Osteoarthritis: Past, Present and the Future

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Declaration of interest

I declare that in the past three years I have:

• received royalties from: DJO for a patellofemoral brace patent
• Consulted for Flexion, Tissuegene, Merck Serono
• Supported by an NHMRC Health Practitioner Fellowship.
Evidence-based Medicine


• Clinical algorithms to aid osteoarthritis guideline dissemination. *Osteoarthritis Cartilage.* 2016 Sep;24(9):1487-99.

What is osteoarthritis?

Disease of the whole joint

Declining mortality meet increasing morbidity

Figure 2: Estimated Age of Diagnosis among Persons with Symptomatic Knee OA

- 2007-2008 incidence estimates:
  - Current median age of incidence = 56
  - Mean = 55.8, standard deviation = 15.5

- 1991-1992 incidence estimates:
  - Historical median age of incidence = 69
  - Mean = 68.5 (95% CI 67.5, 69.1), standard deviation = 13.3

Male deaths from any cause at ages 35-69 years in 2004:
- 19,365 (2.5% of all male deaths)
- 566 out of every 100,000 males at this age, a rate which was:
  - 12% less than in 2000 (rate: 649)
  - 61% less than in 1975 (rate: 1463)
  - 63% less than in 1955 (rate: 1527)
Health Care Costs Related to OA Represent about 38% of the Overall Economic Cost with a Total of $3.8B

- $3.8 billion in 2012
- 4X increase since 2000
- Most expensive type of arthritis in direct costs
- $1,684 per patient per year (2012 data)

Source: Access Economics, 2013

- OA represents 41% of the total health cost of musculoskeletal conditions

Source: Access Economics, 2007

Distribution of OA health care costs

Source: Access Economics, 2013

The individual and socioeconomic impact of osteoarthritis.
Distribution of indirect costs for osteoarthritis by kind

- Productivity costs: 63%
- Deadweight loss: 19%
- Carer costs: 10%
- Other: 7%

- Reduced employment rate: 82%
- Lost retirement income: 7%
- Presenteeism: 5%
- Absenteeism: 4%
- Premature death: 1%

The individual and socioeconomic impact of osteoarthritis.
Outline

Past - Inappropriate Management

Present - Evidence Based Management

Coordinated Chronic Disease Management and Identifying Non-responders to TJR

Future - Prevention, Disease Modification
Hard Yards

• “osteoarthritis is an easy disease to take care of—when the patient walks in the front door, I walk out the back door”
  – Sir William Osler
Appropriate care

Percentage of appropriate care received

Where are we failing?

- The quality of OA care as assessed by a meta-analysis of Quality indicator pass rates across studies was suboptimal for all treatment domains.

- Pass rates:
  - pain and functional status assessment – 48.5% (95% CI 32.6-64.6);
  - non-drug treatment – 36.1%, (95% CI 27.8-44.7);
  - drug treatment – 37.5% (95% CI 30.8-44.5);
  - surgical referral – 78.9% (95% CI 57.4-94.2).

**Non drug treatment**

- McGlynn, 2003
- Wenger, 2003
- Asch, 2004
- Cadogan, 2005
- Ganz, 2006
- Broadbent, 2008
- Li, 2011
- Runciman, 2012
- Østerås, 2013

**Surgical referral**

- Wenger, 2003
- Ganz, 2006
- Broadbent, 2008
- Runciman, 2012
- Østerås, 2013

Patients are Extremely Unsatisfied: High Unmet Medical Need

*Today’s treatment paradigm is trapping patients in a vicious cycle of OA knee pain*

- Knee OA patients are highly satisfied with their current treatment (19%)
- Not ready for total knee replacement (91%)
- Will try almost anything prior to surgery (59%)

Peoplemetrics Patient Segmentation Research, 2007
Paracetamol – no longer first line analgesic

• Increased risk of mortality, cardiovascular, GI and renal AEs

• Paracetamol is ineffective in the treatment of low back pain and provides minimal short term benefit (not clinically relevant) for people with osteoarthritis.
  — *BMJ.* 2015 Mar 31;350:h1225.
Overdose Deaths Involving Opioids, Cocaine and Heroin: United States, 1999–2010

% Change 2006-10
+ 21%
- 44%
+ 45%

<table>
<thead>
<tr>
<th>Year</th>
<th>Opioid Analgesic</th>
<th>Cocaine</th>
<th>Heroin*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>4030</td>
<td>3822</td>
<td>1963</td>
</tr>
<tr>
<td>2000</td>
<td>4400</td>
<td>3544</td>
<td>1843</td>
</tr>
<tr>
<td>2001</td>
<td>5528</td>
<td>3833</td>
<td>1784</td>
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<td>2002</td>
<td>7456</td>
<td>4599</td>
<td>2092</td>
</tr>
<tr>
<td>2003</td>
<td>8517</td>
<td>5199</td>
<td>2084</td>
</tr>
<tr>
<td>2004</td>
<td>9857</td>
<td>5443</td>
<td>1879</td>
</tr>
<tr>
<td>2005</td>
<td>10928</td>
<td>6208</td>
<td>2010</td>
</tr>
<tr>
<td>2006</td>
<td>13723</td>
<td>7448</td>
<td>2089</td>
</tr>
<tr>
<td>2007</td>
<td>14408</td>
<td>6512</td>
<td>2402</td>
</tr>
<tr>
<td>2008</td>
<td>14800</td>
<td>5129</td>
<td>3041</td>
</tr>
<tr>
<td>2009</td>
<td>15597</td>
<td>4350</td>
<td>3279</td>
</tr>
<tr>
<td>2010</td>
<td>16651</td>
<td>4183</td>
<td>3038</td>
</tr>
</tbody>
</table>

Source: CDC
DRUG OVERDOSES KILL MORE THAN CARS, GUNS, AND FALLING.

- Falling: 26,852 deaths
- Guns: 31,672 deaths
- Traffic accidents: 33,687 deaths
- Drug overdoses: 38,329 deaths*

*30,006 of which were unintentional.

IN OA KNEE PAIN…
RELIEVE THE PAIN
RESTORE THE MOBILITY

- Drug-free OA knee pain relief that can last for months
- Improvement in mobility nearly twice that of diclofenac
- Just 3 injections

SYNVISC®
HYLAN G-F 20
MOVE CLOSER TO HEALTHY SYNOVIAL FLUID
Viscosupplementation

- Systematic review
- Significant heterogeneity, funnel plot markedly asymmetric.
- Pooled effect size of ITT studies was 0.34 (95% CI –0.3 - 0.97).

JAMA. 2003 Dec 17;290(23):3115-21
Arthroscopy

- 100,000/year
- $500 million
- 2-3*higher in wealthy (fee for service)

Results of primary analysis on benefit on patient reported pain of interventions including arthroscopic knee surgery compared with control interventions (follow-up time range: 3-24 months).

<table>
<thead>
<tr>
<th>Author</th>
<th>Effect size (95% CI)</th>
<th>Weight (%)</th>
<th>Effect size (95% CI)</th>
</tr>
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<tbody>
<tr>
<td>Chang 1993</td>
<td></td>
<td></td>
<td>2.74 -0.07 (-0.77 to 0.63)</td>
</tr>
<tr>
<td>Moseley 2002</td>
<td></td>
<td>12.36</td>
<td>0.07 (-0.26 to 0.40)</td>
</tr>
<tr>
<td>Herrlin 2007</td>
<td></td>
<td>7.78</td>
<td>0.18 (-0.23 to 0.60)</td>
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<tr>
<td>Kirkley 2008</td>
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<td>14.56</td>
<td>0.13 (-0.18 to 0.43)</td>
</tr>
<tr>
<td>Østerås 2012</td>
<td></td>
<td>1.43</td>
<td>-0.45 (-1.42 to 0.52)</td>
</tr>
<tr>
<td>Katz 2013</td>
<td></td>
<td>28.52</td>
<td>0.22 (0.01 to 0.44)</td>
</tr>
<tr>
<td>Sihvonen 2013</td>
<td></td>
<td>12.67</td>
<td>0.08 (-0.24 to 0.41)</td>
</tr>
<tr>
<td>Yim 2013</td>
<td></td>
<td>8.87</td>
<td>-0.06 (-0.45 to 0.33)</td>
</tr>
<tr>
<td>Gauffin 2014</td>
<td></td>
<td>11.07</td>
<td>0.35 (0.00 to 0.70)</td>
</tr>
<tr>
<td>Test for overall effect: P=0.742, I²=0%</td>
<td></td>
<td>100.00</td>
<td>0.14 (0.03 to 0.26)</td>
</tr>
</tbody>
</table>

J B Thorlund et al. BMJ 2015;350:bmj.h2747
If you don’t believe the evidence what are some other reasons not to do arthroscopy in this setting?

• Adverse outcomes-DVT (0.4%), PE (0.1%), death (0.03%)

• Increases rate of progression of osteoarthritis.
  • Arthritis Rheum 2004;50:2811-2819

• Shortens time to joint replacement.
Clinical trials of MSCs for the treatment of OA and related joint defects

<table>
<thead>
<tr>
<th>Trial</th>
<th>Sponsor</th>
<th>Phase / current stage</th>
<th>Indication</th>
<th>Intervention</th>
<th>Comparator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment of Knee Osteoarthritis With Autologous Mesenchymal Stem Cells (MSV.allo): NCT01589322a</td>
<td>Red de Terapia Cellular</td>
<td>Phase I/II; recruiting</td>
<td>Knee OA</td>
<td>Intra-articular injection of 40×10^6 autologous MSCs</td>
<td>Intra-articular injection of 60mg hyaluronic acid</td>
</tr>
<tr>
<td>Treatment of Knee Osteoarthritis With Autologous Mesenchymal Stem Cells (NOGMSYS): NCT01837289b</td>
<td>Red de Terapia Cellular</td>
<td>Phase I/II; active, not recruiting</td>
<td>Knee OA, Kellgren and Lawrence grade II-IV</td>
<td>Intra-articular injection of 40×10^6 autologous MSCs</td>
<td>None (open-label, single-group safety study)</td>
</tr>
<tr>
<td>Intra-Articular Autologous Bone Marrow Mesenchymal Stem Cells Transplantation to Treat Mild to Moderate Osteoarthritis; NCT01455620d</td>
<td>National University of Malaysia</td>
<td>Phase II: recruiting</td>
<td>Knee OA, mild to moderate</td>
<td>Single intra-articular implantation of autologous bone marrow-derived MSCs in hyaluronic acid</td>
<td>None (open-label, single-group safety study)</td>
</tr>
<tr>
<td>The Effects of Intra-articular Injection of Mesenchymal Stem Cells in Knee Joint Osteoarthritis; NCT01504644c</td>
<td>Rayan Institute</td>
<td>Phase II; completed, no results posted</td>
<td>Knee OA</td>
<td>Intra-articular injection of MSCs</td>
<td>Placebo injection</td>
</tr>
<tr>
<td>Mesenchymal Stem Cell Transplantation in Osteoarthritis of Hip Joint; NCT01499256e</td>
<td>Rayan Institute</td>
<td>Phase II; completed, no results posted</td>
<td>Hip OA</td>
<td>MSC injection</td>
<td>None (open-label, single-group safety study)</td>
</tr>
<tr>
<td>Allogeneic Mesenchymal Stem Cells in Osteoarthritis; NCT01537389f</td>
<td>Stempeutics Research Pvt Ltd</td>
<td>Phase II; active, not recruiting</td>
<td>Knee OA</td>
<td>Intra-articular dose of allogeneic MSCs in 2–4ml Plasmalyte-A followed by 2ml hyaluronic acid</td>
<td>Single intra-articular dose of 2ml Plasmalyte-A</td>
</tr>
<tr>
<td>Side Effects of Autologous Mesenchymal Stem Cell Transplantation in Ankle Joint Osteoarthritis; NCT01436098g</td>
<td>Rayan Institute</td>
<td>Phase I; completed, no results posted</td>
<td>Ankle joint OA</td>
<td>Intra-articular injection of MSCs</td>
<td>None (open-label, single-group safety study)</td>
</tr>
<tr>
<td>Adult Stem Cell Therapy for Repairing Articular Cartilage in Gonarthrosis; NCT01227694h</td>
<td>Banc de Sang i Teixits</td>
<td>Phase I/II; active, not recruiting</td>
<td>Knee OA</td>
<td>Intra-articular injection of 40×10^6 autologous MSCs</td>
<td>None (open-label, single-group safety study)</td>
</tr>
<tr>
<td>Autologous Adipose Tissue Derived Mesenchymal Stem Cells Transplantation in Patients With Degenerative Arthritis; NCT01306395i</td>
<td>RNL Bio Company Ltd</td>
<td>Phase I/II; completed, no results posted</td>
<td>Knee OA</td>
<td>Intra-articular injection of autologous adipose tissue-derived MSCs. Doses (in 3ml) listed as: 1×10^6 cells, 5×10^6 cells, 1×10^6 cells</td>
<td>None (open-label, single-group safety study)</td>
</tr>
<tr>
<td>Study to Compare the Efficacy and Safety of Cartistem® and Microstructure in Patients With Knee Articular Cartilage Injury or Defect; NCT0141001l</td>
<td>Medipost Co Ltd</td>
<td>Phase I; completed, no results posted (Follow-up study, NCT01526977) now recruiting</td>
<td>Knee cartilage defect or injury</td>
<td>Intra-articular injection of autologous umbilical cord blood-derived MSCs</td>
<td>Microfracture treatment</td>
</tr>
<tr>
<td>ADIPOA—Clinical Study; NCT01585667j</td>
<td>University Hospital, Montpellier</td>
<td>Phase I; recruiting</td>
<td>Knee OA, moderate or severe</td>
<td>Intra-articular injection of autologous adipose-tissue-derived MSCs. Doses (in 5ml of human albumin): 2×10^6, 10×10^6, 50×10^6 cells</td>
<td>None (open-label, dose-escalating safety study)</td>
</tr>
<tr>
<td>Safety and Efficacy Study of MSB-CA9001 in Subjects 6 Weeks Post an Anterior Cruciate Ligament Reconstruction; NCT01660151m</td>
<td>Mesoblast, Ltd</td>
<td>Phase I/II; recruiting</td>
<td>Anterior cruciate ligament injury</td>
<td>Single intra-articular injection (into the knee) of MSB-CA9001 (2 different doses) combined with hyaluronic acid</td>
<td>Intra-articular injection of hyaluronic acid</td>
</tr>
<tr>
<td>Transplantation of Bone Marrow Stem Cells Stimulated by Proteins Scaffold to Heat Defects Articular Cartilage of the Knee; NCT01159899n</td>
<td>University of Marseille</td>
<td>Phase 0; recruiting</td>
<td>Knee cartilage defects</td>
<td>Rho-124-conjugated expanded autologous bone marrow-derived MSCs, mixed and activated with protein scaffold</td>
<td>None (open-label, single-group pilot study)</td>
</tr>
</tbody>
</table>

*As of April 2013, Plasmalyte-A is a sterile isotonic buffered salt solution. **MSB-CA9001 is a preparation of MSCs. Abbreviations: MSC, mesenchymal stem cell; OA, osteoarthritis.**
Stem Cells and ACSEP

• “hallmarks of ‘quack’ medicine: desperate patients, pseudoscience and large amounts of money being charged for unproven therapies”
  • NSW Coroner

• Recommendation-restrict the use of mesenchymal stem cells to rigorous clinical research trials only.

• Board of the Australasian College of Sport and Exercise Physicians

Need more evidence
Put patients before profits
When worlds collide........

Professional dominance
Profession of medicine is noble; it has special knowledge, inaccessible to laity; it is beneficent; and it will self-regulate.

Exponents believe in professional trust and prerogative.

Accountability and market theory
Exponents believe in accountability, scrutiny, measurement, incentives, and markets.

The machinery is the manipulation of contingencies: rewards, punishments, and pay for performance.

Healthy Era. We need to reject greed
Fundamentally better care, better health, and lower cost.
The best route to these goals is the continual design and redesign of health care as a system
If one does not know to which port one is sailing, no wind is favorable.

Lucius Annaeus Seneca
### Core Treatments

**Appropriate for all individuals**

- Land-based exercise (61.6)
- Water-based exercise (56.5)
- Weight management (60.0)
- Self-mgmt and education (49.1)
- Strength training (59.5)

### Recommended treatments

*Appropriate for the following OA types:*

#### Knee-only OA

- **without co-morbidities**
  - Biomechanical interventions (57.0)
  - Intra-articular Corticosteroids (53.8)
  - Topical NSAIDs (49.9)
  - Walking Cane (46.9)
  - Oral COX-2 Inhibitors (selective NSAIDs) (43.1)
  - Capsaicin (42.6)
  - Oral Non-selective NSAIDs (37.6)
  - Duloxetine (37.2)
  - Acetaminophen/Paracetamol (34.0)

- **with co-morbidities**
  - Biomechanical interventions (50.4)
  - Walking Cane (46.9)
  - Intra-articular Corticosteroids (47.2)
  - Topical NSAIDs (44.7)

#### Multi-joint OA

- **without co-morbidities**
  - Oral COX-2 Inhibitors (selective NSAIDs) (44.0)
  - Intra-articular Corticosteroids (42.7)
  - Oral Non-selective NSAIDs (39.3)
  - Duloxetine (39.3)
  - Biomechanical interventions (37.6)
  - Acetaminophen/Paracetamol (34.8)

- **with co-morbidities**
  - Balneotherapy (41.9)
  - Biomechanical interventions (41.8)
  - Intra-articular Corticosteroids (39.2)
  - Oral COX-2 Inhibitors (selective NSAIDs) (37.1)
  - Duloxetine (35.4)

*OARSI also recommends referral for consideration of open orthopedic surgery if more conservative treatment modalities are found ineffective.*

The composite risk-benefit score was calculated as the product of the benefit score (1-10) and the transposed risk score (where 1=highest risk and 10=safest) yielding a composite score from 1 (worst) to 100 (best).
WOMAC Pain (range 0-20)

Messier S et al. JAMA. 2013 Sep 25;310(12):1263-73
## Baseline characteristics (n=1,383)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) (SD)</td>
<td>64.0 (8.7)</td>
</tr>
<tr>
<td>Females</td>
<td>981 (70.9%)</td>
</tr>
<tr>
<td>Weight (kg) (SD)</td>
<td>95.1 (17.2)</td>
</tr>
<tr>
<td>Height (m) (SD)</td>
<td>1.66 (0.09)</td>
</tr>
<tr>
<td>BMI (kg/m²) (SD)</td>
<td>34.3 (5.17)</td>
</tr>
<tr>
<td>Obesity (BMI ≥30 kg/m²) BSL</td>
<td>1130 (81.7%)</td>
</tr>
<tr>
<td>Obesity (BMI ≥30 kg/m²) Final</td>
<td>772 (56.3%)</td>
</tr>
<tr>
<td>KOOS pain</td>
<td>56.3 (16.8)</td>
</tr>
<tr>
<td>KOOS function</td>
<td>59.5 (18.3)</td>
</tr>
</tbody>
</table>

Difference in KOOS subscales after weight loss intervention

Weight Loss Categories

- ≤2.5%
- 2.6-5%
- 5.1-7.5%
- 7.6-9.9%
- ≥10%

Change in KOOS

- Pain
- Function
- Symptoms
- Sport
- Quality of life

Difference in KOOS subscales after weight loss intervention

< 2.5% wt loss
N=79 (5.7%)

2.6-5% wt loss
N=223 (16.1%)

5.1-7.5% wt loss
N=332 (24.0%)

7.6-10% wt loss
N=317 (22.9%)

10+% wt loss
N=431 (31.2%)

### OACCP

<table>
<thead>
<tr>
<th>Name of Program</th>
<th>Number of persons enrolled/ seen in the program</th>
<th>Website for further information</th>
<th>Health care system, funding model</th>
</tr>
</thead>
</table>
Total Joint Replacement

- Right person, right time.
- Up to 25% of persons having a TKR have a bad outcome.
- Importance of shared decision making and screening out non-responders (depressed, BMI>40, KLG<4 and low pain score).
Knee 1 – Case 3

Clinical diagnosis of OA based on history and examination*

Non-pharmacological interventions
1) Weight loss program available in community
2) Community physical activity program/ Community exercise program/ Home exercise program
3) Self-management program and education
4) Consider referral for psychological interventions (e.g. CBT) for assistance with pain coping or psychological symptoms if appropriate

If in the clinicians' judgment the patient is weak, stiff or has other functional deficits
Consider referral to PT

Therapist Consultation

If ADL is impaired:
• Assistive devices
If malalignment:
• Consider unloader brace
• Appropriate footwear/ insoles
• Patellar taping (supported by assessment of the PF joint and by pain)
• Individualised exercise program aiming for personalised goals for strength, ROM and function

Check for co-morbidities
e.g. cardiac diseases; hypertension; type 2 diabetes; obesity; COPD; low back pain; chronic pain; depression; and visual or hearing impairments.

Pharmacological interventions
1) Continue topical NSAIDs and intermittent paracetamol
2) Consider COX-2 inhibitor and PPI

If the patient has severe and disabling pain, consider opioid for short term use only and insist in non-pharmacological interventions
3) Consider intra-articular corticosteroids
4) Consider opioids e.g. oxycodone, tramadol

Non-pharmacological interventions
1) Weight loss program available in community
2) Community physical activity program/ Community exercise program/ Home exercise program
3) Self-management program and education
4) Consider referral for psychological interventions (e.g. CBT) for assistance with pain coping or psychological symptoms if appropriate

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4) Consider opioids e.g. oxycodone, tramadol

If disabling symptoms and if already exhausted all other options including pharmacological and non-pharmacological interventions
Consider referral to specialist knee surgeon for surgical opinion

If necessary: Surgical intervention

Post-operative program

• Long term: Individualised exercise program aiming for personalised goals for strength, ROM and function regarding the replaced joint and other joints at risk

*Signs and symptoms
• Joint pain
• Impaired activities of daily living, such as difficulty climbing stairs, squatting, kneeling and collecting objects from the floor.
• ‘Giving way’ and locking of the knee are common complaints.
• Small-to-moderate effusions
• Reduced range of motion
• Stiffness
• Crepitus and tenderness along the joint line or with pressure on the patella
• Weakness and wasting of quadriceps muscle

Osteoarthritis Cartilage. 2016 Apr 15. pii: S1063-4584(16)30019-X.
PARTNER OA Model

Centralised Service
Remotely-delivered

Care Support Team

Assessment
Information/Education
Collaborative care plan
Care co-ordination
Self management support

GP

Enhanced consultation

Assessment
Diagnosis
Information provision
Education about
Shared Care and
referral to Care Support Team

People with:
• BMI ≥25
• Pain ≥4/10

All people with knee OA

• Interventions will be directed at GP, care support team and patient behaviours.

Remotely-delivered Care Support Team:

- Allied health professionals (such as pharmacists, physiotherapists, nurses, psychologists) with team skills covering:
  - OA treatments including exercise, weight loss, mood management, medications and other self management strategies
  - Behaviour change support
- IT infrastructure that facilitates communication, patient monitoring and collection of outcome data

Referral and feedback pathway
Got joint pain? Get long term relief.

Let MyJointPain.org.au show you how.

SIGN UP FOR FREE NOW!

DO A RISK ASSESSMENT

Do you have osteoarthritis (OA)? This joint disease can lead to ongoing pain and disability. Answer a few questions to learn your risk.

GET A MANAGEMENT PLAN

Answer questions to get relevant treatment options and a management plan tailor-made for you. Weekly check-ups will help you stay on track.

FIND UP-TO-DATE INFORMATION

Learn about new treatments, what works, and what you should avoid. See interviews with experts and connect with healthcare providers who can help you.

CONNECT WITH OUR COMMUNITY

Talk to other people with joint pain as well as experts. Ask questions, get answers and share your experience. Find out who can help you best.

http://www.youtube.com/watch?v=h6UIZWIB9CA
http://www.youtube.com/watch?v=lvRVmay-u24
LIMITATIONS

Until you spread your wings, you’ll have no idea how far you can walk.
Risk for Knee OA

- Occupation
- Injury
- Obesity
- Other

Osteoarthritis Cartilage. 2009; Sep 2.
Past and projected future overweight rates in selected O.E.C.D countries
My wife said "Watcha doin' today?"
I said "Nothing"
She said, "You did that yesterday"
I said "I wasn't finished."

Sandi V
www.wackywits.com
Milestones in reducing smoking in Australia 1980–2007

The Cancer Council of Victoria 2009
What should we do?
Cost-effectiveness results for selected interventions evaluated in Australia

WHEN IT COMES TO EATING, I JUST CAN'T GET HIM TO THINK OUTSIDE THE BOX...
Injury Prevention

Anterior Cruciate Ligament Tear

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INTERNATIONAL OLYMPIC COMMITTEE

FIFA
Natural History of OA

Initiation of Disease Process

MRI/Biomarkers
Changes in the composition of bone, cartilage, other soft tissues

MRI /US
Structural changes in bone, cartilage, other soft tissues

X-ray
Structural changes in bone (i.e., joint failure)

End-stage Disease
(i.e., joint death)

Symptoms

MRI /US
Structural changes in bone, cartilage, other soft tissues

X-ray
Structural changes in bone (i.e., joint failure)

End-stage Disease
(i.e., joint death)

Molecular
Pre-Radiographic
Radiographic

Clinically detectable OA
Joint Replacement

Defining Disease State of Osteoarthritis
Prevention
Obesity
Joint injury

Progression
Reduce load
Disease modification

Palliation
Analgesia
Joint replacement

Conclusion

• We can all improve the appropriateness of our OA management.
• Disease management can be improved by moving towards chronic disease management focused in particular on exercise and weight loss.
"The people who are crazy enough to think they can change the world are the ones who do."

– Steve Jobs
Osteoarthritis Summit 2017

May 30th, 2017
The Royal North Shore Hospital
Sydney, Australia

Discussions on:
Establishing osteoarthritis research priorities for the next 5 years

Open for registration to all
11th International Osteoarthritis Imaging Workshop, Sydney June 1-4th 2017

Register at: http://www.ismrm.org/workshops/Osteo17/