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The effect of change in BMI over 10yrs on cartilage properties of the knee

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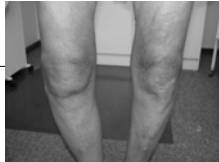
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Impact of osteoarthritis (OA)

- 7th national health priority
- health expenditure estimated \$2.3 billion (2007) ¹
- prevalence 7.8% (2004), rise to 9.8% (2020) ²

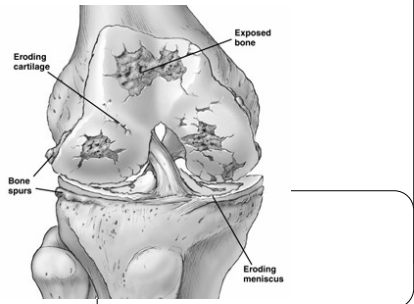


¹ Access Economics, AIHW, Canberra, Oct 2007
² Arthritis - the bottom line, *Arthritis Aust*, 2005

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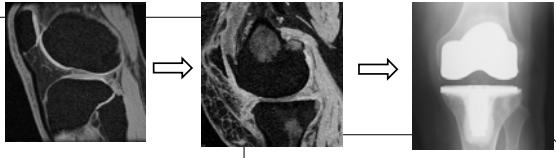
Osteoarthritis: a disease of the whole joint



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Osteoarthritis: symptomatic and costly



Magnetic Resonance Imaging (MRI)

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Does obesity increase the risk of OA?

- ↑ BMI by 1kg ↑ risk of hand and knee OA 9 -13%¹
- ↑ BMI associated with risk of large joint OA^{2,3}
- ↓ 2 BMI units over 12 yrs ↓ risk of knee OA in elderly⁴
- In asymptomatic middle-aged, obesity associated with ↑ cartilage defects^{2,5}

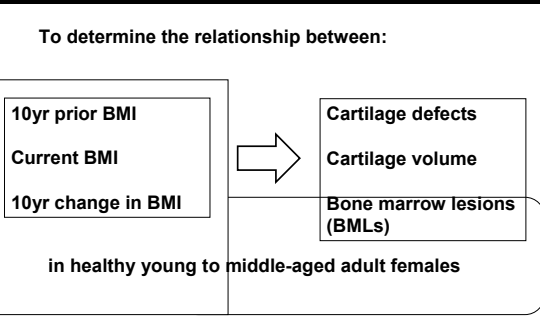
¹ Cicuttini et al, *Rheumatol*, 1996
² Wang et al, *Ann Rheum Dis* 2007
³ Felson et al *Ann Intern Med* 1988
⁴ Felson et al *Ann Intern Med* 1992
⁵ Ding et al *Arch Int Med* 2006

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Aim

To determine the relationship between:



in healthy young to middle-aged adult females

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Study region: Barwon Statistical Division

- Distinct geographical regions
- Range of multicultural and socio-economic groups, and urban/rural areas
- Supported by one major hospital
- Approximately 250,000 residents



Study Design

Subjects recruited from Geelong Osteoporosis Study

1994-97

BMI

2006-07

BMI
MRI

Exclusion Criteria:

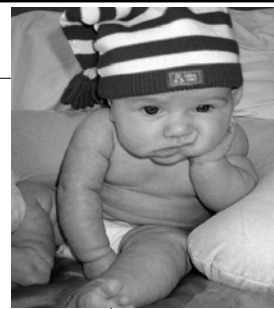
- Current or past knee disease (OA, any diagnosed arthritis)
- Knee pain > 24 hours requiring therapy (past 5 years), previous injury or surgery (including arthroscopy or significant trauma)
- Contraindication to MRI

Participant characteristics (n=142)

	10yr prior	Current	p for diff *
Age (years)	---	41.7 ± 5.3	---
Height (cm)	163.6 ± 5.8	---	---
Weight (kg)	66.9 ± 14.9	73.0 ± 16.7	<0.001
BMI (kg/m ²)	25.0 ± 5.0	27.3 ± 6.3	<0.001
BML, n= (%)	---	9 (6.3%)	---
Cartilage defects, n= (%)	---	76 (47.8%)	---
Cartilage volume (ml)	---	23.1 ± 3.9	---
Total bone area (cm ²)	---	30.2 ± 2.4	---

* Independent samples t-test

I wonder if they adjusted for age and bone area?



Relationship between BMI and cartilage volume, defects and BMLs after adjustment

BMI 10yr prior ^a		Current BMI ^b		Change in BMI over 10yr ^c	
	p		p		p
BMLs ³					
1.14 (1.03, 1.26)	0.009	1.13 (1.04, 1.23)	0.005	1.14 (1.03, 1.26)	0.01
Tibial cartilage defects ²					
1.06 (0.98, 1.15)	0.13	1.06 (1.00, 1.13)	0.05	1.08 (0.96, 1.21)	0.20
Tibial cartilage volume ¹					
-3.81 (-16.7, 9.0)	0.55	-6.98 (-17.0, 3.0)	0.17	-16.44 (-35.7, 2.8)	0.09

¹ Reduced cartilage volume and BMI 10yr prior, current BMI or change in BMI (95%CI), adjusted for ^a age, tibial plateau bone area (cm²), and ^b BMI 10yr prior.

² Odds ratio (95%CI) for cartilage defects, adjusted for ^a age and tibial plateau bone area (cm²), and ^b BMI 10yr prior.

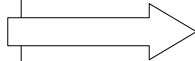
³ Odds ratio (95%CI) for bone marrow lesions, adjusted for ^a age, and BMI 10yr prior.

Limitations

- Low n= BML may limit our findings
- Overestimation - outliers in cartilage volume
- Lack of power to examine weight loss

Conclusion

Maintaining a healthy BMI and avoiding increases in BMI may be important even from an early age to maintain optimum knee health, and thus avoid or delay changes in knee structure associated with OA.



Tracy, don't eat that.
You'll ruin your knees...



Acknowledgments

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MRI technicians at Barwon Health; The Geelong Hospital

Study participants