Motion is Medicine: Knee Osteoarthritis

Aaron Vaughan, MD
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MAHEC *Primary Care Sports Medicine Fellowship Director*
Asheville, NC

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Disclosures

Objectives

- **Remember the "Average" Joe**
  - **Identify your Population**
  - **Know what you're Treating**
- **Motion is Medicine**
  - **Understand your Options**

Clinical Case

- "Joe" is a 65 yo male who presents for knee pain
  - "Doc My Joints Hurt"
    - CC:
      - Joints, mostly right knee
    - HPI:
      - Atraumatic (recent); Remote "twisting"
      - Stiff in the AM
      - Painful up and down stairs
      - Swelling following prolonged standing/walking
    - ROS:
      - No fevers, unintentional weight loss
      - No mechanical symptoms (ie: instability, catching/locking)

Case (cont)

- PMHx:
  - Obesity (BMI: 37)
  - HTN
  - DM
  - Hyperlipidemia
  - CAD (MI @ 55)
  - Gout
- PSHx:
  - RTC repair
  - Right knee arthroscopy @ 52
  - Coronary Catheterization @ 55
- Allergies:
  - PCN (anaphylaxis)
  - Lisinopril (angioedema)
- Meds:
  - ASA
  - Plavix
  - Allopurinol
  - Crestor
  - Celebrex
  - Toprol XL
  - Oxycodone
  - Metformin

Case (cont)

- **PE:**
  - **Inspection: Large knee effusion on the right. Small effusion on the left. No erythema, warmth**
  - **Active/Passive ROM: Limited ROM secondary to swelling/pain**
  - **Patella: Negative patellar grind.**
  - **Joint line: bilateral medial joint line tenderness.**
  - **Popliteal: No popliteal cyst**
  - **McMurray's: Positive bilaterally for pain**
  - **Lachman's: Mild laxity with loose endpoint on the right**
  - **Varus/Valgus stress: Intact with firm endpoint**

Case (cont)

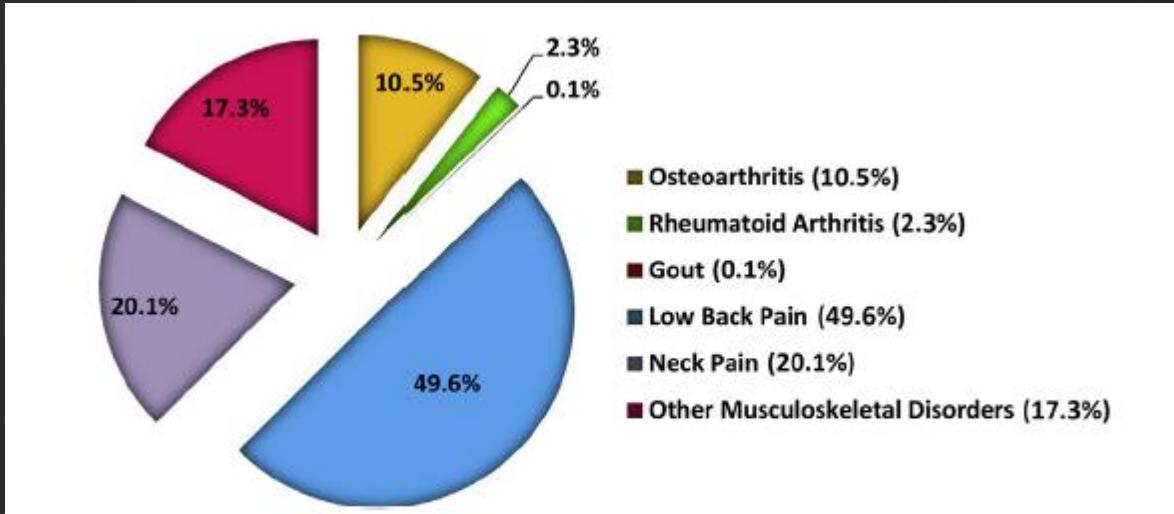
"Average" Joe

- Identify your Population
  - Prevalence
    - OA affects an estimated 26.9 million US adults in 2005 up from 21 million in 1990 (conservative estimate)
    - Knee
      - Age ≥60 years = 37.4 (42.1 female; 31.2 male)
      - Age ≥45 years = 19.2 (19.3 female; 18.6 male)
      - Age ≥26 years = 4.9 (4.9 female; 4.6 male)
  - Incidence
    - Knee OA = 240 per 100,000 person years

Dillon CF, Rasch EK, Gu Q, Hirsch R. Prevalence of knee osteoarthritis in the United States: arthritis data from the Third National Health and Nutrition Examination Survey 1991–1994. *J Rheumatol*, 2006;33(11):2271-2279.
Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. *Arthritis Rheum*. 2008;58(1):26-35.
Sacks JJ, Luo Y-H, Helmick CG. Prevalence of specific types of arthritis and other rheumatic conditions in the ambulatory health care system in the United States, 2001–2005. *Arthritis Care & Research*. 2010;62 (4):460-464.

"Average" Joe

- Identify your Population
  - Prevalence and burden of Msk issues is high



Proportions of YLDs in 2010 for each of the MSK disorders, GBD 2010 Study.

March L et al. *Burden of Disability due to Musculoskeletal (Msk) Disorders.* Best Practice & Research Clinical Rheumatology 28 (2014) 353-366.

“Average” Joe (cont)

- Know what you’re Treating
  - Monoarthritis

Differential diagnosis of acute monoarthritis

Infection
Bacterial
Fungal
Mycobacterial
Viral
Spirochete
Crystal-induced
Monosodium urate
Calcium pyrophosphate dihydrate
Hydroxyapatite
Calcium oxalate
Lipid
Hemarthrosis
Trauma
Anticoagulation
Clotting disorders
Fracture
Pigmented villonodular synovitis

Tumor
Pigmented villonodular synovitis
Chondrosarcoma
Osteoid osteoma
Metastatic disease
Systemic rheumatic disease
Rheumatoid arthritis
Spondyloarthropathy
Systemic lupus erythematosus
Sarcoidosis
Osteoarthritis
Erosive variant
Intraarticular derangement
Meniscal tear
Osteonecrosis
Fracture

“Average” Joe (cont)

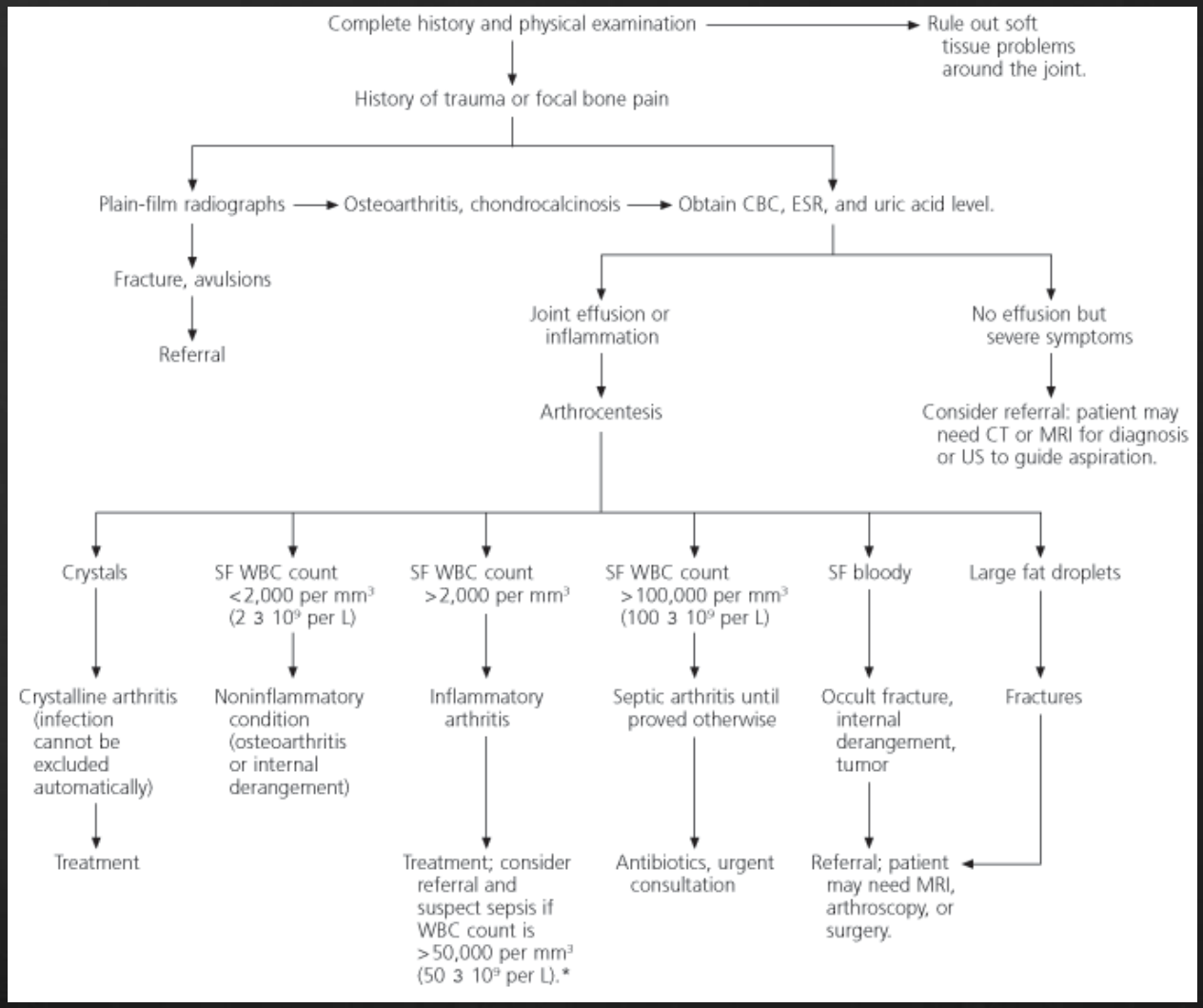
- Know what you’re Treating
  - Polyarthritis

Major causes of inflammatory polyarticular rheumatism

Infectious arthritis	**Crystal-induced arthritis**
Bacterial	**Systemic rheumatic illnesses**
Lyme disease	Systemic lupus erythematosus
Bacterial endocarditis	Systemic vasculitis
Viral	Systemic sclerosis
Other infections	Polymyositis/dermatomyositis
Postinfectious (reactive) arthritis	Still's disease
Rheumatic fever	Behcet syndrome
Reactive arthritis	Relapsing polychondritis
Enteric infection	Autoinflammatory disorders
Other seronegative spondyloarthritides	**Other systemic illnesses**
Ankylosing spondylitis	Sarcoidosis
Psoriatic arthritis	Palindromic rheumatism
Inflammatory bowel disease	Familial Mediterranean fever
Rheumatoid arthritis	Malignancy
Inflammatory osteoarthritis	Hyperlipoproteinemias

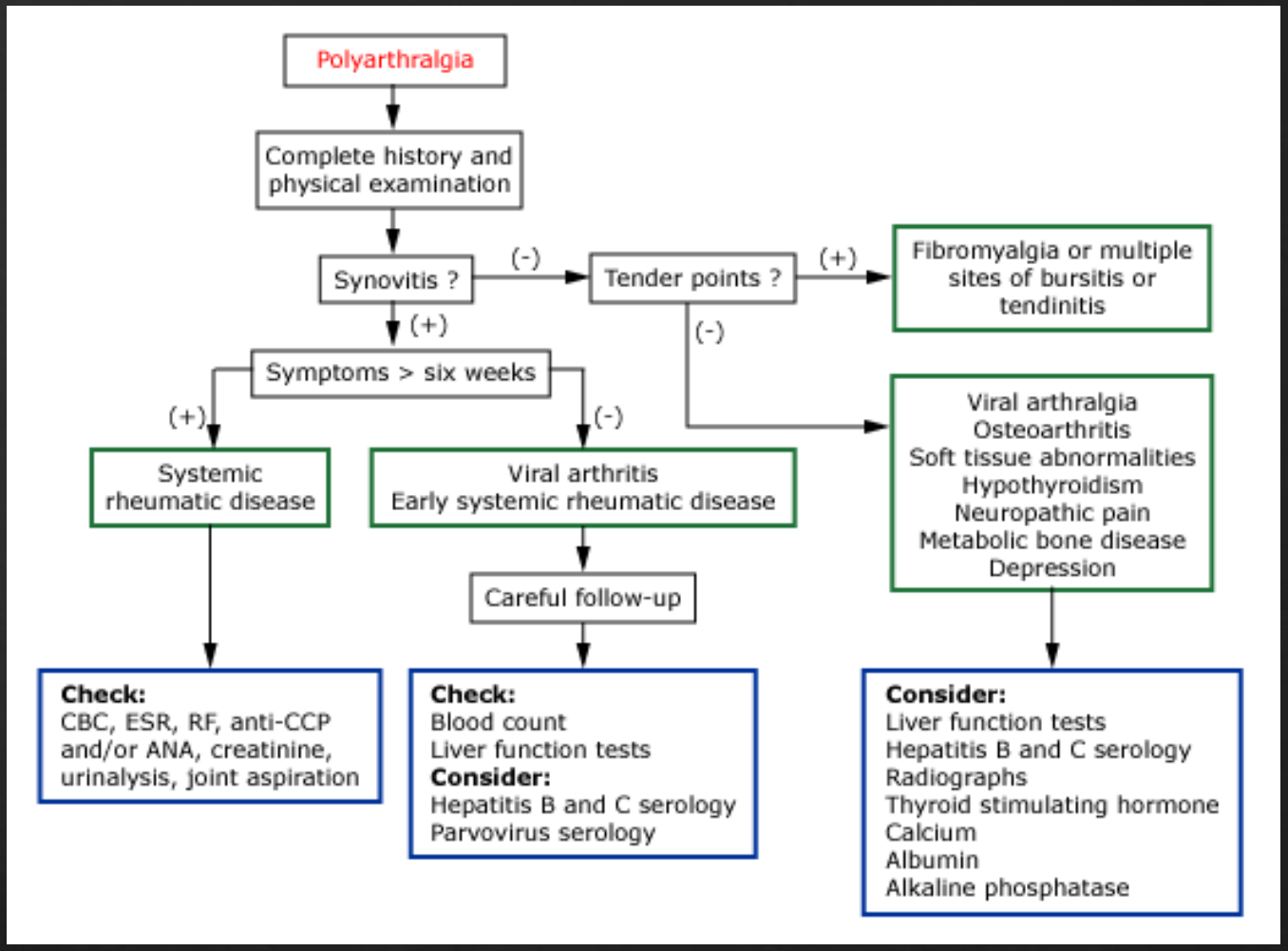
"Average" Joe

- Know what you're Treating
  - Monoarticular Joint Pain

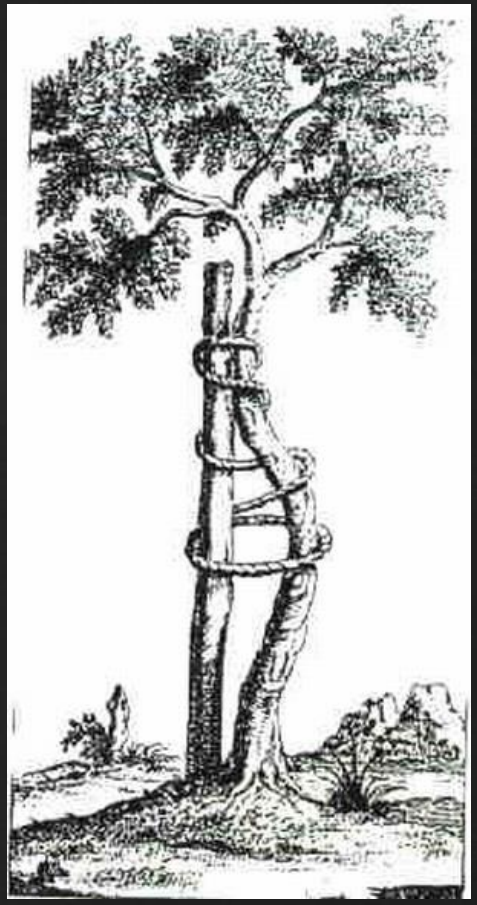


"Average" Joe

- Know what you're Treating
  - Polyarticular Joint Pain



- Remember the “Average” Joe
  - Identify your Population
  - Know what you’re Treating
- Motion is Medicine
  - Understand your Options



Motion is Medicine

- Outcome based research:
  - Duration:
    - Short-term vs Long-term
  - Outcomes:
    - Function (ie: Disability)
    - Quality of Life (ie: Well being)
    - Pain Reduction
    - Physical Health

Iwamoto J et al. *Effectiveness of exercise for osteoarthritis of the knee: A review of the Literature*. World J Orthop 2011 May 18; 2(5): 37-42.

Motion is Medicine (cont)

- **Objective:**
  - To examine whether overall and abdominal adiposity modified the association between physical activity and all-cause mortality and estimated the population attributable fraction (PAF) and the years of life gained for these exposures
- **Design:**
  - Cohort study
  - 334,161 European Men and Women
  - Mean follow-up: 12.4y (>4M person-years)
  - Height, weight, waist circumference measured in clinic
  - Physical activity assessed with a validated self-report instrument

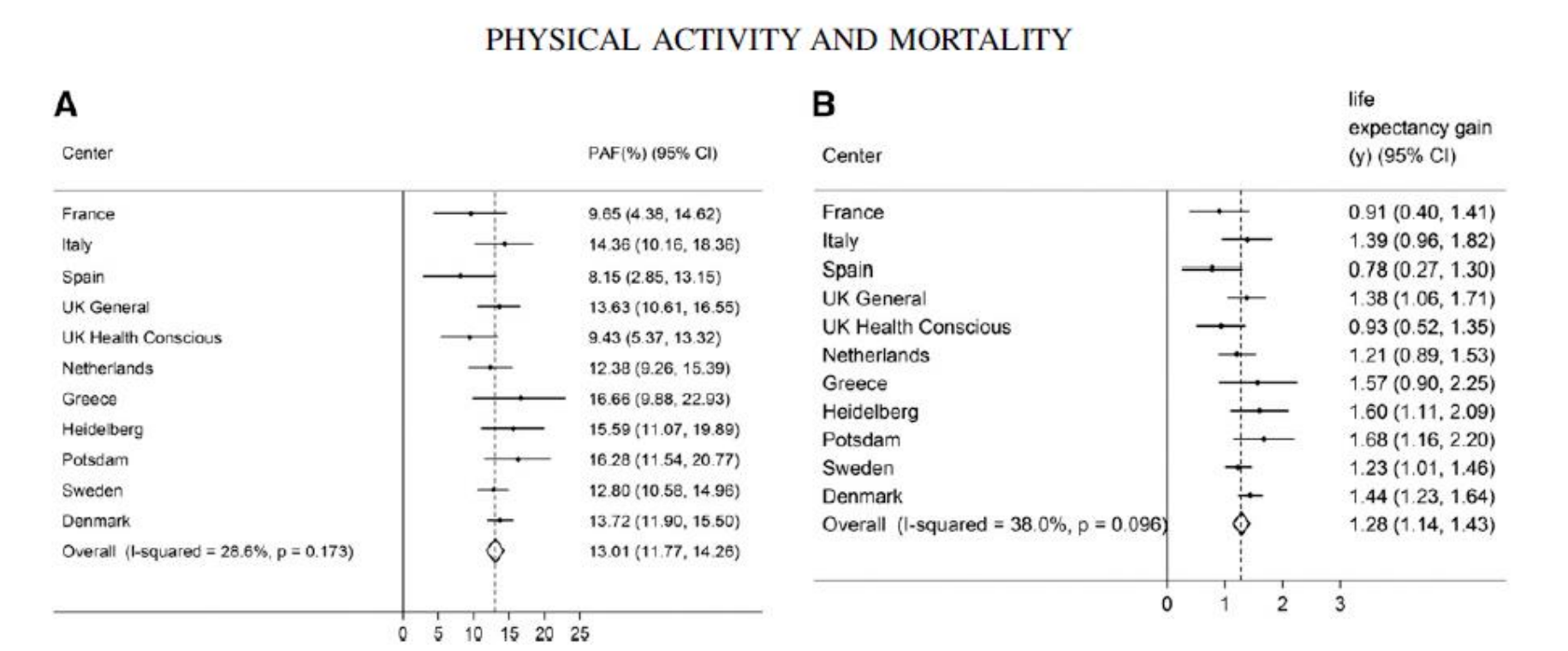
Ekelund U et al. Physical activity and all-cause mortality across levels of overall and abdominal adiposity in European men and women: the European Prospective Investigation into Cancer and Nutrition Study (EPIC). Am J Clin Nutr doi: 10.3945/ajcn.114.100065.

TABLE 3
HRs and 95% CIs of all-cause mortality in relation to physical activity levels within strata of BMI and waist circumference groups[1]

	Deaths, *n*	Inactive	Moderately inactive	Moderately active	Active	HR per one-level difference in physical activity[2]
BMI						
Model 1[3]						
18.5–24.9 kg/m^2	8285	1 (reference)	0.70 (0.66, 0.74)	0.64 (0.60, 0.69)	0.59 (0.55, 0.63)	0.84 (0.82, 0.86)
25–29.9 kg/m^2	8815	1 (reference)	0.77 (0.74, 0.82)	0.74 (0.70, 0.79)	0.72 (0.67, 0.77)	0.90 (0.88, 0.92)
>30 kg/m^2	4338	1 (reference)	0.80 (0.74, 0.87)	0.73 (0.67, 0.81)	0.79 (0.71, 0.87)	0.91 (0.88, 0.94)
Model 2[4]						
18.5–24.9 kg/m^2	8285	1 (reference)	0.76 (0.72, 0.81)	0.71 (0.67, 0.76)	0.65 (0.60, 0.70)	0.87 (0.85, 0.89)
25–29.9 kg/m^2	8815	1 (reference)	0.82 (0.77, 0.86)	0.78 (0.73, 0.83)	0.75 (0.70, 0.80)	0.91 (0.89, 0.93)
>30 kg/m^2	4338	1 (reference)	0.84 (0.78, 0.91)	0.76 (0.69, 0.84)	0.82 (0.74, 0.90)	0.92 (0.89, 0.95)
Waist circumference, cm						
Model 1[3]						
<88 (F)/<102 (M)	14,362	1 (reference)	0.75 (0.72, 0.78)	0.70 (0.67, 0.74)	0.67 (0.63, 0.70)	0.88 (0.86, 0.89)
≥88 (F)/≥102 (M)	7076	1 (reference)	0.79 (0.75, 0.84)	0.74 (0.69, 0.80)	0.76 (0.70, 0.82)	0.90 (0.88, 0.92)
Model 2[4]						
<88 (F)/<102 (M)	14,362	1 (reference)	0.80 (0.76, 0.83)	0.76 (0.72, 0.79)	0.71 (0.68, 0.75)	0.90 (0.88, 0.91)
≥88 (F)/≥102 (M)	7076	1 (reference)	0.84 (0.79, 0.89)	0.78 (0.73, 0.84)	0.80 (0.73, 0.86)	0.91 (0.89, 0.94)

- **Results:**
  - All-cause mortality reduced by 16-30% in moderately inactive individuals vs inactive in different strata of BMI and WC
  - Avoiding all inactivity reduces all-cause mortality by 7.35%
- **Conclusion:**
  - Greatest reductions in mortality risk were observed between the two lowest activity groups across levels of general and abdominal adiposity.
  - Small increases in physical activity in those currently categorized as inactive are associated with significant reduction in all –cause mortality regardless of BMI or WC
  - Dose dependent risk reduction
  - Encourage small increases in activity in inactive individuals

Motion is Medicine (cont)



Motion is Medicine (cont)

Table 1 a: Home-based balance exercises versus home-based strengthening exercises for knee OA

Author(s): Karine Toupin April
Date: 2009-06-12
Question: Should balance training versus strength training be used for knee OA?
Bibliography: Chaipinyo, 2009

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	balance training	strength training	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 4 weeks; measured with: Knee injury and Osteoarthritis Outcome Score (KOOS); range of scores: 0-100; Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	24	18	0.73	SMD -0.23 (-0.85 to 0.38)[4]	⊕⊕OO LOW	CRITICAL
function in daily living (follow-up 4 weeks; measured with: Knee injury and Osteoarthritis Outcome Score (KOOS); range of scores: 0-100; Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	24	18	0.54	SMD -0.45 (-1.07 to 0.17)[4]	⊕⊕OO LOW	CRITICAL
Adherence (follow-up 4 weeks; Maximum number of days:28; measured with: average number of days of exercise performed by participants Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	24	18	-	MD 2 (-0.77 to 4.77)	⊕⊕OO LOW	CRITICAL
Withdrawals												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	0/24 0%	6/24 (25%)	0.08 (0.00 to 1.29)	23 fewer per 100 (from 25 fewer to 7 more)[5]	⊕⊕OO LOW	CRITICAL
Safety												
Not reported												

Table 1 b: Balance exercises in addition to strengthening exercises versus strengthening exercises alone for knee OA

Author(s): Karine Toupin April
Date: 2009-06-12
Question: Should kinesthesia and balance exercises in addition to strengthening exercises versus strengthening exercises be used for knee OA?
Bibliography: Diracoglu, 2005

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	kinesthesia and balance exercises in addition to strength exercises	strength exercises	Relative (95% CI)	Absolute	Quality	Importance
physical function (follow-up 8 weeks; measured with: WOMAC; range of scores: 0-10; Better indicated by lower values)												
1	randomised trials	serious[1]	No serious inconsistency	no serious indirectness[2]	Serious[3]	None	30	30	1.55	SMD 0.46 lower (0.97 lower to 0.05 higher)[4]	⊕⊕OO LOW	CRITICAL
Pain												
No evidence available[5]												
Adverse effects (follow-up 8 weeks; number of patients with event)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	no serious imprecision	none	0/30 (0%)	0/30 (0%)	1	0 more per 100	⊕⊕⊕O MODERATE	CRITICAL
Adherence (follow-up 8 weeks; Maximum number of visits:24; mean number of missed visits)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	24	24	-	MD -2	⊕⊕⊕O MODERATE	CRITICAL
Withdrawals (follow-up 8 weeks; number of patients who withdrew after randomization)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	3/33 (9.1%)	3/33 (9.1%)	1 (0.22 to 4.6)	0 fewer per 100 (from 7 fewer to 33 more)[6]	⊕⊕⊕O MODERATE	CRITICAL

Table 1 c: Cardiovascular land-based exercise versus usual care for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should cardiovascular land exercise versus no exercise be used for osteoarthritis of the knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	cardiovascular land exercise	no exercise	Relative (95% CI)	Absolute	Quality	Importance
pain (measured with: pooled studies with different scales including WOMAC and VAS amongst others; range of scores: 0-0; Better indicated by less)												
4[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[2]	no serious imprecision	none	225	126	1.71	SMD -0.48 (-0.83 to -0.13)	⊕⊕⊕⊕ HIGH	CRITICAL
function (measured with: pooled studies with different scales including WOMAC and VAS amongst others; range of scores: 0-0; Better indicated by less)												
3[4]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[2]	no serious imprecision	none	208	109	1.55	SMD -0.35 (-0.58 to -0.11)	⊕⊕⊕⊕ HIGH	CRITICAL
withdrawals (follow-up mean 18 months; number of withdrawals)												
1[5]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious[6]	none	27/144 (18.8%)	22/149 (14.8%)	RR 1.27 (0.76 to 2.12)	40 more per 1000 (from 36 fewer to 166 more)	⊕⊕⊕O MODERATE	CRITICAL
Safety (follow-up mean 18 months; number of falls)												
1[5]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	2/144 (1.4%)	0/149 (0%)	RR 5.17 (0.25 to 106.82)	0 more per 1000 (from 0 fewer to 0 more)	⊕⊕⊕O MODERATE	CRITICAL
adherence (follow-up mean 18 months; numbers of patients)												
1[5]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	98/144 (68.1%)	142/149 (95.3%)	RR 0.71 (0.63 to 0.80)	276 fewer per 1000 (from 191 fewer to 353 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL

Table 1 d: Resistance land-based exercise versus usual care for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should resistance land exercise versus no exercise be used for osteoarthritis of the knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	resistance land exercise	no exercise	Relative (95% CI)	Absolute	Quality	
Pain (measured with: pooled studies with different scales including WOMAC and VAS amongst others; Better indicated by less)												
9	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[1]	No serious imprecision	none	836	547	1.66	SMD -0.53 (-0.79 to -0.27)	⊕⊕⊕⊕ HIGH	CRITICAL
Function (measured with: pooled studies with different scales including WOMAC and VAS amongst others; Better indicated by less)												
9[2]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[1]	No serious imprecision	none	836	547	2.5	SMD -0.58 (-0.88 to -0.27)	⊕⊕⊕⊕ HIGH	CRITICAL

Table 1 e: Aquatic exercise versus no exercise for OA of hip or knee

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-08-18
Question: Should aquatic exercise versus no exercise be used for osteoarthritis of hip or knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	aquatic exercise	no exercise	Relative (95% CI)	Absolute	Quality	
Pain after intervention (measured with: Pooled different scales[1]; range of scores: -; Better indicated by less)												
4[2]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	306	332	1.2	SMD -0.19 (-0.04 to -0.35)	⊕⊕⊕⊕ HIGH	CRITICAL
Pain follow up (follow-up mean 18 months; measured with: WOMAC pain ; range of scores: 0-20; Better indicated by less)												
1[4]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	152	158	1.1	SMD -0.11 (-0.33 to 0.12)[5]	⊕⊕⊕⊕ HIGH	CRITICAL
Function after intervention (measured with: Pooled different scales[1]; range of scores: -; Better indicated by less)												
4[2]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	314	334	1.3	SMD -0.26 (-0.11 to -0.42)	⊕⊕⊕⊕ HIGH	CRITICAL
Function follow up (follow-up mean 18 months; measured with: WOMAC physical function; range of scores: 0-68; Better indicated by less)												
1[4]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	150	156	1.1	SMD -0.1 (-0.33 to 0.12)	⊕⊕⊕⊕ HIGH	CRITICAL
Withdrawals follow up (follow-up mean 18 months; total withdrawals)												
1[4]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	Serious[7]	none	53/153 (34.6%)	46/159 (28.9%)	RR 1.2 (0.86 to 1.66)	58 more per 1,000	⊕⊕⊕ MODERATE	IMPORTANT

Table 1 f: Aquatic exercise versus land-based exercise for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should aquatic exercise versus land exercise be used for osteoarthritis of the knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	aquatic exercise	land exercise	Relative (95% CI)	Absolute	Quality	
pain (follow-up mean 6 weeks; measured with: VAS; range of scores: 0-10; Better indicated by less)												
1[1]	randomised trial	serious[2]	no serious inconsistency	no serious indirectness[3]	very serious[4]	none	23	23	2.0	SMD -0.86 (-1.47 to -0.25)	⊕OOO VERY LOW	CRITICAL
function - walking ability (follow-up mean 6 weeks; measured with: timed 1-mile walk; range of scores: -; Better indicated by less)												
1[1]	randomised trial	no serious limitations[2]	no serious inconsistency	serious[3]	very serious[4]	none	23	23	1.9	SMD -0.43 (-1.01 to 0.16)	⊕OOO VERY LOW	CRITICAL

Table 1 g: Tai Chi compared to no exercise (education on OA) for knee OA

Author(s): Jessie McGowan, Maria Benkhalti

Date: 2009-07-23

Question: Should tai chi versus no exercise (education on OA) be used for osteoarthritis of the knee?

Settings:

Bibliography:

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Tai Chi	no exercise (education on OA)	Relative (95% CI)	Absolute	Quality	Importance
Pain (follow-up mean 12 weeks; measured with: WOMAC; range of scores: 0-35; Better indicated by less)												
1[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	very serious[2]	none	18	13	1.1	SMD 0.06 (-0.65 to 0.77)	⊕⊕OO LOW	CRITICAL
Function (follow-up mean 12 weeks; measured with: WOMAC; range of scores: 0-85; Better indicated by less)												
1[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	very serious[2]	none	18	13	1.1	SMD 0.07 (-0.65 to 0.78)	⊕⊕OO LOW	CRITICAL
Withdrawals (follow-up mean 12 weeks; Number of drop-outs)												
1[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	Very serious[2]	none	4/22 (18.2%)	6/19 (31.6%)	RR 0.58 (0.19 to 1.74)	133 fewer per 1,000	⊕⊕OO LOW	IMPORTANT

Table 4 b: Manual therapy in combination with supervised exercise and home exercise program versus home exercise program alone for knee OA

Author(s): Karine Toupin April
Date: 2009-08-19
Question: Should manual therapy in combination with supervised exercise and home exercise program vs home exercise be used for knee OA?
Bibliography: Deyle, 2005

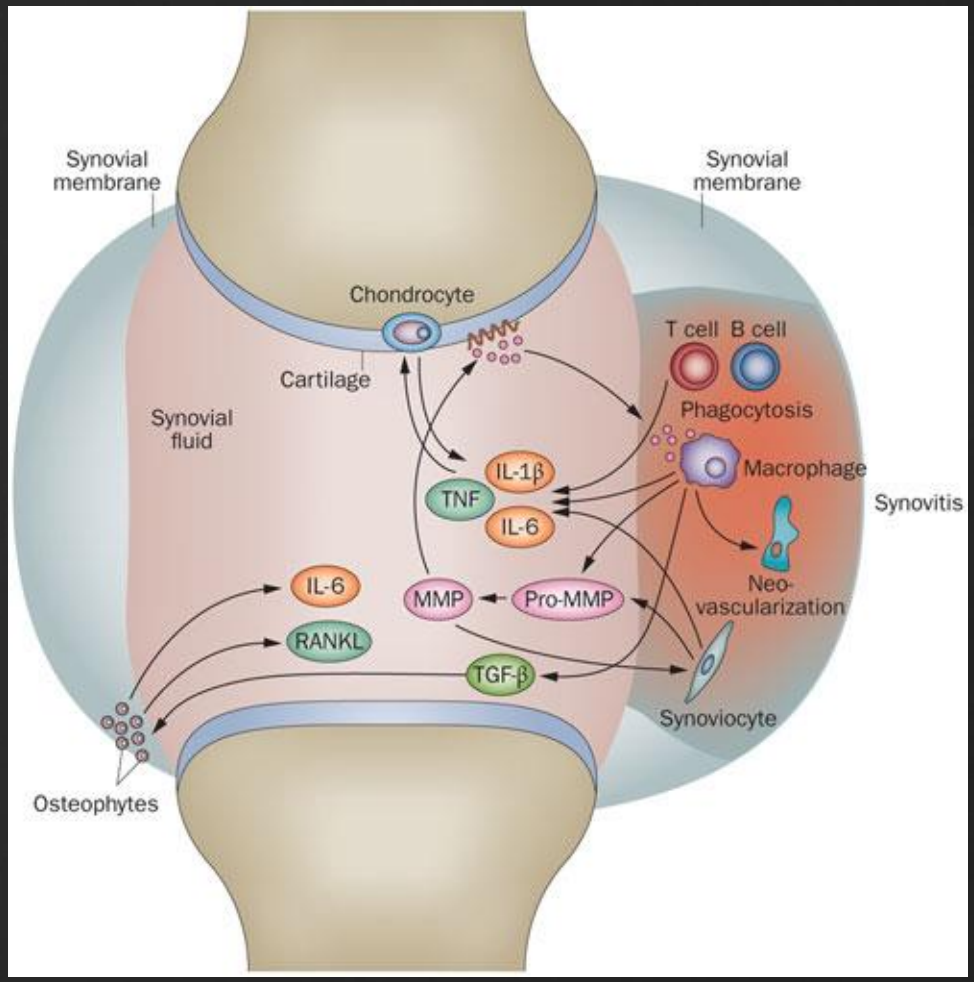
Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Manual therapy+ supervised exercise and home exercise program	Home exercise	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 8 weeks; measured with: WOMAC; range of scores: 0-500; Better indicated by lower values)												
1[1]	randomised trials	no serious limitations[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	60	60	1.43	SMD -0.41 (-0.77 to -0.05)	⊕⊕⊕⊕ HIGH	CRITICAL
function (follow-up 8 weeks; measured with: WOMAC; range of scores: 0-1700; Better indicated by lower values)												
1	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	60	60	1.41	SMD -0.40 (-0.76 to -0.03)	⊕⊕⊕⊕ HIGH	CRITICAL
Discontinuations due to lack of adherence (follow-up 8 weeks; number of patients who were discontinued to lack of adherence to the treatment regimen)												
1	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	0/60 (0%)	0/60 (0%)	0 (0 to 0)	0 fewer per 100 (from 0 fewer to 0 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL
Withdrawals (follow-up 8 weeks; people who withdrew from the study after randomization)												
1	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	serious[3]	none	6/66 (9.1%)[4]	8/68 (11.8%)[5]	RR 0.77 (0.28 to 2.11)	3 fewer per 100 (from 8 fewer to 13 more)	⊕⊕⊕O MODERATE	CRITICAL

Table 6: Weight loss compared to control (no weight loss program) for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-04-28
Question: Should weight loss versus control (no weight loss program) be used for knee OA?
Bibliography: Christensen, 2007

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	weight loss	control (no weight loss)	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 8-24 weeks; measured with: pooled WOMAC 500mm; range of scores: 0-500 and Likert; range of scores 1-5; Better indicated by less)												
2[1]	randomised trial	no serious limitations	serious[2]	no serious indirectness	no serious imprecision	none	208	208	1.2	SMD -0.2 (-0.39 to 0)	⊕⊕⊕O MODERATE	CRITICAL
function (follow-up mean 8-24 weeks; measured with: pooled WOMAC 1700mm; range of scores: 0-1700 and self-reported disability; range of scores 23-115 ; Better indicated by less)												
2[1]	randomised trial	no serious limitations	serious[2]	no serious indirectness	no serious imprecision	none	208	208	1.3	SMD -0.23 (-0.42 to -0.04)	⊕⊕⊕O MODERATE	CRITICAL

Motion is Medicine (cont)



Chevalier X et al. ***Biologic agents in osteoarthritis: hopes and disappointments.*** Nature Reviews Rheumatology 9, 400-410 (July 2013).

Motion is Medicine (cont)

- Osteocytes
  - Mechano-sensing cells that influence osteoclast and osteoblast activity
  - Various cytokines and growth factors secreted by osteoclast/osteoblasts of OA sclerotic bone promote cartilage loss (proteoglycans)
  - Osteocyte deaths confirmed in OA subchondral bone→increased subchondral bone remodeling
    - →dysregulation of osteoclast/osteoblasts→subchondral bone osteoporotic changes

Iijima H, Aoyama T, Ito A, Yamaguchi S, Nagai M, Tajino J, Zhang X, Kuroki H, Effects of short-term gentle treadmill walking on subchondral bone in a rat model of instability-induced osteoarthritis, *Osteoarthritis and Cartilage* (2015), doi: 10.1016/j.joca.2015.04.015.

"Average" Joe (cont)

- Optimal Management of Symptomatic OA requires a combination of pharmacologic and non-pharmacologic therapies
  - Activity:
    - Strength training (isometric knee extensions in sitting for each leg 5x/wk)
    - Cardiovascular land exercise
    - Aquatic exercise
    - Weak evidence of stretching/balance
  - Therapy:
    - Manual therapy + Supervised exercise plan
  - Weight Loss
    - Weight loss

Zhang W et al. OARSI recommendations for the management of hip and knee osteoarthritis, Part II: OARSI evidence-based, expert consensus guidelines. Osteoarthritis and Cartilage (2008) 16, 137-62.

"Average" Joe (cont)

- Psychological
  - Empower your patients through self-help and self-driven treatments
- Bracing
  - Walking aids/supportive bracing helpful in those with deformity and/or instability
- Pharmacologic
  - Glucosamine/Chondroitin, Tylenol, NSAIDs, Topicals, Opioids, IA corticosteroids, IA viscosupplementation, PRP, prolotherapy, Stem Cells,…
- Surgical Modalities
  - Arthroscopy
  - Replacement arthroplasties
    - Effective, Cost-effective

“Average” Joe

- We’re all athletes

References

- http://www.radiopaedia.org/
- ACR OA Guidelines; summary of findings. Non-pharmacologic Modalities for Hip and Knee OA. Sept 2009.
- Chevalier X et al. Biologic agents in osteoarthritis: hopes and disappointments. Nature Reviews Rheumatology 9, 400-410 (July 2013).
- Dillon CF, Rasch EK, Gu Q, Hirsch R. Prevalence of knee osteoarthritis in the United States: arthritis data from the Third National Health and Nutrition Examination Survey 1991–1994. J Rheumatol, 2006;33(11):2271-2279.
- Ekelund U et al. Physical activity and all-cause mortality across levels of overall and abdominal adiposity in European men and women: the European Prospective Investigation into Cancer and Nutrition Study (EPIC). Am J Clin Nutr doi: 10.3945/ajcn.114.100065.
- Helfgott et al. Evaluation of the adult with monoarticular pain. UpToDate
- Iijima H, Aoyama T, Ito A, Yamaguchi S, Nagai M, Tajino J, Zhang X, Kuroki H, Effects of short-term gentle treadmill walking on subchondral bone in a rat model of instability-inducedosteoarthritis, Osteoarthritis and Cartilage (2015), doi: 10.1016/j.joca.2015.04.015.
- Iwamoto J et al. Effectiveness of exercise for osteoarthritis of the knee: A review of the Literature. World J Orthop 2011 May 18; 2(5): 37-42.
- Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. Arthritis Rheum. 2008;58(1):26-35
- March et al. Burden of Disability due to Musculoskeletal (Msk) Disorders. Best Practice & Research Clinical Rheumatology 28 (2014) 353-366.
- Richie et al. Diagnostic Approach to Polyarticular Joint Pain. AAFP 2003
- Sacks JJ, Luo Y-H, Helmick CG. Prevalence of specific types of arthritis and other rheumatic conditions in the ambulatory health care system in the United States, 2001–2005. Arthritis Care & Research. 2010;62 (4):460-464.
- Shmerling et al. Evaluation of the adult with polyarticular pain. UpToDate
- Siva et al. Diagnosing acute monoarthritis in adults: A practical approach for the family physician. AAFP 2003
- Zhang W et al. OARSI recommendations for the management of hip and knee osteoarthritis, Part II: OARSI evidence-based, expert consensus guidelines. Osteoarthritis and Cartilage (2008) 16, 137-62.

Thank You

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Aaron Vaughan, MD

MAHEC/Mission Sports Medicine

aaron.vaughan@mahec.net

http://mahec.net/patient-information/family-health/sports-medicine

330-904-9273

@DrAJVaughan

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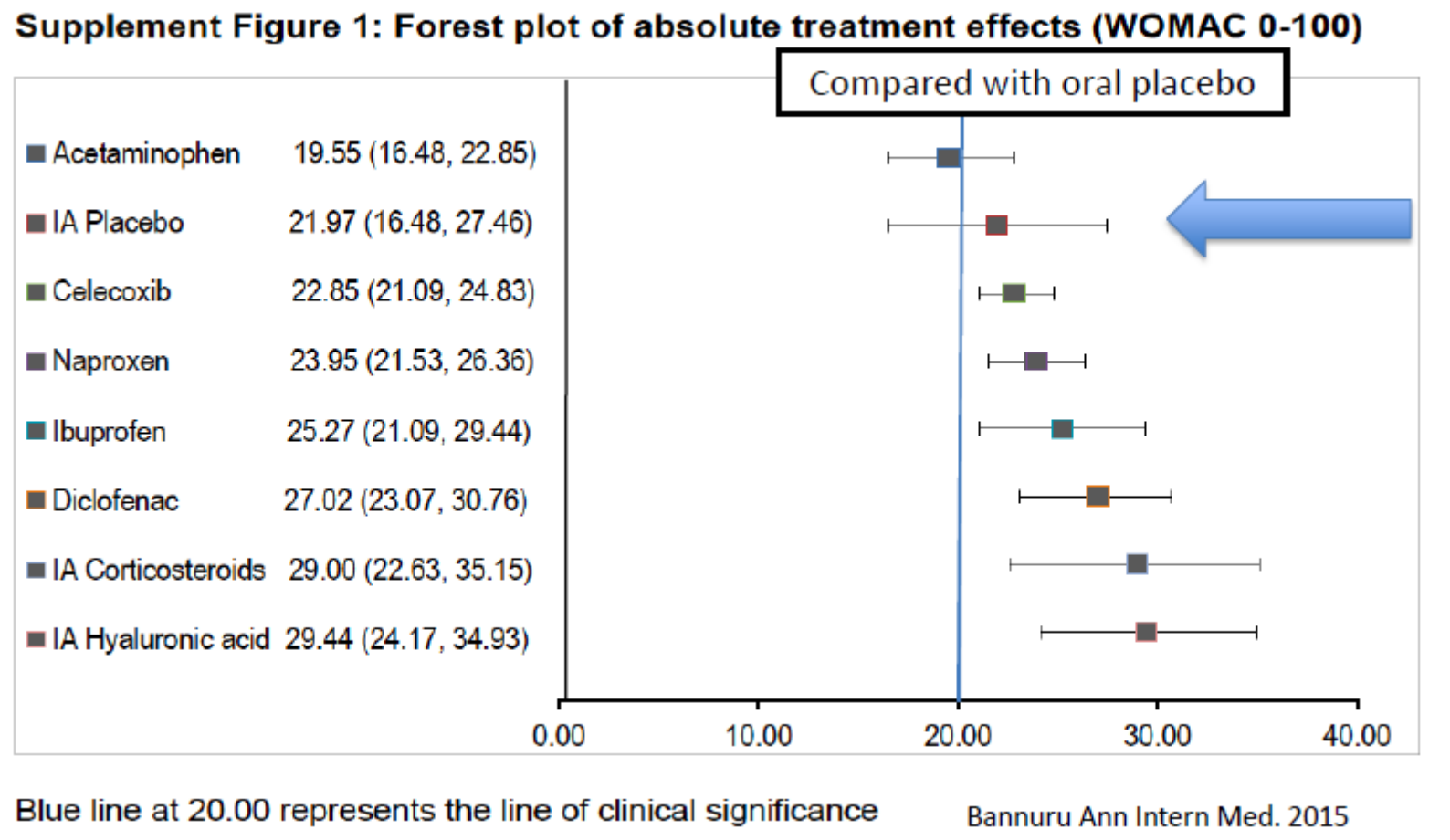
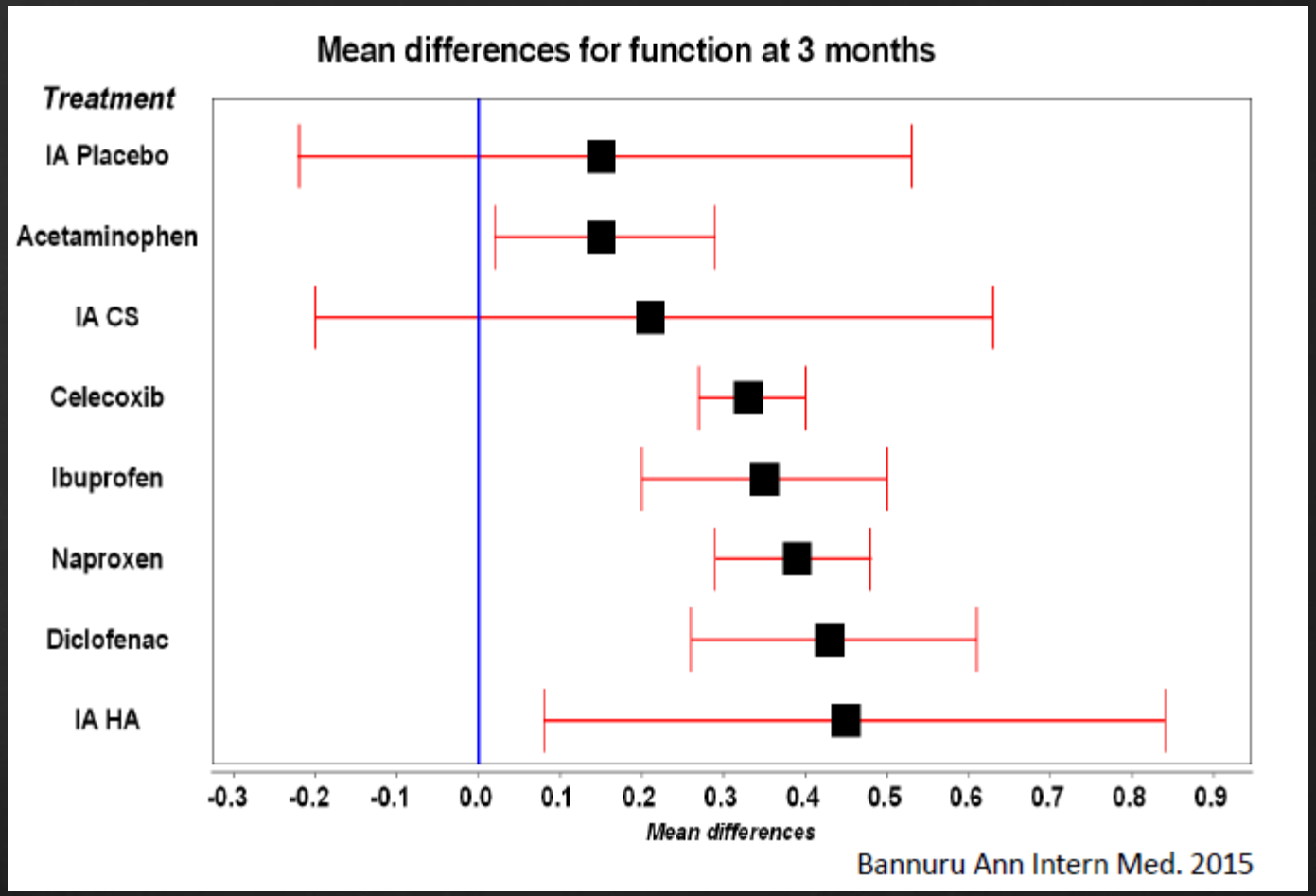
Conversation Pieces

- Pharmacologic Management Oral/Injectable Pain Improvement



Conversation Pieces

- Pharmacologic Management Oral/Injectable Function



Conversation Pieces (cont)

- Arthroscopy, Degenerative Meniscus Tears

Arthritis Rheum. 2009 March ; 60(3): 831–839. doi:10.1002/art.24383.

Meniscal Tear in Knees Without Surgery and the Development of Radiographic Osteoarthritis Among Middle-Aged and Elderly Persons:

The Multicenter Osteoarthritis Study

Martin Englund, MD, PhD[1], Ali Guermazi, MD[2], Frank W. Roemer, MD[3], Piran Aliabadi, MD[4], Mei Yang, MS[5], Cora E. Lewis, MD, MSPH[6], James Torner, PhD[7], Michael C. Nevitt, PhD[8], Burton Sack, MD[5], and David T. Felson, MD, MPH[5]