

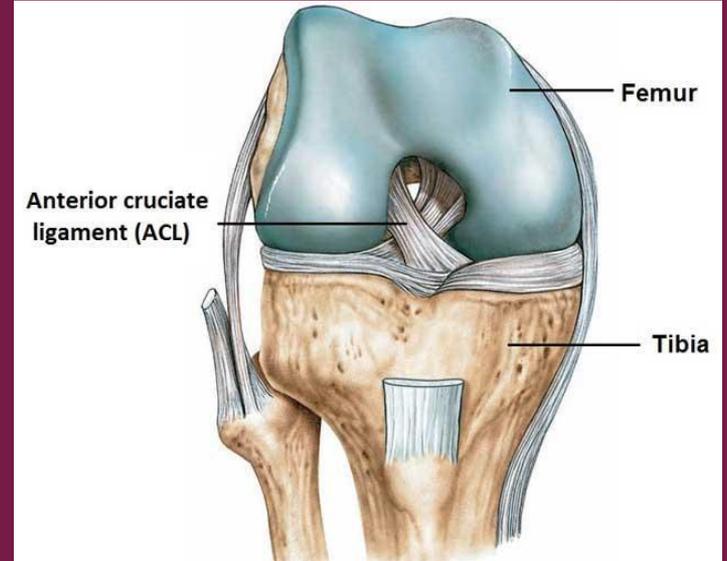
Critical Appraisal of
*“The Menstrual Cycle,
Sex Hormones, and
Anterior Cruciate
Ligament Injuries”*

By Megan Tomlin

Anterior Cruciate Ligament (ACL)

Main Functions:

- multi planar stability of the knee (mostly in the sagittal plane)
- guides to a natural movement between the tibia and femur
- proprioception of the knee

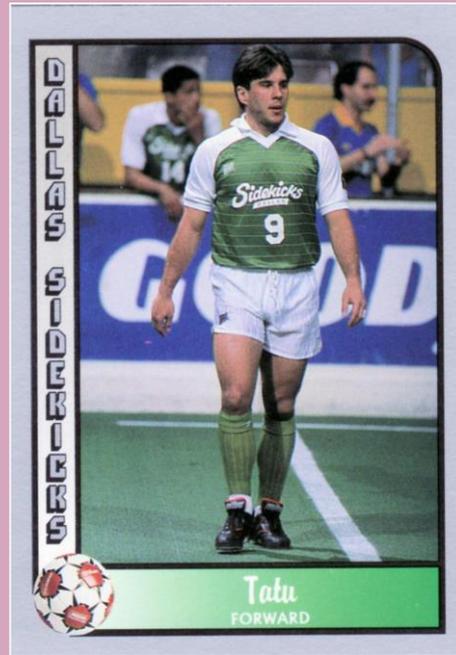


Effects of a Ruptured ACL

- Increase in hyperextension
- Anterior translation (extended knee)
- Increase in internal and external rotation (knee extended)
- Increase in external rotation with knee in mid flexion
- Anterolateral instability with an increase in anterior translation in flexion

Who's at Risk?

- Females vs Males
- Athletes vs Nonathletes
- Previous Injury vs None



Introduction

- Females injure their ACL's more frequently than males participating in similar athletic activities. This sex discrepancy is likely multifactorial
- This article predicts that ACL injury is more likely to occur at a certain time during the menstrual cycle.

Methods

- 38 athletes with ACL injuries participated in the study
- Each participant completed a questionnaire defining their ACL injury, last menstrual period, prior knee injury, school, and type of birth control (if used).
- When injured, each athlete provided a saliva sample within 72 hours of injury.
- Physical examination, MRI, and (if needed) surgery confirmed the injury in all subjects.

Results

- Among all 37 athletes for whom data were analyzed:
 - 25 injured their ACLs during the follicular phase
 - 11 during the luteal phase
 - 1 during ovulation
- Among the 27 athletes who self-reported their menstrual histories, 10 sustained injuries during the few days before and the first 2 days after the onset of menses

Conclusion

- This is the first study to confirm self-reported menstrual histories with salivary sex-hormone profiles at the time of ACL injury.
- 26 out of 37 athletes tore their ACLs during the follicular phase of the menstrual cycle
- 10 of the 27 injuries occurred during the few days before and the 2 days after the onset of menses
- At this time two particular hormones are very high: E2 and P
- Injuries are more likely during the late luteal and early follicular phases of the cycle

Clinical Significance

- Not sure why ACL injuries occur around the time of menses, but current research is investigating the different sex hormones present in ACL tissue remodeling.
- Currently, this study has led the researchers to believe that E2 and P may alter expression of genes encoding tissue-remodeling enzymes and proteins.
- If a molecular basis for sex differences in ACL injury is found, treatments may be instituted to decrease the injury rates in females.

Personal Comments : Introduction

Strengths

- The article was well written and included several licensed PT's, MD's, and PhD individuals
- Accredited by the National Athletic Trainers Association
- Went into great detail about saliva samples and availability for those that want to recreate the study
- Demonstrated how others have not done the same experiment

Weaknesses

- The article did not explain ACL injuries enough, just vaguely spoke of the occurrence in females more than males.
- It went off topic in appraising it's own question instead going into great detail about the comparisons with other articles
- Did not explain the phases of the menstrual cycle

Personal Comments : Methods

Strengths

- Providing saliva samples to make sure the information given by the athletes were correct.
- Thorough examination of the injury and follow up to see if the extent of the injury matched the requirements of the study

Weaknesses

- One member dropped out due to a hysterectomy during the study.
- Did not explain the methodology of the computerized control study that they used to compare the athletes.
- One hormone cannot unequivocally define the day of the menstrual cycle

Personal Comments : Results

Strengths

- Those participants that did not provide completely accurate medical histories were corrected by the salivary sample.

Weaknesses

- Same problem that has been occurring: did not explain in enough detail the extent of the study.
- Explain the extent of the injury: complete tear, sprain, etc.
- Contact or non-contact injury

Personal Comments : Conclusion

Strengths

- Had nice representations of the comparisons between different phases of the cycle
- Explained in great detail what this impact going forward in future studies would be.

Weaknesses

- Computer-simulated control group cannot always be an indicator of ACL injuries of non-athletes
- Past studies of the correlation between salivary and serum sex-hormone measurements have conflicting results.

Favor / Against ?

- I'd be in favor for future research to confirm that the ACL has specific hormones in the remodeling or original tissue that could possibly be suppressed in athletes in order to prevent injuries.
- INFORM, INFORM, INFORM.