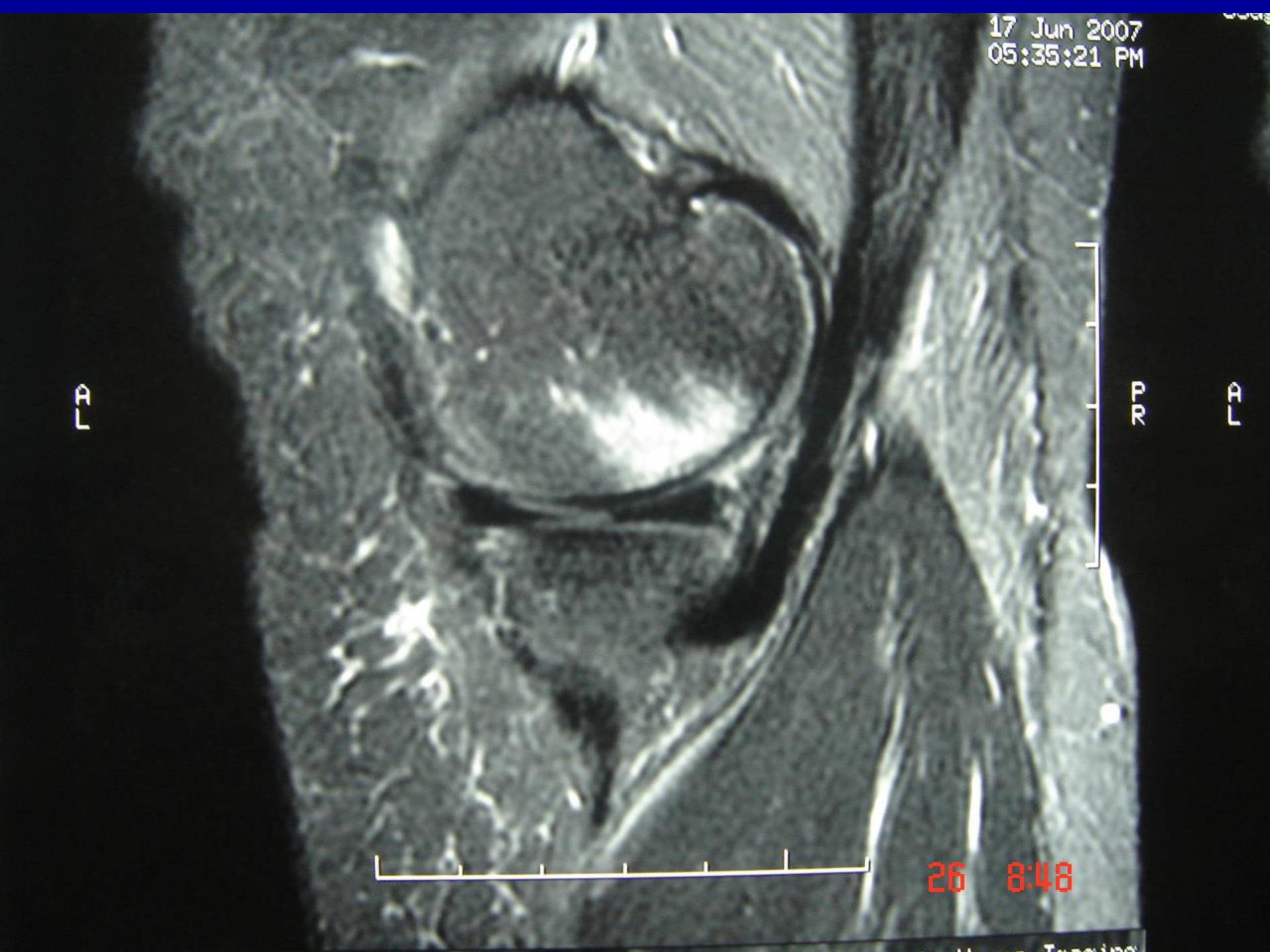
175
WW: 3872 WL: 1936

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26
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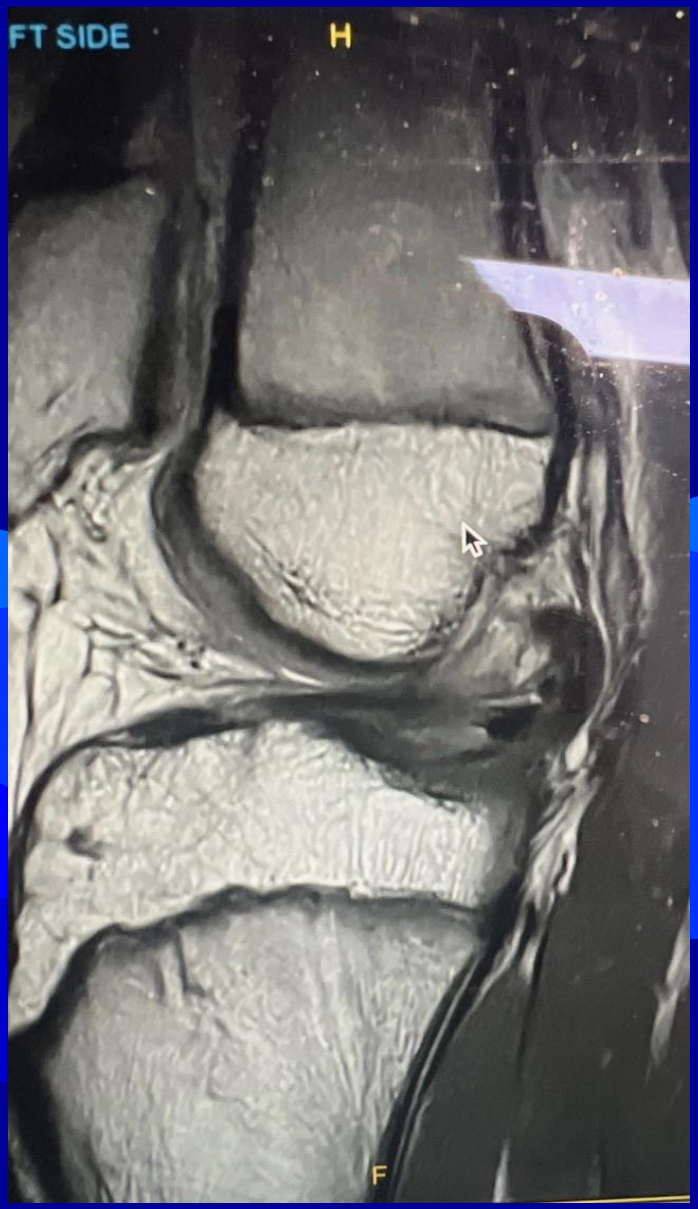
CONGENITAL FAMILIAL ABSENCE OF ACL

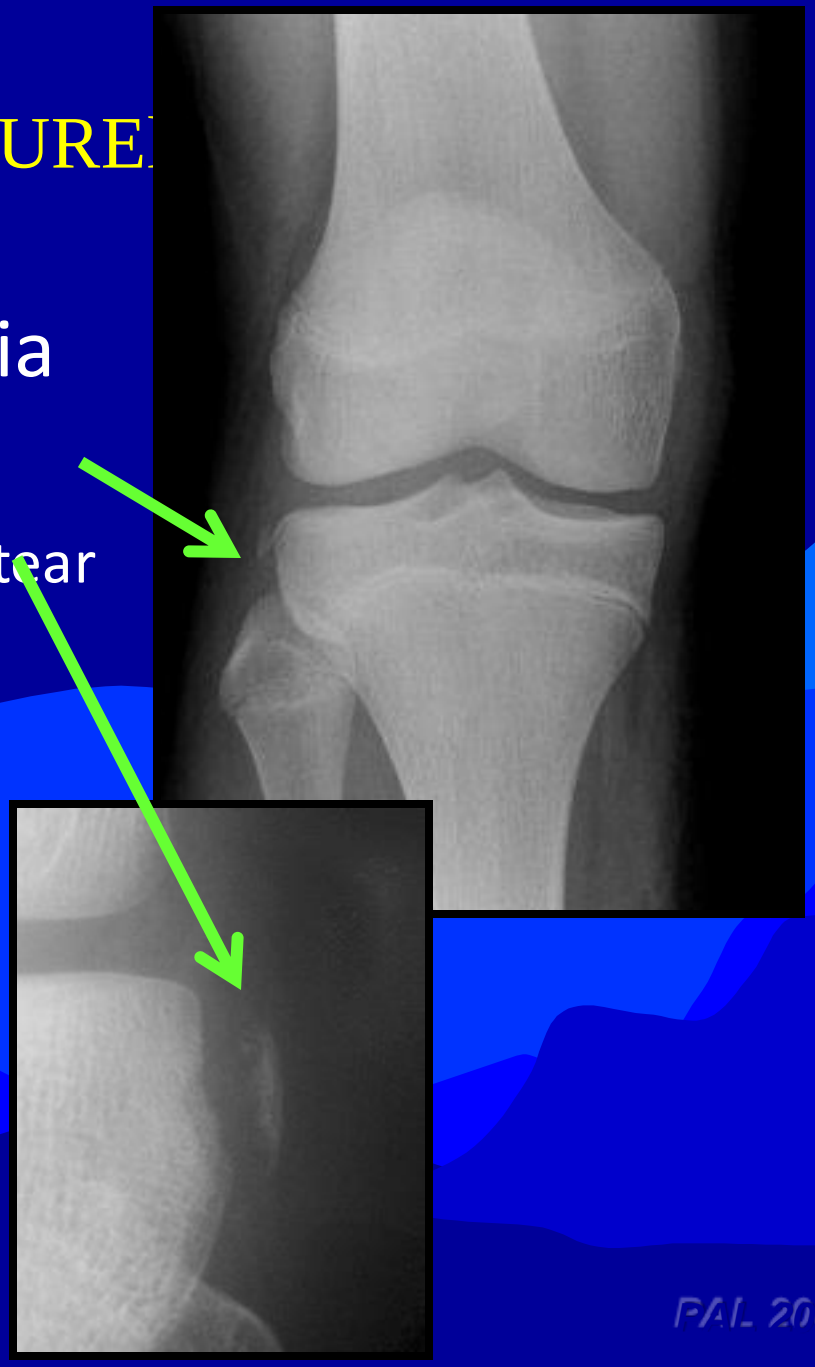


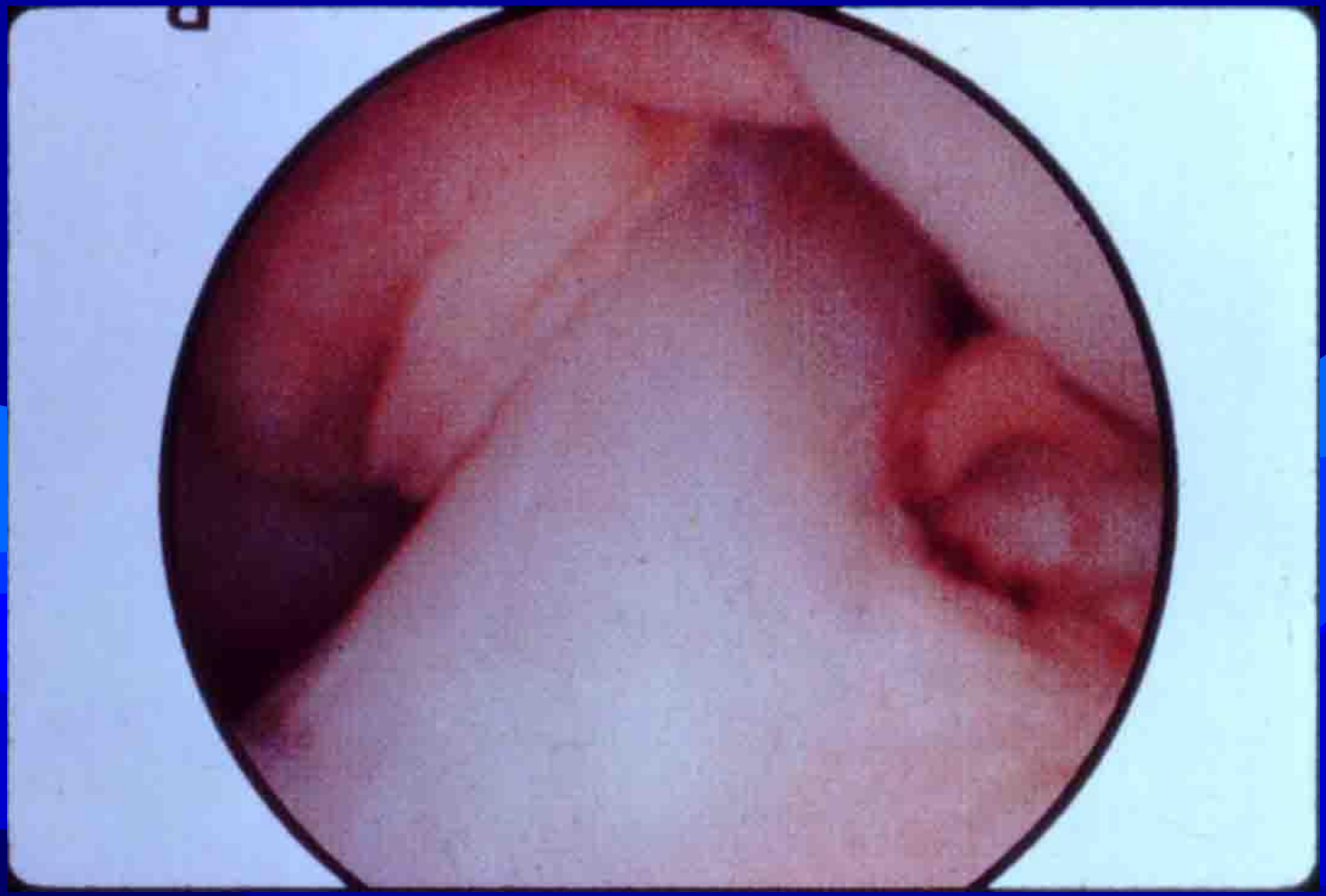
DR PETER LARKINS


PAL 2002

SEGUND FRACTURE

- Capsular avulsion lat tibia
  - 70- 90% of IDK cases
    - "Pathognomonic" of ACL tear
    - No impact on Rx decision





The Long-term Consequence of Anterior Cruciate Ligament and Meniscus Injuries

Osteoarthritis

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Abstract

The objectives of this study are to review the long-term consequences of injuries to the anterior cruciate ligament and menisci, the pathogenic mechanisms, and the causes of the considerable variability in outcome. Injuries of the anterior cruciate ligament and menisci are common in both athletes and the general population. At 10 to 20 years after the diagnosis, on average, 50% of those with a diagnosed anterior cruciate ligament or meniscus tear have osteoarthritis with associated pain and functional impairment: the young patient with an old knee. These individuals make up a substantial proportion of the overall osteoarthritis population. There is a lack of evidence to support a protective role of repair or reconstructive surgery of the anterior cruciate ligament or meniscus against osteoarthritis development. A consistent finding in a review of the literature is the often poor reporting of critical study variables, precluding data pooling or a meta-analysis. Osteoarthritis development in the injured joints is caused by intra-articular pathogenic processes initiated at the time of injury, combined with long-term changes in dynamic joint loading. Variation in outcome is reinforced by additional variables associated with the individual such as age, sex, genetics, obesity, muscle strength, activity, and reinjury. A better understanding of these variables may improve future prevention and treatment strategies. In evaluating

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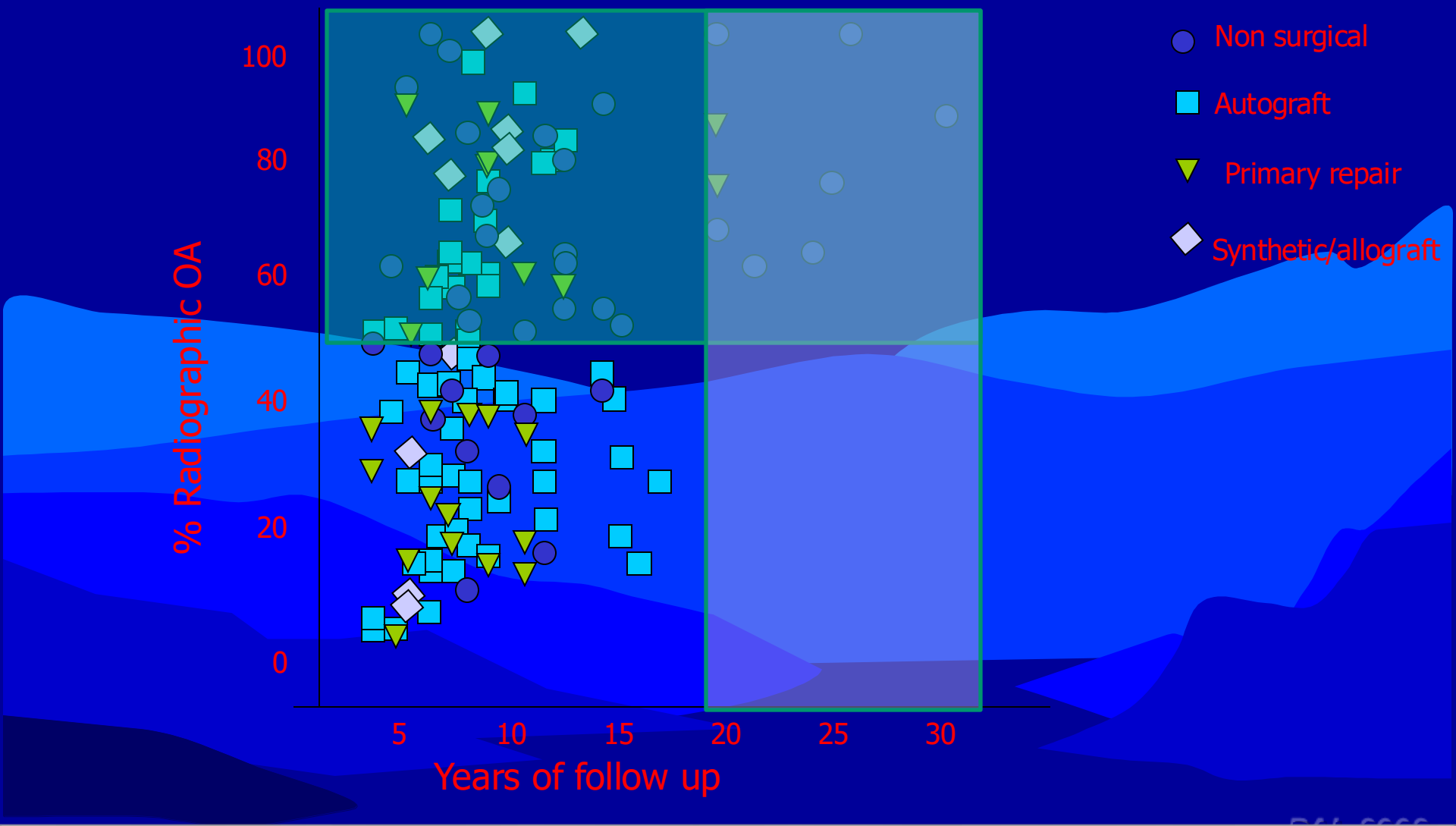
ACL injury and knee OA



Lohmander et al, AJSM (2007)

The American Orthopaedic Society for Sports Medicine

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Knee Function and Prevalence of Knee Osteoarthritis After Anterior Cruciate Ligament Reconstruction

A Prospective Study With 10 to 15 Years of Follow-up

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« Previous | Next Article »
Table of Contents

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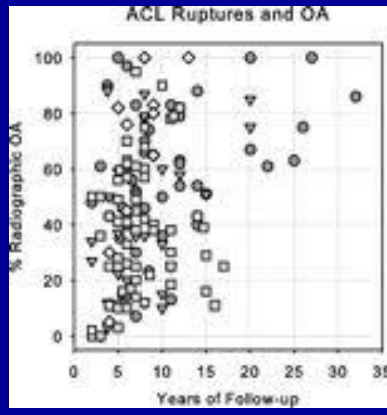
Abstract

Background: Few prospective long-term studies of more than 10 years have reported changes in knee function and radiologic outcomes after anterior cruciate ligament (ACL) reconstruction.

Purpose: To examine changes in knee function from 6 months to 10 to 15 years

OA after ACL surgery

10 -15 year follow up



- Isolated ACL - XR OA 62%
- Combined injury XR OA 80%

- Isolated ACL Symptomatic OA 32%
- Combined injury 46%
-

Oiestad et al 2010

PAL 2002

IS ACL RECO PROTECTIVE FOR OA ?

- Convincing evidence for superiority of ACLR vs ONOT (optimal non op treatment) is still lacking !
- (Smith et al "Knee" 2014)
- ACLR no guarantee of restoring N joint mechanics
- ↑ loading in focal articular areas
- $\underline{\Delta}$ in gait – joint loading, tibial rotation cf uninjured knee
- ↑ medial cpt load after ACLR
- Post op inflamm markers- IL-1B, IL-6, TNF-α

ACL Synovial Inflammatory Response

- 50% cases ------→ post traumatic OA (PTOA)
- Why do some NOT get OA… unknown ?
- Elevated proinflamm cytokines, catabolic enzymes ,cartilage degradation biomarkers in ACL knee synovial fluid
- Interleukin 1α and 1β, Matrix proteinase-3, Collagen peptides I & II
- At risk patients show ”dysregulated inflammatory response” (DIR)
- DIR not always related to injury severity
- Challenge to identify which patients develop DIR (27%-38%)
- Some PTOA patients do not have DIR
- Other causes ?
- Mechanical loading, body mass, altered joint mechanics ?

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CORE MANAGEMENT PRINCIPLES

- ESTABLISH CLEAR DIAGNOSIS *
- IDENTIFY CAUSE- IF POSSIBLE
- CONFIRM PATIENT GOALS
- CONSERVATIVE vs SURGICAL PATHWAY – surgical timing ?
- OUTLINE THERAPY NEEDS- STRENGTH ETC..
- SET HOME BASED PROGRAM
- MODIFY ACTIVITY LOADS
- SET REALISTIC GOALS
- REGULAR FOLLOW UP & REVIEW
- PSYCHOLOGICAL SUPPORT – NOT JUST ELITE ATHLETES
- RECOVERY TIME FRAME ESTIMATES
- PREVENTION STRATEGY – MINIMISE RECURRENCE

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ACL Injury

Surgery

vs

Conservative?

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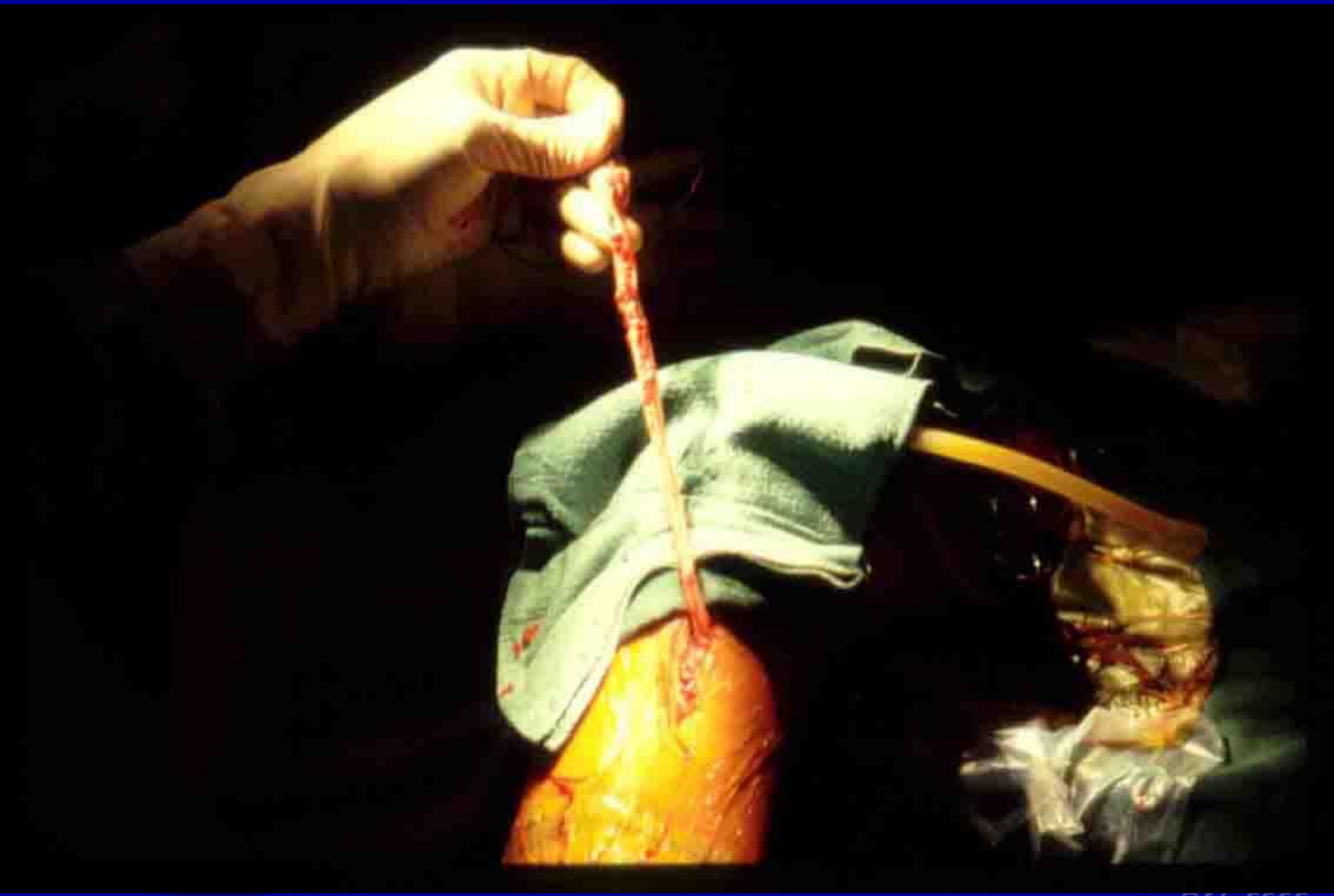

ACL Injury

Surgery

- Active athlete
- Younger patient
- Very loose (laxity)
- Demanding lifestyle
- Ongoing symptoms
- Lack of R.O.M.
- Any age
- OA risk

Conservative

- Non athlete
- Low demand lifestyle
- Good R.O.M.
- No pain , diability
- No assoc. damage
- Mild laxity
- Any age
- OA risk

TOTAL ACL SURGERIES

- 2003 – 2008
- 50,187 operations
- Private & Public
- Primary & ? Revisions
- Elite revisions 15%....."normal" 5-6%
- Still no ACL register
- Ski, ARF, Rugby,Netball,Soccer
- $75 million pa direct costs
- Indirect $$ – work losses,disability,OA,obesity,low fitness, health detriment ….

»

(Janssen & Orchard 2011)

ACL REHAB GOALS

- STABLE FUNCTIONAL KNEE
- 0° → 140° ROM
- COMPARABLE R/L STRENGTH (<10 % VARIANCE)
- NO SWELLING / SORENESS

DR PETER LARKINS

SAMPLE ACL REHAB TIMELINES – AFL

- 0-2 W – assisted WB, LM brace
- 2-6 W – careful FWB , low range isometric strength, brace
- 6-12 W- ROM, progress strength
- 12- 16 W- balance, proprioception, straight line running
- 16- 26-W more strength, low level agility, proprioception,
- 6-10 MOS- controlled plyometrics, landing drills, progress run sessions, controlled cutting drills
- 10 – 12 MOS – return to pre injury sport trg drills, continue strength, agility, proprioception, plyometrics, RTP ?

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FACTORS ASSOCIATED WITH SUCCESSFUL ACL SURGERY

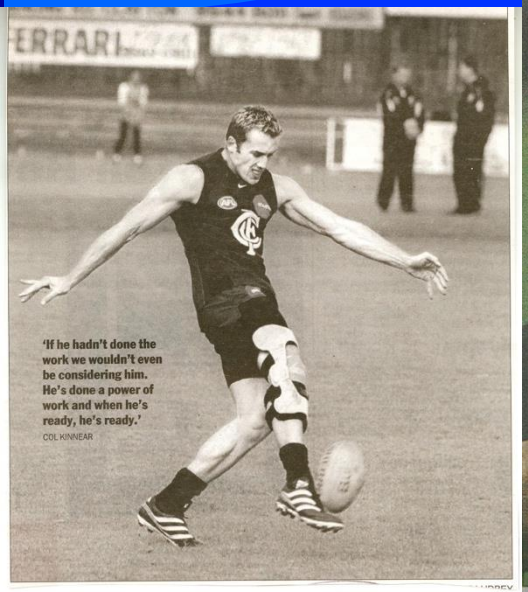
POSITIVE

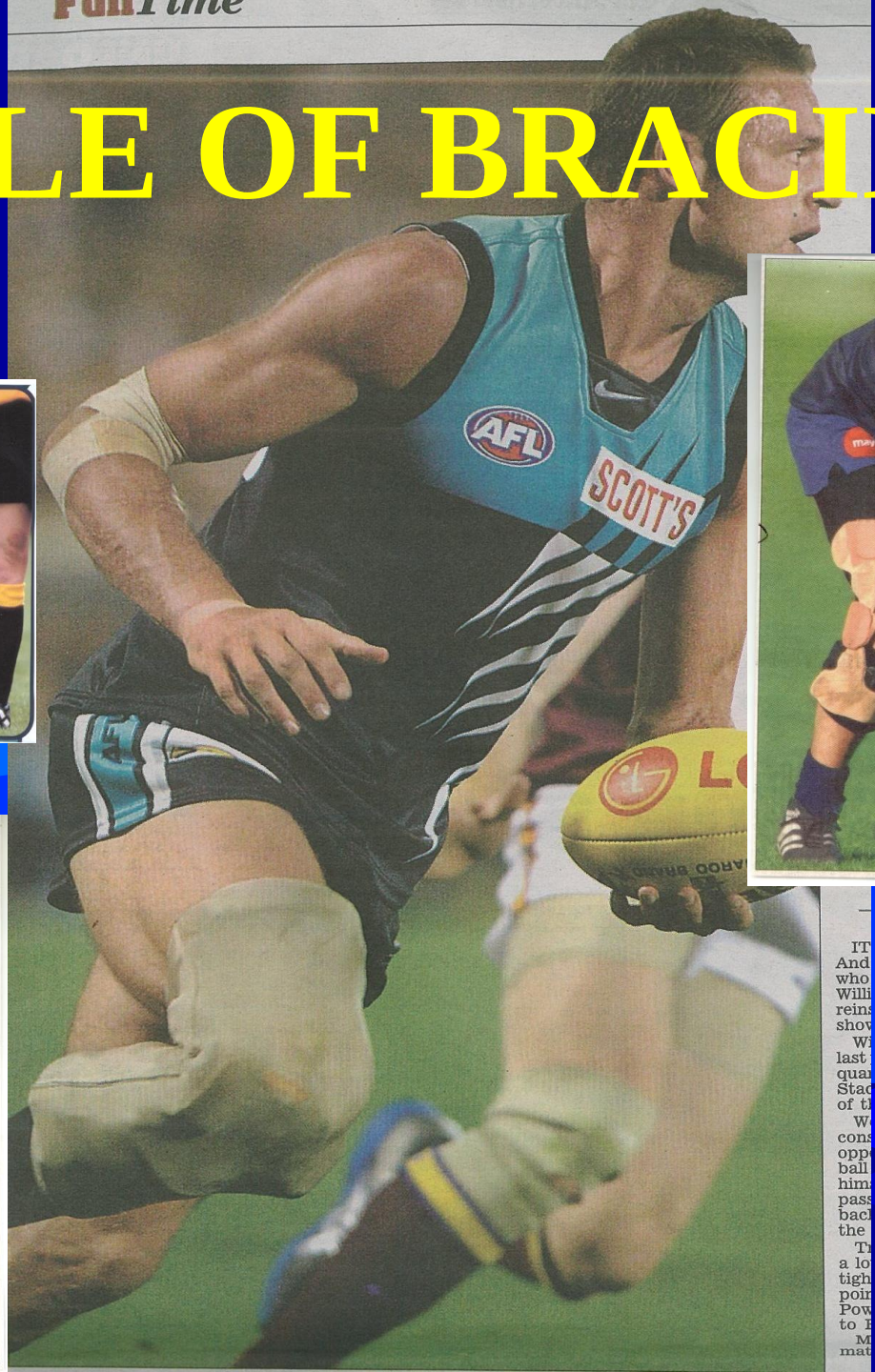
- Motivated patient
- Younger elite athlete
- Good surgical technique
- First time injury
- Non dominant leg
- Formal rehab/ counselling
- Adequate follow up
- High draft pick
- > 12 month rehab

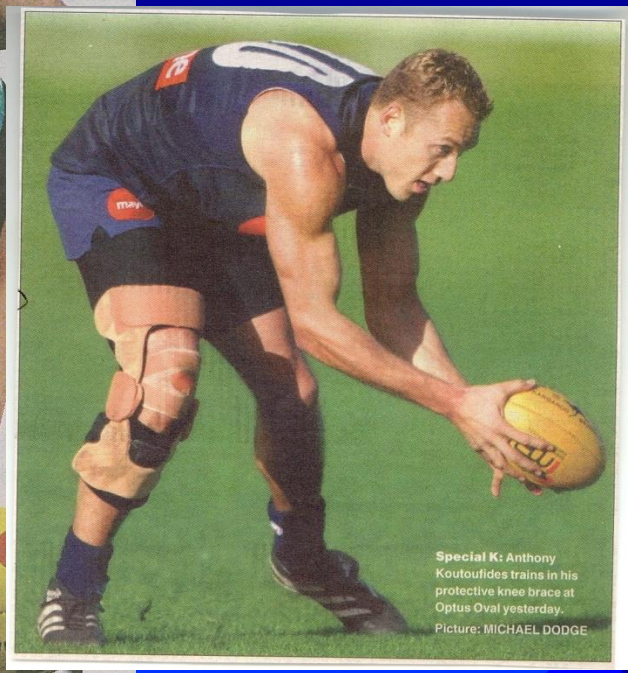
NEGATIVE

- Older athlete
- Dominant leg
- Recurrent injury
- Suboptimal surgical technique
- Inadeqaute rehab
- Loss to follow up
- Lower ranked athlete
- < 9 month rehab

ROLE OF BRACING







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ACTIVITY BRACES

TAKE HOME MESSAGES

- ACL injury is a global problem and under reported
- Risk of long term knee degen high (PTOA)
- Females are at higher risk- in all sports
- Rehab protocols vary enormously
- Return to sport time frames also vary- sport specific?
- Non surgical treatment may suit specific individual needs

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VOLUNTEERS
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