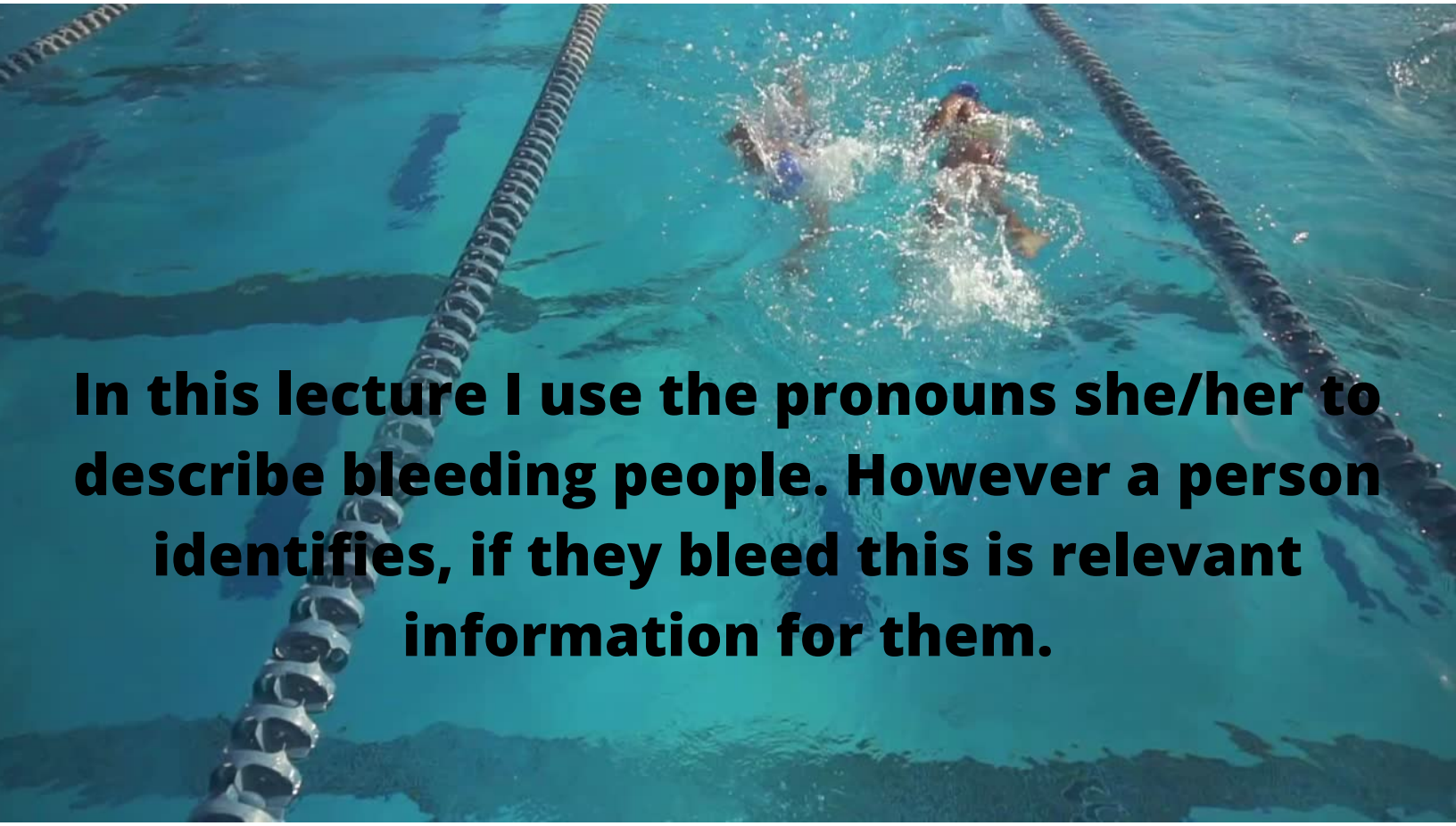
TREATING THE BLEEDING ATHLETE

GISELLE FOSS, DC

COURSE OUTLINE

1. Introduction About Me
2. Menstruation Concepts
3. "Normal" Menstrual Cycle
4. Hormone Refresher
5. Menstrual Cycles and TCM
6. Research on cycle phase and injury in the athlete
7. Cyclical Fascia Changes and the athlete
8. How birth control can affect the menstrual cycle and the body of an athlete
9. Training the athlete with their cyclical body
10. How to teach your athlete to track their cycle
11. Conclusion



In this lecture I use the pronouns she/her to describe bleeding people. However a person identifies, if they bleed this is relevant information for them.

My Story

I heard the call and followed it

TROVE MENSTRUAL HEALTH

Sacred Cycle Support

"The term *Tian Gui* is impossible to translate because *Tian Gui* means 'heaven' or 'heavenly'.... The fact that the term for *Tian Gui* refers to 'Heaven' is significant: it refers to the fact that women's menstrual cycle is influenced by cosmic cycles."
-Maciocia

menstruation noun

Save Word

men·stru·a·tion | \ ˌmen(t)-strü-ˈwā-shən, men-ˈstrā- \

Definition of *menstruation*

: a cyclical discharging of blood, secretions, and tissue debris from the uterus that recurs in nonpregnant breeding-age primate females at approximately monthly intervals and that is considered to represent a readjustment of the uterus to the nonpregnant state following proliferative changes accompanying the preceding ovulation

YOUR MENSTRUAL CYCLE IS NOT JUST YOUR PERIOD.

BLEEDING BODIES ARE NOT THE SAME EVERY WEEK.

WHAT IS A "NORMAL CYCLE"

- A "normal" cycle is between 24-32 days
- Bleeding lasts 3-5 days
- Blood loss is 10mL to 80mL

HORMONES CONTROL ALMOST EVERY ASPECT OF OUR HUMAN EXPERIENCE.

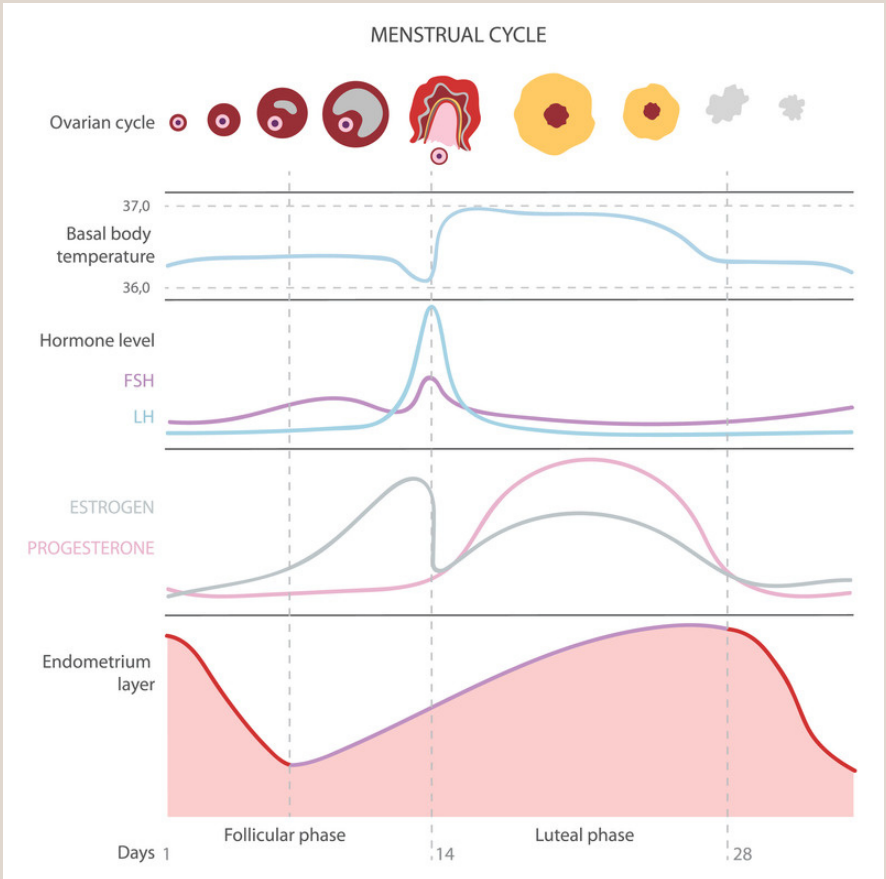
HORMONES PNEUMONIC

HORMONES

ESTROGEN

LUTENIZING HORMONE/ FOLLICLE STIMULATING HORMONE

PROGESTERONE



ESTROGEN

- THERE ARE 3 TYPES OF ESTROGENS IN YOUR BODY:
  - ESTRIOL, ESTRADIOL, AND ESTRONE.

- ESTROGEN IS MOST COMMONLY PRODUCED BY YOUR OVARIES, BUT SMALL AMOUNTS CAN ALSO BE CREATED BY YOUR ADRENAL GLANDS AS WELL AS FAT CELLS.

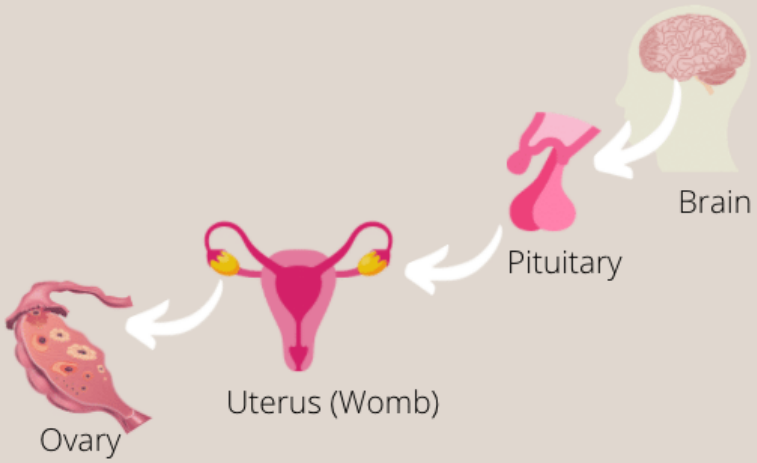
- THE MAIN ROLE IT PLAYS IN YOUR MENSTRUAL CYCLE IS TO HELP YOUR UTERINE WALL REGROW AFTER YOUR BLEED SO THAT AN EGG MAY HAVE A SOFT, SAFE SPACE TO IMPLANT IF CONCEPTION OCCURS.

- THE FIRST HORMONE TO RISE IN THE BEGINNING PART OF YOUR MENSTRUAL CYCLE. SHE RISES AROUND DAY 8 OF YOUR CYCLE.

- ESTROGEN DOES SO MUCH MORE THAN JUST PLAY A ROLE IN YOUR REPRODUCTIVE SYSTEM.
  - HELPS KEEP YOUR HEART HEALTHY BY RAISING HDL, WHICH IS THE CHOLESTEROL YOU WANT!
  - HELPS KEEP YOUR BONES STRONG.
  - AFFECTS YOUR MOOD.
  - AFFECTS COGNITION.
  - AFFECTS YOUR HAIR AND SKIN.
  - AFFECTS BREAST TISSUE.

LUTENIZING HORMONE

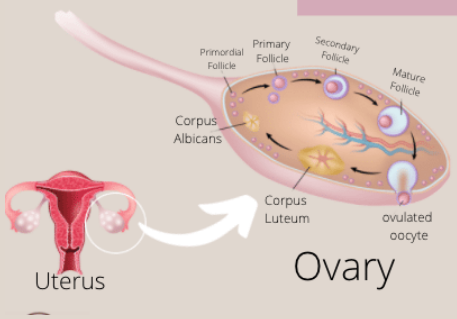
When your body is ready to ovulate, your pituitary gland produces LH. When it is released, it surges and triggers the release of an egg from your ovary.



FOLLICLE STIMULATING HORMONE

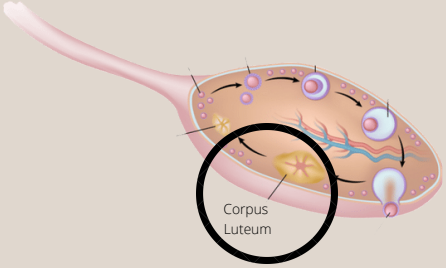
Follicle Stimulating hormone is abbreviated as FSH. She has a lot of similarities to LH. She is also released from the pituitary gland and rises at the time of your ovulation. The job of FSH is to get an egg ready for ovulation by stimulating the growth of a **follicle** in your ovary.

Follicles are tiny fluid filled sacs who live inside of your ovaries and secret hormones that influence your menstrual cycle (like estrogen). Each follicle has the potential to release an egg during ovulation.



PROGESTERONE

- Progesterone's job is to help your womb get ready to get pregnant! Progestrone makes sure that your uterus is ready for an embryo to implant in the linining of your uterine wall.
- Progesterone is dominant in the second half of your cycle and she makes you feel calm, reduces your anxiety, and helps you fall soundly asleep at night.
- Helps protect your breasts and uterus from cancers.
- Progesterone is created by the corpus luteum (this is in your ovary) which is created at ovulation.



TESTOSTERONE

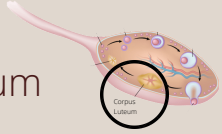
- When we hear testosterone, we usually think of a man. BUT we need testosterone too! Our ovaries produce our testosterone along with our adrenal glands. We don't have nearly as much testosterone as a male has, but having normal testosterone levels is extremely important for us.

- Testosterone helps with bone strength, brain speed, good moods, boosts confidence, energy, and libido.

I'll take all of that please!

RELAXIN

- Most well known for facilitating vaginal labor
  - increases laxity of ligaments in the pelvis for child birth
- Member of the insulin-like family
- 3 types of relaxin:
  - Relaxin-1 & Relaxin-2
    - regulate expression of collagen, fibroblast metabolism, and changes in the corpus luteum, decidua, and endometrium
    - Relaxin-2: present in non-pregnant females and linked to cyclical changes of connective tissue that alter the mechanical properties of ligaments, tendons, muscles, and cartilage
      - Produced primarily by the corpus luteum



  - Relaxin-3
    - specific to the brain

THYROID HORMONE

- Arguably one of THE MOST important hormone when it comes to irregular menstrual cycles. When your thyroid is out of whack, everything is out of whack.
- When thinking about your thyroid, there are three things you need to remember: T3, T4, and TSH.
    - T4 is the inactive form of Thyroid Hormone and needs the help of your gut, kidneys, and liver to convert into active T3.
    - T3 manages your mood, energy, and metabolism. Too low T3 can lead to irregular menses. Low thyroid hormone is associated with infertility, miscarriages, digestive disorders, hair loss, and skin disorders.
- When you are getting your athlete bloodwork to check their thyroid levels, make sure you are ordering for T3, T4, and TSH levels. You need to see all 3 thyroid levels to get the full picture of what is going on.

PHASES OF THE MENSTRUAL CYCLE

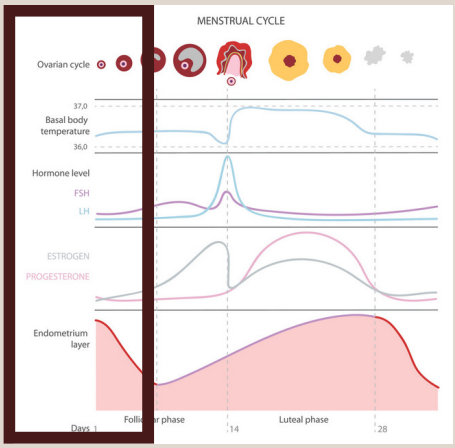
In order:

1.Menstrual
2. Follicular
3.Ovulation
4. Luteal

In TCM, each element corresponds to a menstrual phase, a color, flavor, season, form of movement, etc.

MENSTRUAL PHASE

- The menstrual phase is when we are actively bleeding; this is our period!
- The first day that you start bleeding is Day 1 of your menstrual cycle and we keep counting up in numbers until we start bleeding again.
- The fall of progesterone triggers our endometrium (uterine lining) to start shedding; this is our menstrual blood! (Tian Gui)



Menstruation

INNER WINTER

Day 1

ELEMENT: WATER
EMOTION: FEAR
YIN ORGAN: KIDNEYS
YANG ORGAN: URINARY BLADDER

EXERCISE: GENTLE STRETCHING/SLOW WALKING
ENERGETICS: REST AND REFLECTION
FLAVOR: SALTY
NUTRITION: BONE BROTHS AND WARMING FOODS

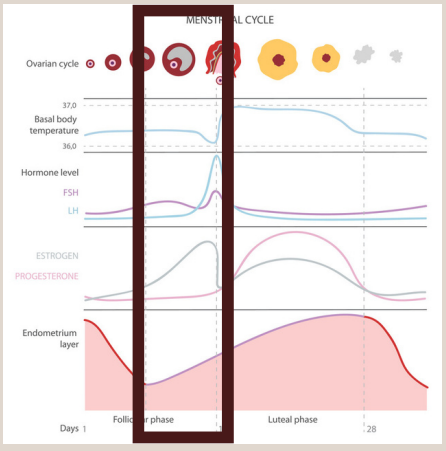
FOLLICULAR PHASE

- This is from the point you stop bleeding up until you ovulate.

During this time, you might notice a rise of energy, productivity, and inspiration! Optimize on your energy!

- The energetics of our follicular phase is rising; this is our inner spring. This is when you want to plan, prepare, and get organized.

- Estrogen rises in our follicular phase.
- Characterized by the growth of follicles
  - As follicles mature, they secrete increasing amounts of estradiol
    - estrogens start the formation of new endometrium layer
    - estrogens stimulate the cervix (crypts) to produce fertile cervical mucous
- Cycle day 5-13 in a perfect world



Follicular Phase

INNER SPRING

EXERCISE: YOGA TO KEEP WOOD FLEXIBLE IN THE WIND

ELEMENT: WOOD
EMOTION: ANGER
YIN ORGAN: LIVER
YANG ORGAN: GALLBLADDER

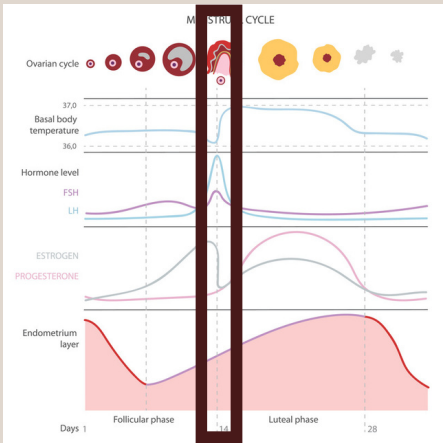
ENERGETICS: RISING & PRODUCTIVE

FLAVOR: SOUR

NUTRITION: EAT LIGHT; NUTS, SPROUTS, SALADS

OVULATION

- When the body has reached peak estradiol levels, a sudden release of LH from the pituitary start ovulation
- Ovulation is the time when you are the most fertile
- Hormonal surge lasts approximately 48 hours
- Release of LH matures the egg, starts the process to release an ovum, if not fertilized it dissolves in the fallopian tube
- You may notice an increase in libido as well as a boost in confidence.
- This is our energetic peak! After this point we are gliding down the other side of our hormonal mountain.



Ovulation

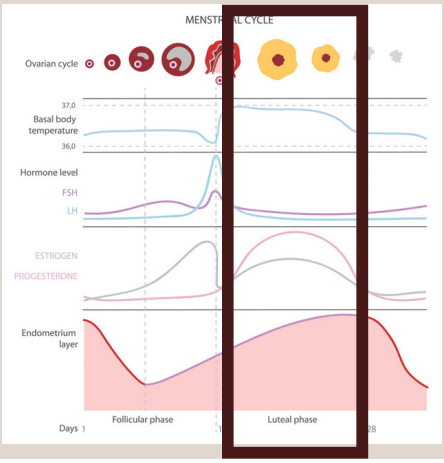
INNER SUMMER

ELEMENT: FIRE
EMOTION: JOY
YIN ORGAN: HEART
YANG ORGAN: SMALL INTESTINE

EXERCISE: HIIT; A LOT OF CARDIO BECAUSE FIRE RULES THE HEART
ENERGETICS: UP&OUT
FLAVOR: BITTER
NUTRITION: FRUITS AND VEGGIES; COLD IF FIRE EXCESS, HOT IF FIRE DEFICIENT

LUTEAL PHASE

- From ovulation to the bleed
- Lasts approximately 14 days
- During our luteal phase, our energy starts to decrease. This is perfectly normal.
- Allow the body to move a little bit slower and try to give yourself breaks to rest throughout the day.
- Our progesterone rises as we transition into this reflective phase as the corpus luteum produces it
- This is our inner fall and when you will notice some PMS.



Luteal Phase

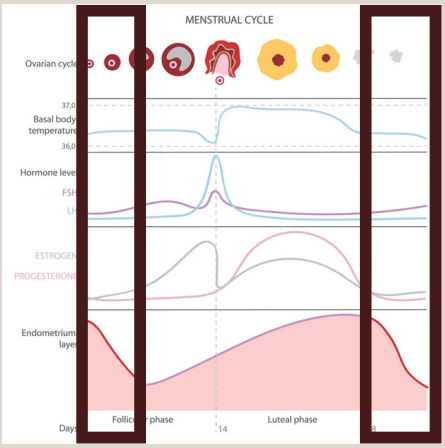
INNER AUTUMN

ELEMENT: METAL
EMOTION: GRIEF
YIN ORGAN: LUNG
YANG ORGAN: LARGE INTESTINE

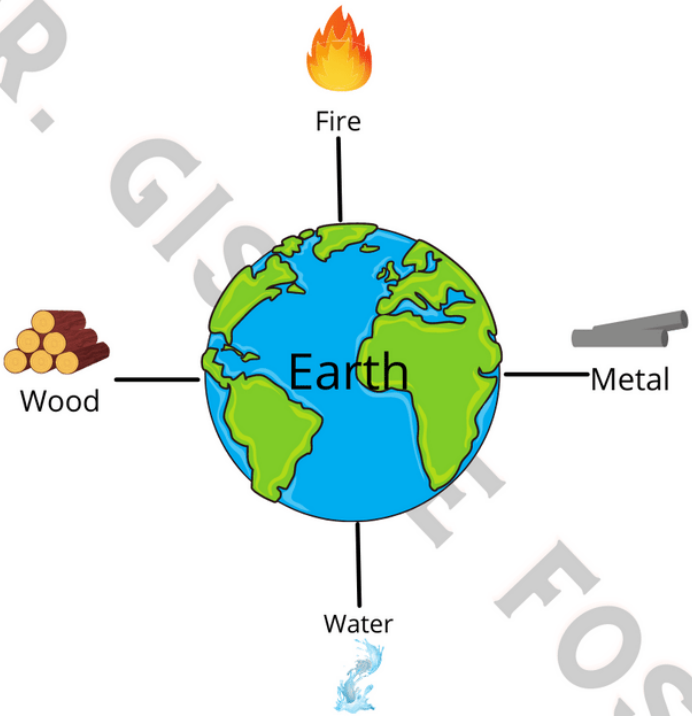
EXERCISE: WEIGHT TRAINING
ENERGETICS: FALLING
FLAVOR: SPICY
NUTRITION: ROOT VEGGIES AND HEARTY FOODS

BACK TO THE BEGINNING

- At the very end of our luteal phase, our progesterone levels will drop off allowing our bodies to start bleeding.



But where does Earth fit?

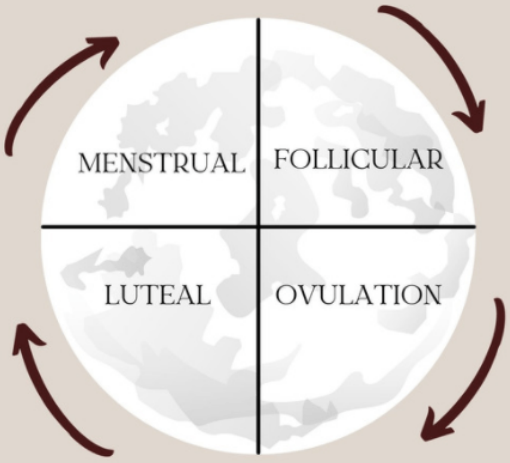


The In Between

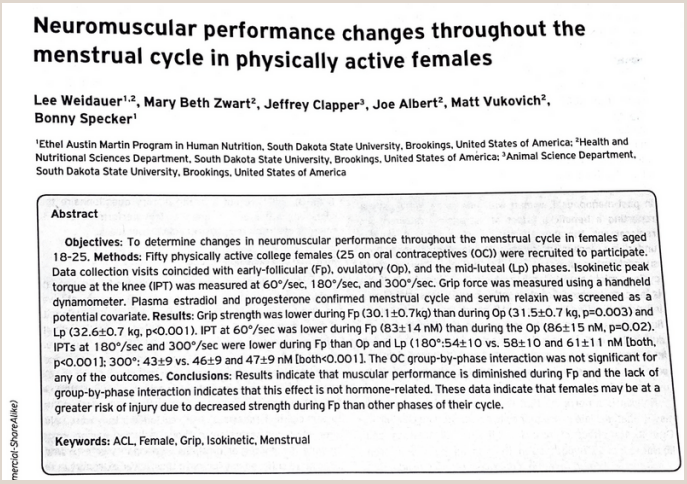
LATE SUMMER

ELEMENT: EARTH
EMOTION: WORRY
YIN ORGAN: SPLEEN
YANG ORGAN: STOMACH

EXERCISE: STABILIZING; STRENGHING LEG MUSCLES
ENERGETICS: HOLDING
FLAVOR: SWEET
NUTRITION: EATING MINDFULLY, SMART SUGARS, BLAND AND WARM FOODS



INJURIES AND HOW THEY PERTAIN TO MENSTRUAL CYCLES



Neuromuscular performance changes throughout the menstrual cycle in physically active females

Lee Weidauer[1,2], Mary Beth Zwart[2], Jeffrey Clapper[3], Joe Albert[2], Matt Vukovich[2], Bonny Specker[1]

[1]Ethel Austin Martin Program in Human Nutrition, South Dakota State University, Brookings, United States of America; [2]Health and Nutritional Sciences Department, South Dakota State University, Brookings, United States of America; [3]Animal Science Department, South Dakota State University, Brookings, United States of America

Abstract

Objectives: To determine changes in neuromuscular performance throughout the menstrual cycle in females aged 18-25. **Methods:** Fifty physically active college females (25 on oral contraceptives (OC)) were recruited to participate. Data collection visits coincided with early-follicular (Fp), ovulatory (Op), and the mid-luteal (Lp) phases. Isokinetic peak torque at the knee (IPT) was measured at 60°/sec, 180°/sec, and 300°/sec. Grip force was measured using a handheld dynamometer. Plasma estradiol and progesterone confirmed menstrual cycle and serum relaxin was screened as a potential covariate. **Results:** Grip strength was lower during Fp (30.1±0.7kg) than during Op (31.5±0.7 kg, p=0.003) and Lp (32.6±0.7 kg, p<0.001). IPT at 60°/sec was lower during Fp (83±14 nM) than during the Op (86±15 nM, p=0.02). IPTs at 180°/sec and 300°/sec were lower during Fp than Op and Lp (180°:54±10 vs. 58±10 and 61±11 nM [both, p<0.001]; 300°: 43±9 vs. 46±9 and 47±9 nM [both<0.001]. The OC group-by-phase interaction was not significant for any of the outcomes. **Conclusions:** Results indicate that muscular performance is diminished during Fp and the lack of group-by-phase interaction indicates that this effect is not hormone-related. These data indicate that females may be at a greater risk of injury due to decreased strength during Fp than other phases of their cycle.

Keywords: ACL, Female, Grip, Isokinetic, Menstrual

2020

Fifty active college females ages 18-25 had their grip force (dynamometer) tested during different phases of their menstrual cycle

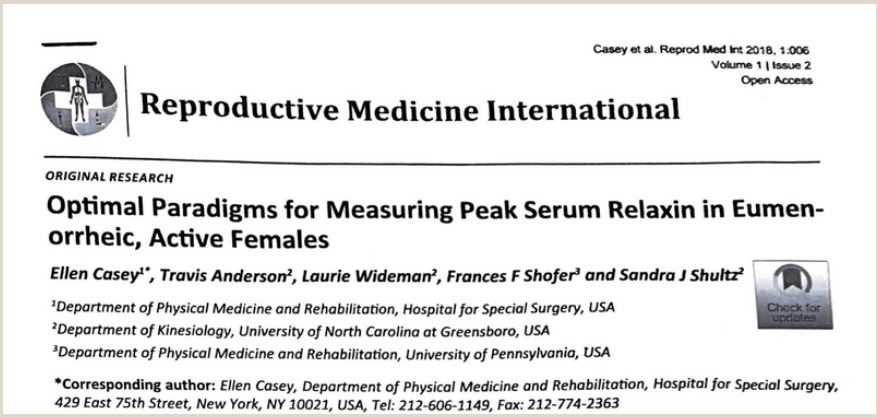
Conclusion: "Grip strength and peak torque were lower during the early-follicular phase than the ovulatory and mid-luteal phases."

"Muscular performance is diminished during folliculuar phase. " "These data indicate that females may be at a greater risk of injury due to decreased strength during follicular phase than other phases of their cycle"

Not hormone related

- "Female athlete appear to be at a greater risk for ACL injuries than male athletes"
- "Female basketball players tear their ACL at almost 3x the rate of men"
- "Studied indicate knee joint laxity and menstrual cycle phases"
- "Injury rates may fluctuate based on hormonal changes that occur throughout the menstrual cycle"

2018



Casey et al. Reprod Med Int 2018, 1:006
Volume 1 | Issue 2
Open Access

Reproductive Medicine International

ORIGINAL RESEARCH

Optimal Paradigms for Measuring Peak Serum Relaxin in Eumenorrheic, Active Females

Ellen Casey[1], Travis Anderson[2], Laurie Wideman[2], Frances F Shofer[3] and Sandra J Shultz[2]*

[1]Department of Physical Medicine and Rehabilitation, Hospital for Special Surgery, USA
[2]Department of Kinesiology, University of North Carolina at Greensboro, USA
[3]Department of Physical Medicine and Rehabilitation, University of Pennsylvania, USA

***Corresponding author:** Ellen Casey, Department of Physical Medicine and Rehabilitation, Hospital for Special Surgery, 429 East 75th Street, New York, NY 10021, USA, Tel: 212-606-1149, Fax: 212-774-2363*

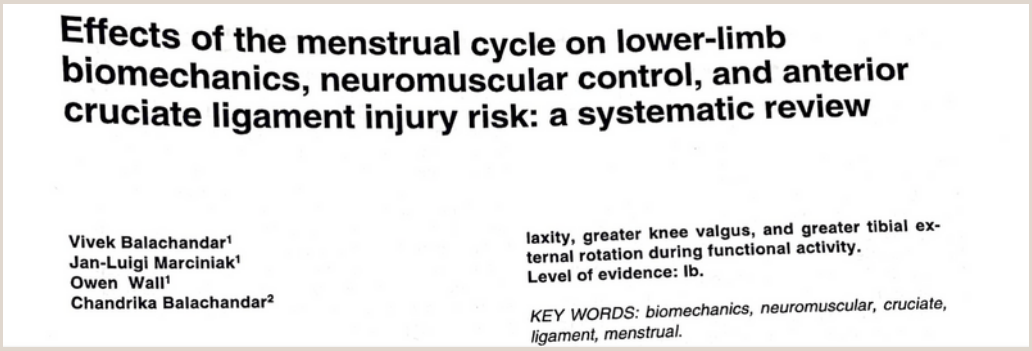
Abstract

Purpose: Sex disparity in anterior cruciate ligament injury is multifactorial. Sex hormones, such as relaxin, may play a role in the increased risk of injury in female athletes. In order to fully investigate this relationship, optimal strategies for capturing serum relaxin concentration across the menstrual cycle must be determined. The aim of this study was to describe the variability in the timing and magnitude of relaxin concentration changes across the menstrual cycle.

Serum samples from 26 recreationally active women from one menstrual cycle were analyzed to determine relaxin levels throughout the menstrual cycle.

Conclusion: There is a significant change in relaxin levels throughout the menstrual cycle. Relaxin peaks occurred on average luteal days 9 or day 10 (approx. 3 days after peak progesterone).

2017



Effects of the menstrual cycle on lower-limb biomechanics, neuromuscular control, and anterior cruciate ligament injury risk: a systematic review

Vivek Balachandar[1]
Jan-Luigi Marciniak[1]
Owen Wall[1]
Chandrika Balachandar[2]

laxity, greater knee valgus, and greater tibial external rotation during functional activity.
Level of evidence: Ib.

KEY WORDS: biomechanics, neuromuscular, cruciate, ligament, menstrual.

Multiple scientific databases were evaluated to investigate the effects of the menstrual cycle on lower limb-biomechanics, neuromuscular control, and ACL injury risk.

Conclusion: "Females are at a greater risk of ACL injury during the pre-ovulation phase of the menstrual cycle through a combination of greater ACL laxity, greater knee valgus, and greater tibial external rotation during functional activity.

THE JOURNAL OF
Obstetrics and Gynaecology Research

Original Article

Oral contraceptive therapy reduces serum relaxin-2 in elite female athletes

Sayaka Nose-Ogura, Osamu Yoshino, Kaori Yamada-Nomoto, Mariko Nakamura, Miyuki Harada, Michiko Dohi, Toru Okuwaki, Yutaka Osuga, Takashi Kawahara, Shigeru Saito

First published: 27 December 2016 | https://doi.org/10.1111/jog.13226 | Citations: 8

Methods

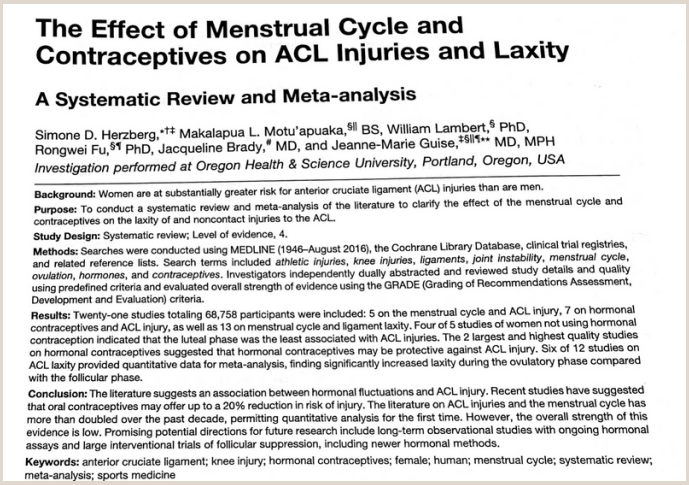
Levels of relaxin-2, estradiol, progesterone, luteinizing hormone and follicle-stimulating hormone were measured in serum samples (n = 183) from 106 elite female athletes. Five athletes with serum relaxin-2 concentrations > 6 pg/mL during the luteal phase were recruited to assess the effect of OC therapy.

Results

Serum relaxin-2 concentrations were significantly higher during the luteal phase (n = 57) than in the follicular phase (n = 72), or in athletes on OC therapy (n = 10) ($P < 0.001$, $P < 0.001$ and $P < 0.05$, respectively). In the luteal phase, 36.8% (21/57) of the athletes had relaxin levels > 6 pg/mL. In 23 athletes, serum relaxin-2 concentrations were measured during both the follicular and luteal phases, revealing that relaxin-2 levels were significantly higher in the luteal phase compared with the follicular phase. In 5 out of 23 athletes, serum relaxin-2 concentrations were > 6 pg/mL in the luteal phase and during the second cycle of OC therapy, relaxin-2 concentrations decreased dramatically to below the detection limit (0.26 pg/mL).

Conclusions

High serum relaxin-2 concentrations were only detected during the luteal phase. In athletes with high relaxin-2 concentrations during the luteal phase, OC therapy decreased serum relaxin-2 levels.



The Effect of Menstrual Cycle and Contraceptives on ACL Injuries and Laxity

A Systematic Review and Meta-analysis

Simone D. Herzberg,*†‡ Makalapua L. Motu'apuaka,§‖ BS, William Lambert,§ PhD, Rongwei Fu,§¶ PhD, Jacqueline Brady,# MD, and Jeanne-Marie Guise,‡§‖¶** MD, MPH

Investigation performed at Oregon Health & Science University, Portland, Oregon, USA

Background: Women are at substantially greater risk for anterior cruciate ligament (ACL) injuries than are men.

Purpose: To conduct a systematic review and meta-analysis of the literature to clarify the effect of the menstrual cycle and contraceptives on the laxity of and noncontact injuries to the ACL.

Study Design: Systematic review; Level of evidence, 4.

Methods: Searches were conducted using MEDLINE (1946–August 2016), the Cochrane Library Database, clinical trial registries, and related reference lists. Search terms included *athletic injuries*, *knee injuries*, *ligaments*, *joint instability*, *menstrual cycle*, *ovulation*, *hormones*, and *contraceptives*. Investigators independently dually abstracted and reviewed study details and quality using predefined criteria and evaluated overall strength of evidence using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) criteria.

Results: Twenty-one studies totaling 68,758 participants were included: 5 on the menstrual cycle and ACL injury, 7 on hormonal contraceptives and ACL injury, as well as 13 on menstrual cycle and ligament laxity. Four of 5 studies of women not using hormonal contraception indicated that the luteal phase was the least associated with ACL injuries. The 2 largest and highest quality studies on hormonal contraceptives suggested that hormonal contraceptives may be protective against ACL injury. Six of 12 studies on ACL laxity provided quantitative data for meta-analysis, finding significantly increased laxity during the ovulatory phase compared with the follicular phase.

Conclusion: The literature suggests an association between hormonal fluctuations and ACL injury. Recent studies have suggested that oral contraceptives may offer up to a 20% reduction in risk of injury. The literature on ACL injuries and the menstrual cycle has more than doubled over the past decade, permitting quantitative analysis for the first time. However, the overall strength of this evidence is low. Promising potential directions for future research include long-term observational studies with ongoing hormonal assays and large interventional trials of follicular suppression, including newer hormonal methods.

Keywords: anterior cruciate ligament; knee injury; hormonal contraceptives; female; human; menstrual cycle; systematic review; meta-analysis; sports medicine

2017

Searches were conducted across multiple databases to evaluate the effect of the menstrual cycle and contraceptives on ACL Injuries & Laxity

Conclusion: An associate between hormonal fluctuations and ACL Injuries. Oral contraceptives may offer a 20% more risk reduction of ligamentous injury. Literature suggests that ACL laxity and risk of injury may be increased in the ovulatory phase.

FASCIA

- Dr. Carla Stecco
- Fascia is influcened by sex hormones (specifically estrogen)
- fascia is much more active in the periovulatory phase compared to the follicular phase and the most active in pregnancy
- Collegen Type III ; motor adaptable (elastic) more in pregnancy and periovulatory than follciular phase and even less post menopausal
    - this increase in type III collagen creates more elasticity therefore leading to an increase in instability in joints
- Foot length is increased in ovulation compared to menstruation bc of the greater elasticity of fascia (study)
- Ovulation presents less of balance compared to mestruation (plantar fascia)

Clin Anat. 2019 Jul 17. doi: 10.1002/ca.23428. [Epub ahead of print]

Influence of Female Hormones on Fascia Elasticity: An Elastography Study.

Vita M[1], Sedlackova Z[1], Herman M[1], Furst T[1], Smekal D[2], Cech Z[3].

Author information

1 Departments and faculties of Medicine and Dentistry, University Hospital Olomouc, Palacky University Olomouc, Olomouc, Czech Republic.
2 Departments and faculties of Physical Education, Palacky University Olomouc, Olomouc, Czech Republic.
3 Second Faculty of Medicine, Department of Rehabilitation and Sports Medicine, Charles University in Prague, Prague, Czech Republic.

Abstract

The aim of this study was to examine the influence of hormonal changes during the menstrual cycle on deep fasciae. A total of 29 women, 17 users, and 12 nonusers of hormonal contraceptives were examined clinically and by ultrasound, including shear wave elastography, at two phases of the menstrual cycle. The thickness and elasticity of the fascia lata, thoracolumbar fascia, and plantar fascia were measured, compared between hormonal contraceptive users and nonusers, and correlated with clinical data. There were statistically significant differences between users and nonusers of hormonal contraceptives: the thoracolumbar fascia was thicker in nonusers (P = 0.011), and nonusers had higher maximal and mean stiffnesses of the fascia lata (P = 0.01 and 0.0095, respectively). Generally, nonusers had a higher body mass index (BMI). The elasticity of the thoracolumbar and the plantar fasciae did not differ significantly between the groups. We found no correlation between thickness and elasticity in the fasciae. There were no statistically significant differences in hypermobility, cephalgia, or dysmenorrhea between users and nonusers of hormonal contraceptives. The results of this pilot study suggest that deep fasciae can be evaluated by shear wave elastography. Nonusers of contraceptives had greater stiffness of the fascia lata and higher BMI. Clin. Anat., 2019.

CONTRACEPTIVES

- Oral
- IUD (copper or hormonal)
- Implant
- Injection
- Patch
- Vaginal Ring

CONTRACEPTIVES

- There is no menstrual cycle if a patient is utilizing hormonal contraceptives

CONTRACEPTIVE FACTS

- A study performed on sample size of over one million bleeding people concluded that women who were taking oral contraceptives were more like to also be prescribed and antidepressant. *Journal of the American Medical Association*
- There is a 300% increased risk of developing Crohn's disease while taking oral contraceptives
- Oral contraceptive usage has been liked to autoimmune and thyroid disorders
- Folate, B12, and magnesium deficiencies
- Increased risk of blood clots, cervical cancer, breast cancer, and liver cancer

POST BIRTH CONTROL SYNDROME

- Oral contraceptives shut down the communication between the brain and the ovaries
  - Acupuncture
  - Chinese Medicine
  - Quality Supplementation
  - Sufficient Diet

HOW CAN AN ATHLETE BE AWARE OF WHAT PHASE SHE IS IN?

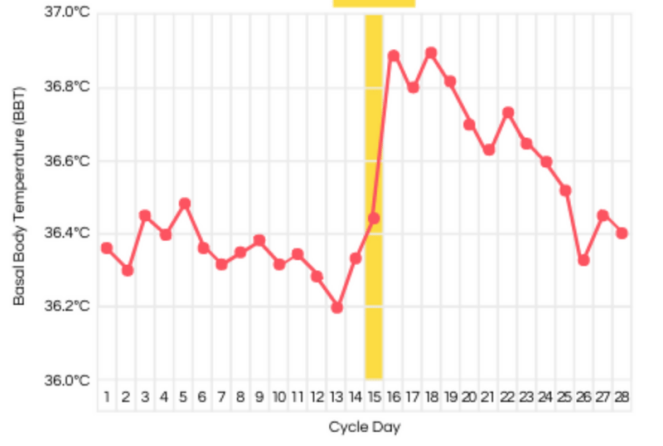
1. Cervical Mucous
2. Basal Body Temperature
3. Journal

CERVICAL MUCOUS

Bleed= Blood&Tissue
Follicular= watery/thin
Ovulation=sticky/eggwhite
Luteal= thick, creamy, white

BASAL BODY TEMPERATURE

- Your temperature when you are fully at rest
- Must be taken at the same time every morning between the hours of 4-7am



JOURNALING

- Date
- Cycle Day
- Mood
- Energy
- Emotions

THE BIG PICTURE

- Bleeding bodies change weekly
- To optimize female athlete performance is to educate her to train WITH her cycle
  - Bleed- REST (athlete's may not want to so think light activity; walking, gentle stretching....etc.)
  - Follicular- Focus on improving flexibility
  - Ovulation- Cardio (watch for ligamentous laxity)
  - Luteal- Lifting
- Bleeding athletes are prone to different injuries during different cycle phases:
  - i.e. her strength will be decreased & muscular performance will be lessened during follicular phase
  - her ligaments will be the most lax during ovulation/beginning of luteal phase

OTHER ATHLETE RELATED IDEAS

- ammennorhea
  - osteoporosis
- dysmennorhea
  - 33% of elite athletes with a BMI lower than 25 present with dysmennorhea
- painful periods
- back pain

Teaching bleeding people to live in tune with their bodies is such a potent gift and I have seen life-changing results in my patients.

Questions?

trovemenstrualhealth@gmail.com

Casey, E., Anderson, T., Wideman, L., Shofer, F., & Shultz, S. (2018). Optimal paradigms for measuring peak serum relaxin in eumenorrheic, active females. Reprod Med Int, 1(005).

Bani, D. (1997). Relaxin: a pleiotropic hormone. General Pharmacology: The Vascular System, 28(1), 13-22.

Nose-Ogura, S., Yoshino, O., Dohi, M., Kigawa, M., Harada, M., Kawahara, T., ... & Saito, S. (2020). Low bone mineral density in elite female athletes with a history of secondary amenorrhea in their teens. Clinical Journal of Sport Medicine, 30(3), 245-250.

Verrilli, L., Blanchard, H., Landry, M., & Stanic, A. (2018). Prevalence and predictors of oligomenorrhea and amenorrhea in division 1 female athletes. Fertility and Sterility, 110(4), e245.

BRIGHTEN, J. O. L. E. N. E. (2019). Beyond the pill: A 30-day plan to eliminate period problems, boost libido, improve mood, clear ... skin, and ditch the pill when you're ready. HARPER ONE.

Maciocia, G. (2011). Obstetrics and gynecology in chinese medicine. Churchill Livingstone.