Knee Osteoarthritis: Prediction & Prevention
A Product of Brenau DPT Cadaver Case Studies

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Leading cause of disability in the US.
- Knee OA
  - Total population:
    - 40% in men
    - 47% in women

OA Most commonly diagnosed disease in general practice
- Projected to double by 2020
  - 21 million in 1995 → 27 million in 2005

What’s your lifetime risk for developing symptomatic knee OA? Murphy et al

Modifiable Local Risk Factors
1. Muscle strength
2. Physical activity / occupation
3. Joint injury
4. Joint alignment
5. Leg length inequality

Susceptible Joint

Modifiable Systemic Risk Factors
1. Obesity
2. Diet
3. Bone Metabolism

Non-Modifiable Systemic Risk Factors
1. Age
2. Sex
3. Genetics
4. Ethnicity

Predisposed Individual

Increased risk of incident OA

Knee OA: Prediction & Prevention

Can we identify clients at risk for knee OA (developing or progressing)?

“...individuals who present with these symptoms may not demonstrate radiographic OA, while others who have been confirmed to have OA using radiographic techniques may not present with clinical manifestations of the disease.” Kerkof et al

“Easily obtainable questionnaire variables, genetic markers, OA at other joint sites and biochemical markers add only modestly to the prediction of knee osteoarthritis incidence using age, gender and BMI in an elderly population.” Kerhof et al

“One of the major impediments to bringing new treatment to the patient is the limited capacity to detect the risk of developing OA at a stage where the course of the disease can be modified” Andriacchi et al

OA Systems Model- Andriacchi et al

- Biology: Cell metabolism, levels of systemic inflammation, genetic etiologies
- Mechanics: Gait
- Structure: Joint alignment, boney change, cartilage thickness/shape, ligament properties

“...it is the relative balance between the changes in the biological, mechanical and structural components that determine progression of clinical OA.”

Gait: Favre et al- Study on kinematic differences in gait. 110 subjects
29 Yasyym; 27 Oasyym; 28 OmodOA; 26 OsevOA

Hypothesis:
H1- Sagittal plane knee function during walking is different between a younger and older group of asymptomatic subjects.
H2- The age-related differences in H1 are increased in patients with moderate OA compared to asymptomatic subjects and are increased in severe OA compared to moderate OA
Gait Mechanics: Favre et al

Findings:
- At Heel Strike:
  - Less Knee Extension: PT’s ask why?
  - Less Backward Shank Inclination
  - Less Posterior Femoral Displacement: PT’s ask why?

PS: Just happens same changes found in obese and knee joint trauma clients prior to development of OA!

And how might this effect the cartilage?

FIGURE 3. The individual patterns of cartilage thickness distribution can influence the sensitivity of cartilage health to kinematic changes (Andriacchi, Koo, Scanlan) since relatively small kinematic changes can move contact to substantially different regions. The gradients in cartilage thickness distribution can be relatively large in the load bearing regions as illustrated by the 2d projection on the right.

References