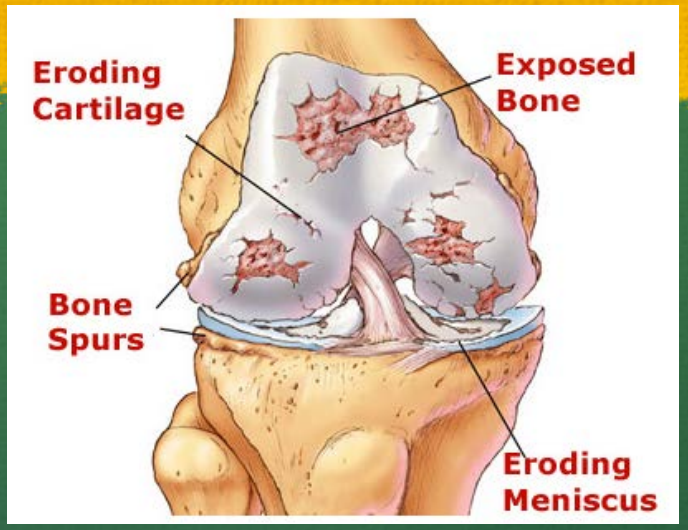
Hip Bone Marrow Lesions in asymptomatic and osteoarthritic adults:
Prevalence, risk factors and significance

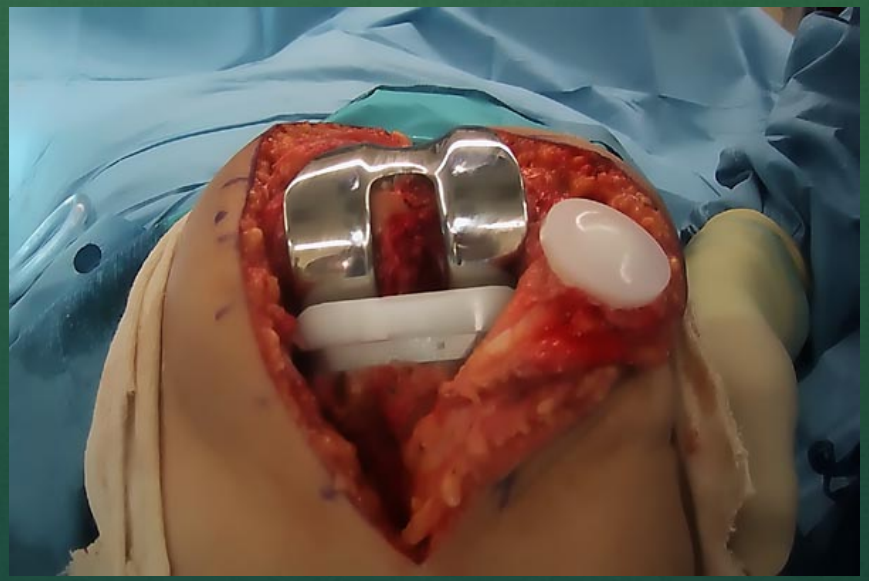
Summer Research Project

Luke Dawson

What is Hip OA

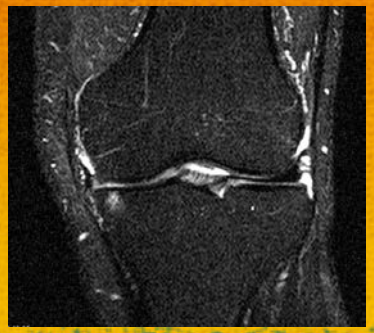
- Loss of cartilage
  - Leading to pain and disability
- No Curative treatment
- Total Joint Replacement
- Research
  - Most at knee, little at hip







How are BMLs relevant to OA?



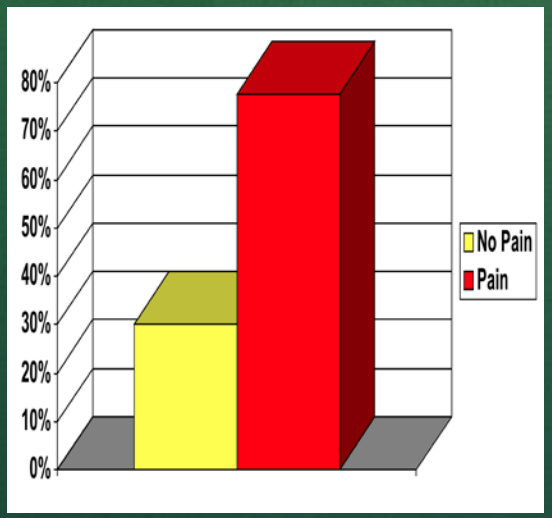
BMLs

PAIN

OA Progression

Total Knee Replacement

Increased pain in OA sufferers



Including:

Cartilage Loss

Cartilage Defects

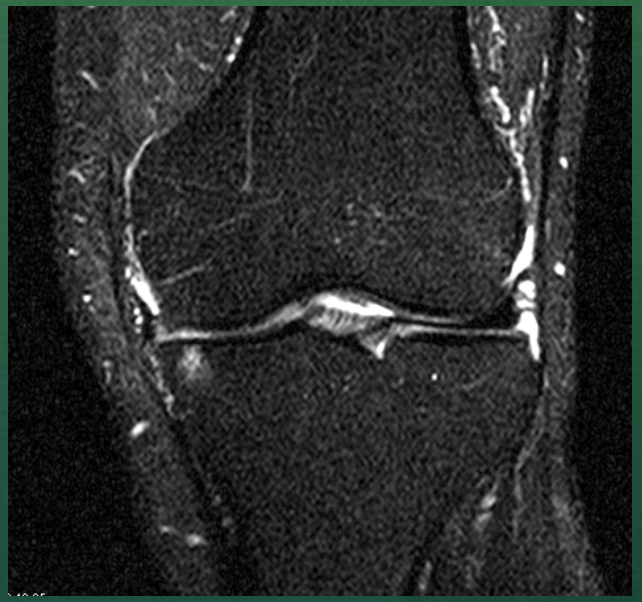
Joint Space Narrowing





What is a BML?

- Definition
  - Low signal intensity on T1 weighted MR images
  - High signal intensity on T2 weighted MR images
  - Subchondral
- Histopathological Correlation
  - Substantial (Leydet-Quilici, 2010)
  - Edema, fibrosis, necrosis



What are risk factors for BMLs?

BMLs

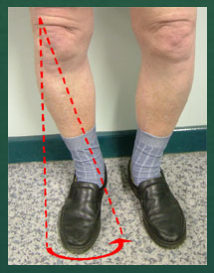
Biomechanical



Trauma



Misalignment



Metabolic



↑Vitamin C reduces risk



BMI
Fat Mass
Lipids



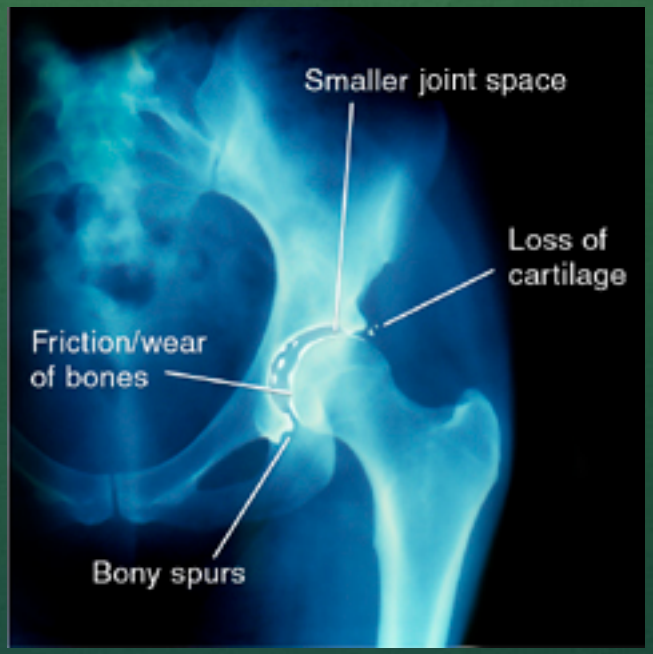
Smoking



Aims

- BMLs at the knee joint well studied
- BMLs at the *hip* joint not studied
  - **Prevalence, associations**
  - **Asymptomatic, osteoarthritic**





Patients

- Melbourne Collaborative Cohort Study
  - Prospective cohort study 1990-1994
  - 142 participants recruited
  - Exclusion criteria
    - Hip OA, recent hip pain, malignancy, arthritis
- 19 Hip OA participants also recruited
- Box Hill MRI Centre

Methods

- Trained observer
  - BMLs
    - Present or absent
    - Kappa intra-observer reliability 0.73
    - Also measured high-intensity BML
- Previously Measured
  - Cartilage volumes (mm3)
  - Bone head area (mm2)

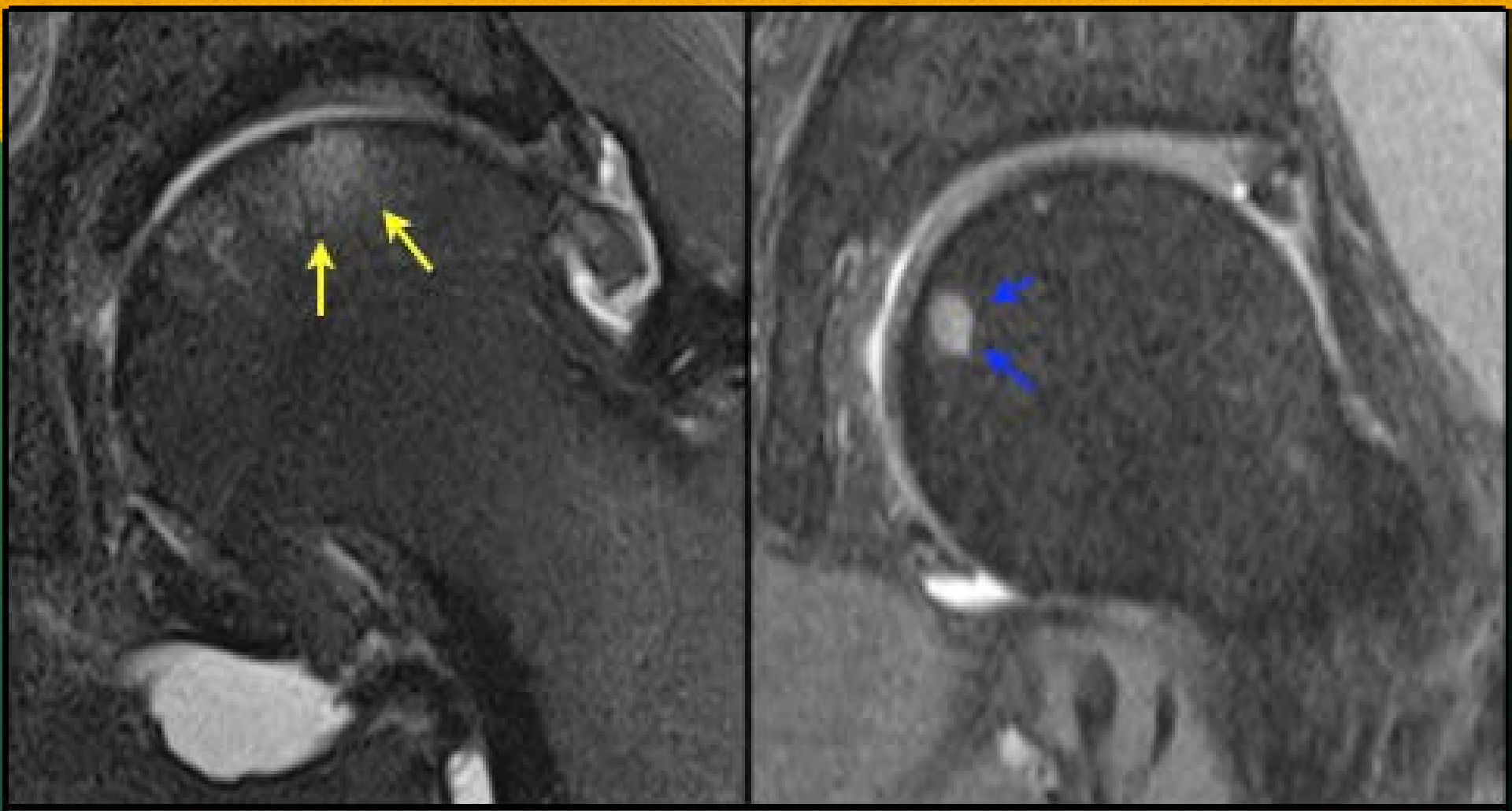


Figure 1: Bone marrow lesion (left), subchondral cyst (right)



Measurement of hip cartilage volume (mm3)

Results I

- Age
  - 66.8+/-7.4 years (healthy)
  - 59.5+/-7.6 years (OA)
  - $p<0.001$
- Females
  - 55.6% (healthy)
  - 57.9% (OA)
  - $p=0.85$
- BMI
  - 27.6+/-4.8 kg/m2 (healthy)
  - 27.2+/-4.8 kg/m2 (OA)
  - $p=0.73$

Results II

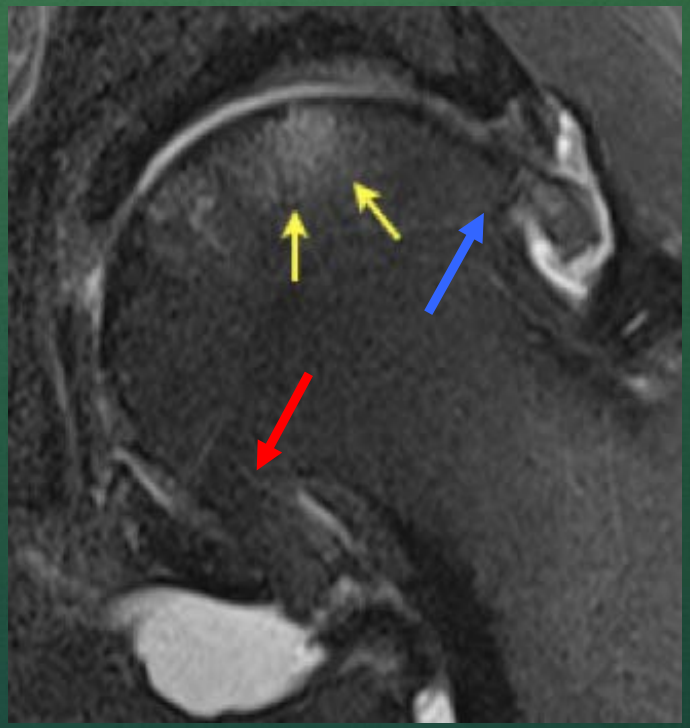
- Prevalence of BMLs at the Hip
  - 17.6% in asymptomatic population
  - 63.2% in OA population
- Risk Factors for BMLs
  - Younger Age, p=0.045 in *asymptomatic* group
  - Not associated with gender or BMI

Results III

- BMLs and Osteoarthritis
  - OR 5.32, 95%CI 1.78-15.9, p=0.003
  - Adjusted for age, gender, BMI
- BMLs and lower Cartilage Volume
  - -245.7 mm3 (95%CI -455.5, -36.0, p=0.02) (total pop)
  - -426.6 mm3 (95%CI -855.2, 2.14, p=0.05) (OA group)
  - Adjusted for age, gender, BMI, bone area, hip OA

Results IV

- High Intensity BMLs
  - More strongly associated with OA
- Location of lesions
  - Lower inner quadrant
  - Upper outer quadrant
    - Femoral acetabular impingement



Discussion

- BMLs common at hip joint in those with OA
  - Also present in asymptomatic
  - Associated with reduced hip cartilage volume
- Comparable to knee BMLs
  - 17.6% (hip) v 13.1-14.9% (knee) in asymptomatic population
  - 63.2% (hip) vs 46.9-66% (knees) in OA group
- Significantly associated with OA
- Significantly associated with structural damage
- Younger age is a risk factor
  - ?Low grade trauma

Limitations

- Cross-sectional
  - Need longitudinal data
- Small sample size of OA group
- Narrow Age Range
- Effect of physical Activity

Conclusions

- BMLs are associated with hip OA
- BMLs at hip may provide a novel target for the treatment and prevention of hip OA

Thanks to

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  - Flavia Cicuttini, Yuanyuan Wang, Anita Wluka, Fahad Hanna
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