Biomechanical Knee Joint Loading of Tai Chi in Knee Osteoarthritis: Form by Form Analysis, Biofeedback Approach

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Knee Osteoarthritis

- Breakdown of cartilage in the knee joint causing pain and stiffness
- Medial Knee OA is most common
- No cure
  - Researchers looking for ways to slow progression
**Knee Osteoarthritis: Mechanical Factor**

- Medial knee OA is attributed to increased mechanical loading within the medial compartment of the knee joint
  

- Increased mechanical loading within the medial compartment has been associated with cartilage defects and medial cartilage loss

Treatments

- American College of Rheumatology (ACR) treatment recommendations for Knee OA:
  - Pharmacologic
  - Non-Pharmaceuticals

- Exercise has been shown to decrease pain and stiffness, and should be incorporated into every patient's treatment plan\(^3\)

- Exercise must be beneficial overall, and not be harmful to the joint with OA

Tai Chi Exercise

- Complimentary Alternative Medicine (CAM) is becoming more popular in the US

- Tai Chi exercise has shown positive results in reducing knee pain and stiffness associated with knee OA⁴

- It is thought that Tai Chi strengthens muscles around the knee joint, leading to increased joint stability and reductions in pain⁵

- The **Biomechanical Reasons** for this reduction in pain are unknown

What is Tai Chi?
Measuring Medial Knee Load

- External Knee Adduction Moment (EKAM)
  - The parameter that is measured to determine medial knee joint load

- EKAM forces the knee in varus deformation placing increased load within the medial compartment

- Disease severity and rate of progression are strongly associated with peak EKAM\(^6\)

Study 1: External Knee Adduction Moment

Normal Knee Joint

Knee Joint with Knee OA
Motion Analysis Lab Set Up
Study 1 Results: Biofeedback Approach
Conclusion

• **Tai Chi exercise shows different mechanical loading pattern on EKAM.**

• **Tai Chi exercise needs to be targeted to modifying biomechanical movement strategies to optimize knee joint function**
Thank you