HEALTH ISSUES OF FEMALE ATHLETE

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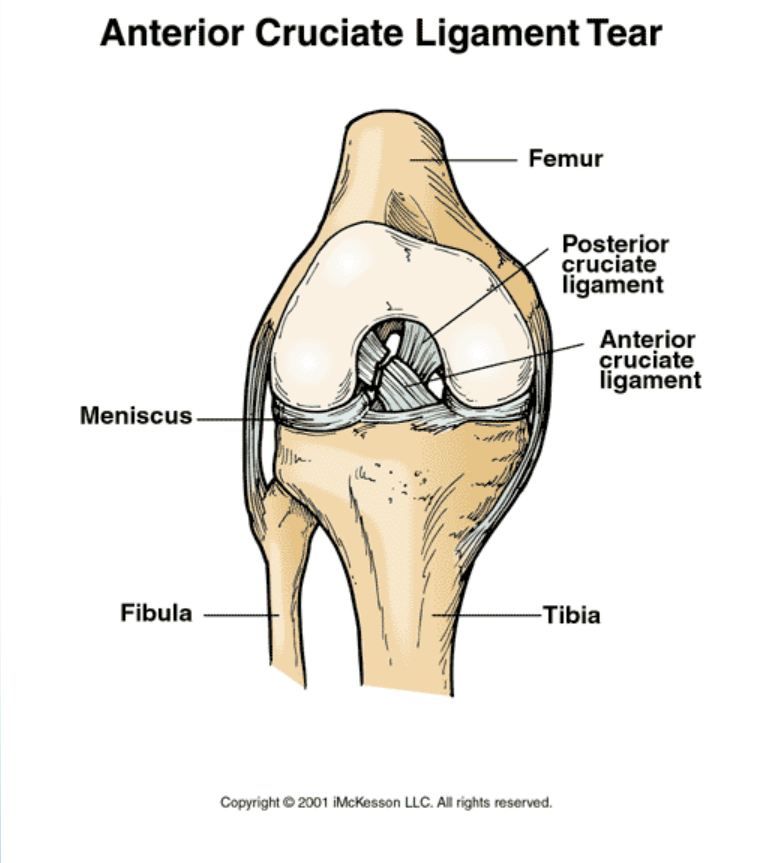
TOPICS TO BE DISCUSSED

- Sports injuries in female athletes
  - ACL tear
  - Patellofemoral joint pain
  - Stress fracture
- Menstrual cycle and exercise
  - Effects on sports performance
  - Exercise related menstrual dysfunction
  - Female Athlete Triad

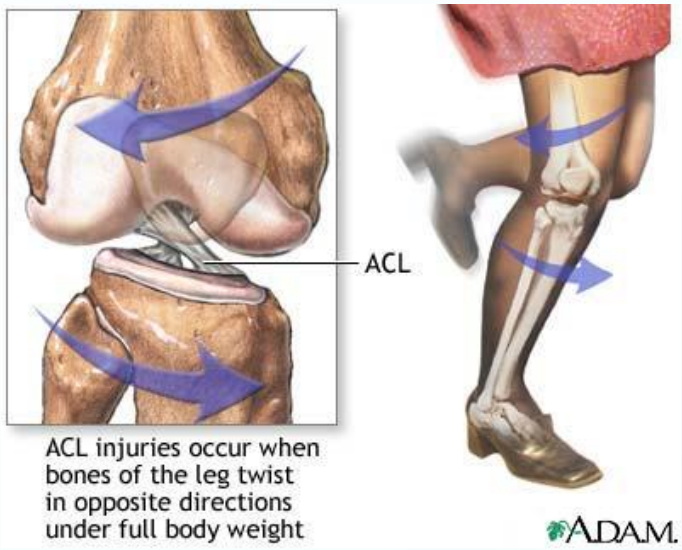
ANTERIOR CRUCIATE LIGAMENT

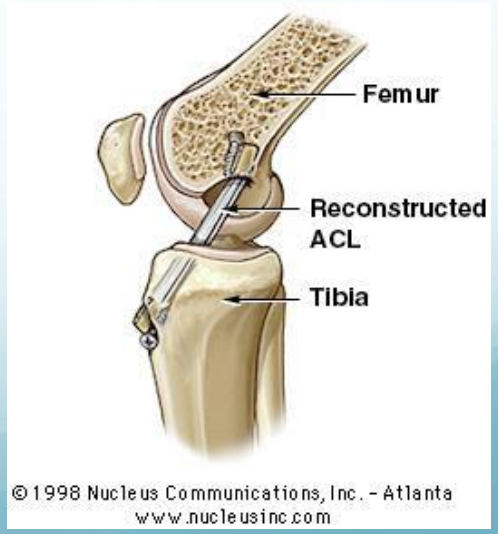
- Prevents femur from moving forward during weight bearing
- Prevents rotation of the joint
- Hamstrings and quadriceps co-activation



ACL TEAR

- 4-6 folds increase in female athletes
- Common in soccer, basketball, netball
- MECHANISM OF INJURY:
  - Contact (tackled by another player) vs non-contact (pivoting/cutting, sudden deceleration, landing from jump)
- TREATMENT
  - Reconstructive surgery
- RISK OF OSTEOARTHRITIS





ACL TEAR – RISK FACTORS

- Intrinsic factors:
  - Hormones
  - Ligament size
  - Intercondylar notch size

- Extrinsic factors:
  - Strength
  - Muscle recruitment patterns
  - Landing, cutting/pivoting techniques

ACL TEAR – RISK FACTORS

- Hamstring activation reduces strain in ACL
  - Female athletes rely less on their hamstrings and more on quads and gastrocnemus
- Landing/cutting techniques in women are different
  - Increased hip adduction/internal rotation, knee abduction
  - Muscular strength, neuromuscular activation
  - Increases strain in ACL

PATELLOFEMORAL JOINT PAIN

- Dull, aching pain under or around the knee cap, pain with stair ascent/decent, squatting, running, jumping, prolonged sitting

- Excessive patellofemoral joint stress associated with abnormal patellar tracking/kinematics
  - Proximal factors
    - Alttered trunk/pelvis motion, hip abductor and ER weakness
  - Local factors
    - Quadriceps strength/recruitment, soft tissue tightness, patellar alignment
  - Distal factors
    - Subtalar pronation

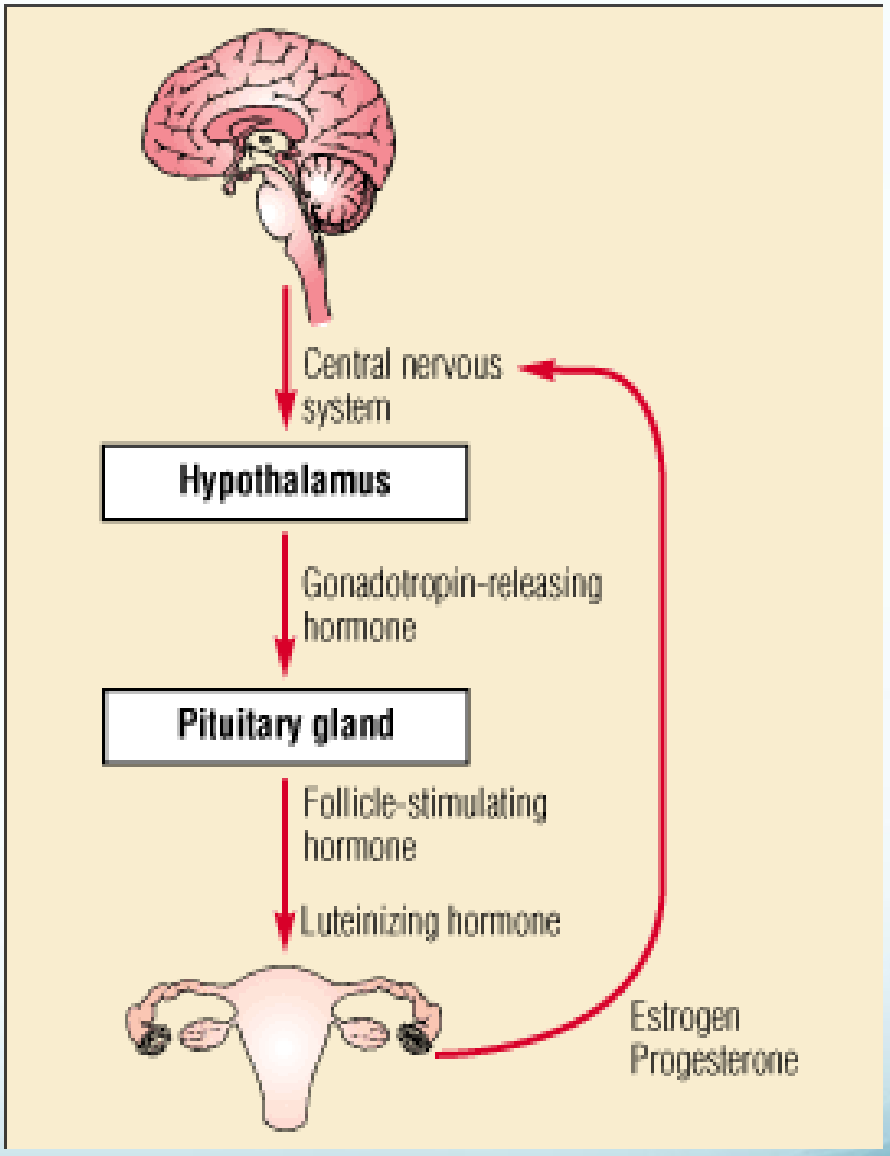
KNEE INJURY PREVENTION

- ACL injury prevention programs
  - E.g. FIFA 11+ , PEP program
  - 52% and 85% risk reduction in F and M respectively
- Key components
  - Coach and athlete education
  - Improve trunk/hip/knee neuromuscular control
    - Learn how to fall/jump/cut
  - Strength and plyometric training
    - Reduce landing forces and improve strength ratios
    - Improve knee stiffness, agility, balance

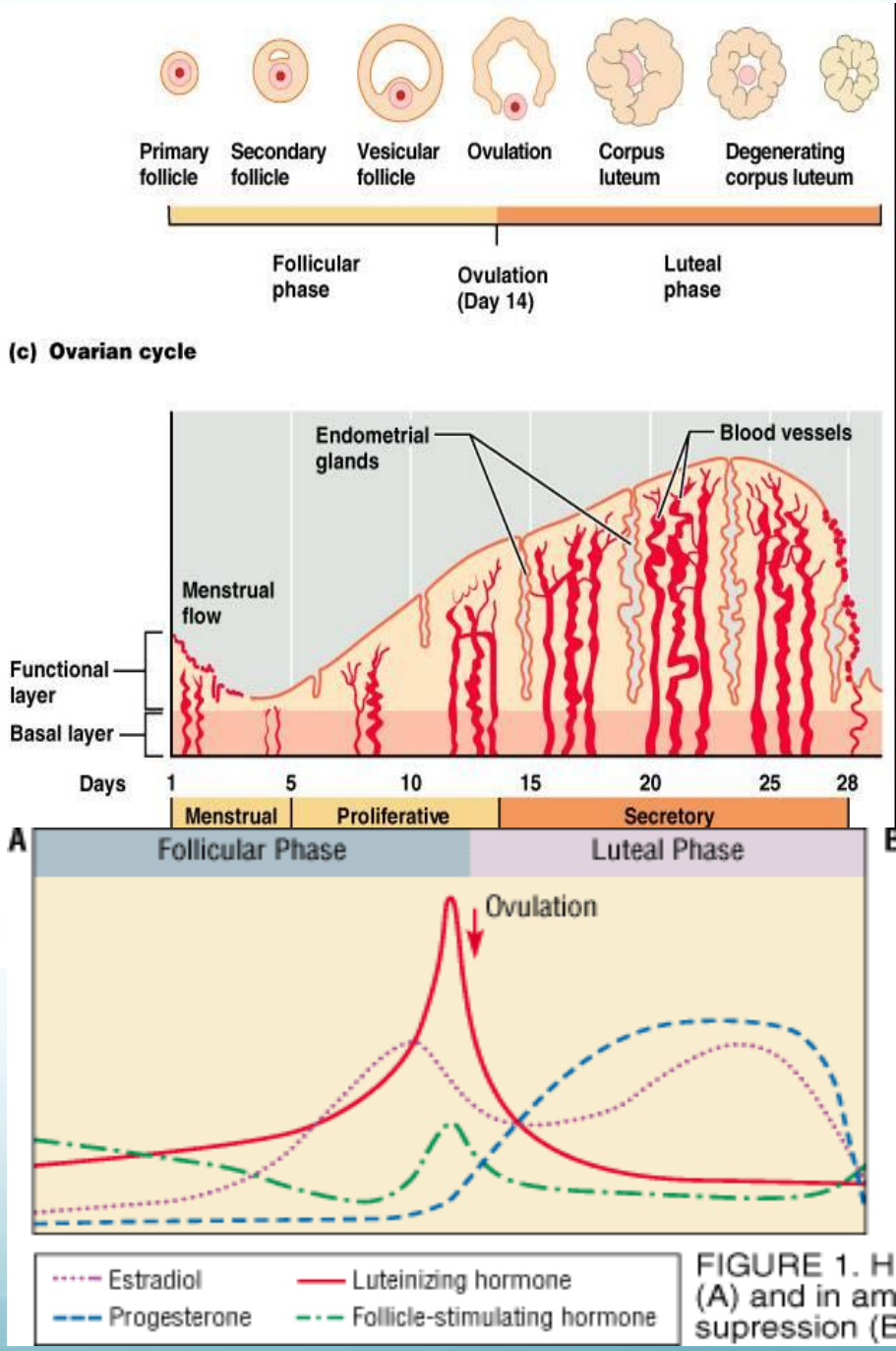
Stress Fractures

- Most common in weight bearing bones
  - Feet, tibia, femoral neck
- Risk factors
  - Overloading, low bone mass, biomechanical issues
- Diagnosis by x-ray, bone scan or MRI
- Treatment- rest, address biomechanical issues, surgical (e.g. femoral neck)

MENSTRUAL CYCLE



- Follicular phase:
  - ↑ FSH, low E & P
  - E level peaks toward the end
  - LH surge -> OVULATION
- Luteal phase
  - Corpus luteum (CL) secretes E & P -> uterine lining thickens
  - No fertilisation, CL degenerates
  - ↓ P & E -> lining sloughs off -> menstrual bleeding
- Average length of cycle: 28-40 days



DOES MENSTRUAL CYCLE AFFECTS SPORTS PERFORMANCE?

- Most studies show that sports performance is not affected by the menstrual cycle
  - muscle strength and fatigability
  - Substrate utilisation (glycogen and fat)
  - Body weight, fluid regulation
  - VO2max, anaerobic capacity
- Decrease in ex time to exhaustion during mid-luteal phase in hot/humid conditions
  - Prob. Due to increase in BBT

MENSTRUAL DISORDERS THAT MAY AFFECT SPORTS PERFORMANCE

Heavy menstrual flow (Menorrhagia)

Painful menstruation (Dysmenorrhoea)

Pre-menstrual syndrome (PMS)

MENORRHAGIA

- Blood loss during menstruation
  - 80% ~ 10-90ml (mean 43ml), quickly replaced by body
- Heavy flow interferes with daily activities, iron loss and low blood count (iron deficiency anaemia)
- Possible causes
  - hormonal imbalance, polyps, fibroids, Endometrosis
- Medical evaluation is needed

DYSMENORRHOEA

- Common in young women
- Pain in first few days before period or during period
  - "Cramps", muscles in the uterus contracting or tightening
- Nausea, vomiting, headache, diarrhoea
- Improved with pain medication
- Severe pain – need medical evaluation to rule out other causes

PREMENSTRUAL SYNDROME

- A collection of symptoms that some women experience before each period
- Symptoms vary in severity, may interfere with normal functioning
- Physical symptoms:
  - Breast tenderness, bloating, lethargy, joint/muscle pain. Headache, food cravings etc
- Emotional symptoms:
  - Irritable, anger, sad, depressed, difficulty concentrating, decreased interest etc

EXERCISE RELATED MENSTRUAL DISORDERS

- Prevalence
  - 6-79% in female athletes vs 2-5% in general population, common in female runners, gymnasts, dancers
- Types
  - Luteal phase defect, anovulation
  - Oligomenorrhea (< 8 cycles per yr, cycle > 35 days)
  - Secondary amenorrhea (cessation of menses > 3 months)
- Mechanism
  - “Low energy availability”: Inadequate dietary energy intake to support exercise energy expenditure and menstrual functions -> hypothalamus-pituitary axis suppression -> low estrogen
  - Exercise does not have suppressive effect on reproductive functions apart from its energy cost

INTENSE TRAINING AND DELAYED PUBERTY

- Delayed pubertal growth, menarche and skeletal maturation reported in female athletes involved in sports that emphasize on low body fat
- Earlier the age of initiating intensive/competitive training before puberty -> more delayed the menarche age, greater the % of athletes who are delayed
- Nature, Nuture or both?
  - Many athletes may inherit a tendency for late maturation but delay further or exaggerated by early ex training

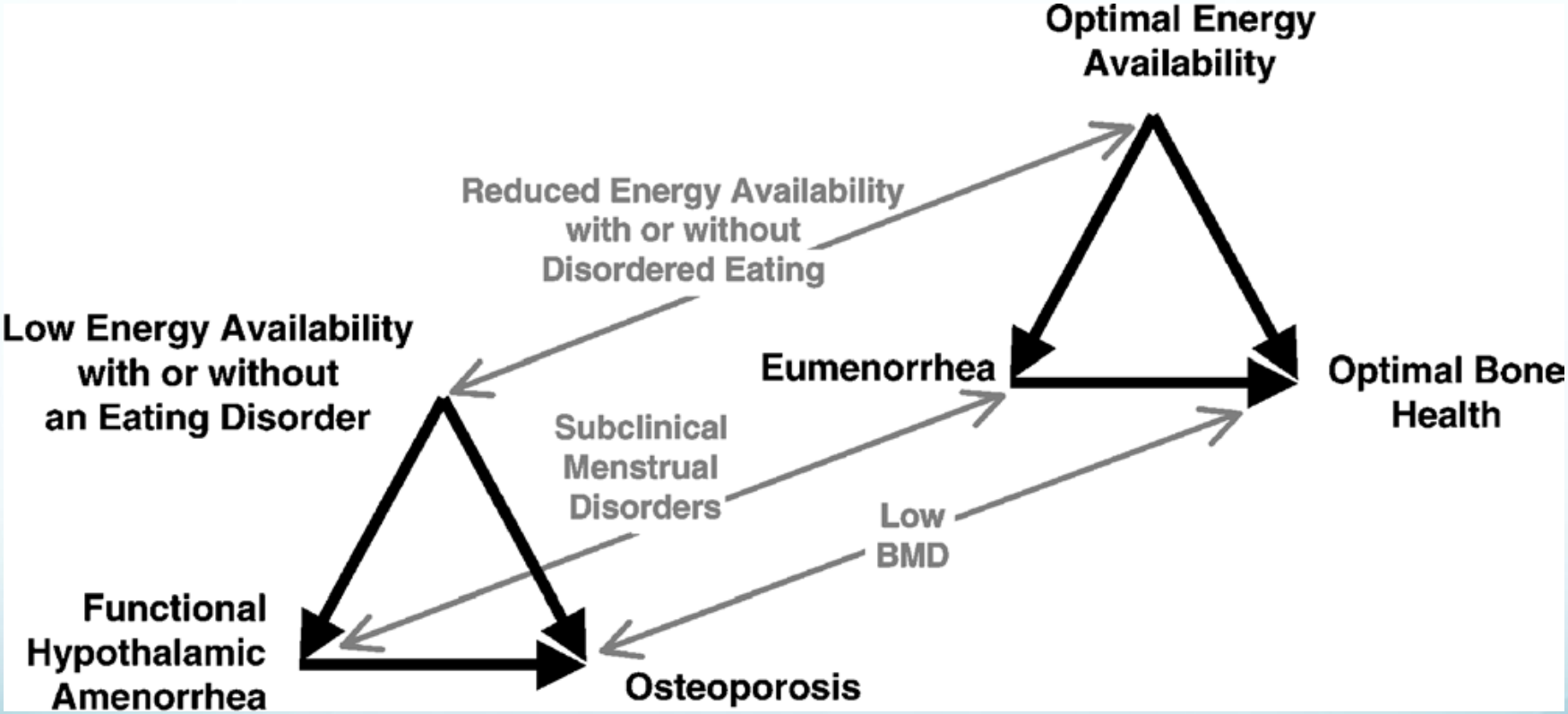
HEALTH CONSEQUENCES

- Delayed Menarche
  - lower rate of bone mineral accretion during adolescence, decreased peak bone mass
  - Higher incidence of scoliosis
  - ? Greater risk for stress fracture/osteoporosis in later life
- Estrogen Deficiency
  - Rapid bone loss in first 2-3 yrs following menstrual disturbance – 4% per yr, slower rate after that
  - Higher risk of stress fracture, low bone mass, premature osteoporosis
  - Infertility, elevated LDL ? Risk of cardiovascular disease
- Low dietary intake/eating disorders -> nutritional deficiency

FEMALE ATHLETE TRIAD

- 3 distinct but interrelated disorders found in female athletic population: amenorrhea, disordered eating, osteoporosis
- Original ACSM position statement in 1997; Revised definition and recommendations in 2007
- Low energy availability (with or without eating disorders), menstrual dysfunction and altered bone mineral density

2007 ACSM Position Stand on Female Athlete Triad



MANAGEMENT

- MEDICAL EVALUATION
  - No menarche/breast development by age 14
  - No menarche at age 16
  - Absence of menses for 3 months or longer
- DIAGNOSIS OF EXCLUSION
  - Need to rule out other causes
    - Thyroid disease, polycystic ovary syndrome, prolactinoma, premature ovarian failure etc

TREATMENT FOR EXERCISE RELATED AMENORRHOEA

- Aims: Restore menstrual cycle, improve BMD, correct abnormal eating behaviours
- Multi-disciplinary team
  - Sports physician, gynaecologist, psychiatrist, dietician
- Nonpharmacological therapy
  - ↑ energy availability thru increase energy intake and/or reduce energy expenditure (> 30kcal/kg FFM /day)
  - Weight gain may be necessary to improve BMD
  - Calcium and VIT D supplements (? Higher requirement)
  - Higher protein needs (1.2-1.6g /kg/day)
  - Psychotherapy, counseling

TREATMENT FOR EXERCISE RELATED AMENORRHEA

- Consider pharmacological therapy if low bone mass density present
- Estrogen replacement therapy
  - No pharmaceutical agent has been shown to fully revert low BMD in amenorrheic athletes

PREVENTION

- **Early detection**
  - Monitor Ht, Wt, sexual maturation/menstrual cycle, dietary intake, training volume, emotional stress
  - Evaluate delayed menarche/menstrual disorders, screen for eating disorders in high risk sports
- **Educating athletes, parents and coaches**
  - Delayed menarche/amenorrhea not a normal response to exercise/indication of training effectiveness
  - Understanding increased adipose deposit is part of natural development during puberty
  - Recognizing unhealthy weight control practices