

UNIQUE SPORTS MEDICINE CONCERNS OF THE FEMALE CYCLIST

Medicine of Cycling Conference 2016

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Disclosure Slide

- ❖ Neither I, Gloria Cohen, nor any family member(s), have any relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation.

Introduction



- ❖ Female cyclists have shown increasing participation in recreational and competitive cycling.
- ❖ 1937 first Female US National Champion
- ❖ 1984 Women's first Olympic road race in Los Angeles
- ❖ 1988 Olympic sprints in Seoul
- ❖ 1992 Olympic individual pursuit
- ❖ 2016 Kristin Armstrong selected for Rio Games time-trial
- ❖ Attention directed to the injuries and medical concerns of the female cyclist

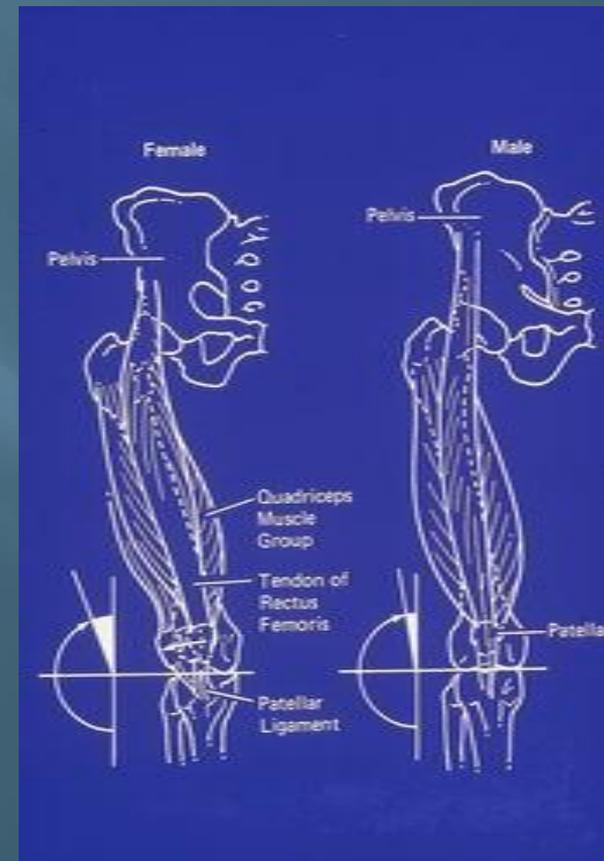
Anatomy

- ❖ Musculoskeletal
- ❖ Breast
- ❖ Gynecology and Obstetrics



Lower Extremity Anatomy and Biomechanics

- ❖ Females tend to have wider pelvises and greater genu valgum than males
- ❖ Biomechanical malalignment –may predispose to overuse injuries of the lower extremity especially in the unconditioned state
- ❖ Patellar tracking
- ❖ Pronation and supination
- ❖ Muscle imbalance



Biomechanics of the Lower Extremity

- ❖ Important relationships in cycling as in running
- ❖ Biomechanical malalignment
- ❖ Patellar tracking
- ❖ Pronation



Bike Fit

- ❖ Handlebars
- ❖ Saddle
- ❖ Pedal



Handlebars



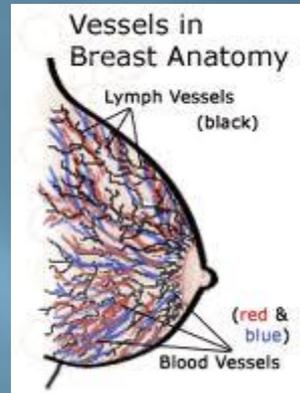
- ❖ Handlebar width is often narrower for a female.
- ❖ Handlebar width should be appropriate for the cyclist's anatomy.
- ❖ Shorter brake levers for smaller hands
- ❖ Some bikes have short-reach brakes

Breast Injuries



- ❖ Mastalgia
- ❖ “Cyclist’s nipples”
- ❖ Contusion
- ❖ Abrasion
- ❖ Laceration
- ❖ Hematoma
- ❖ Mondor’s Disease

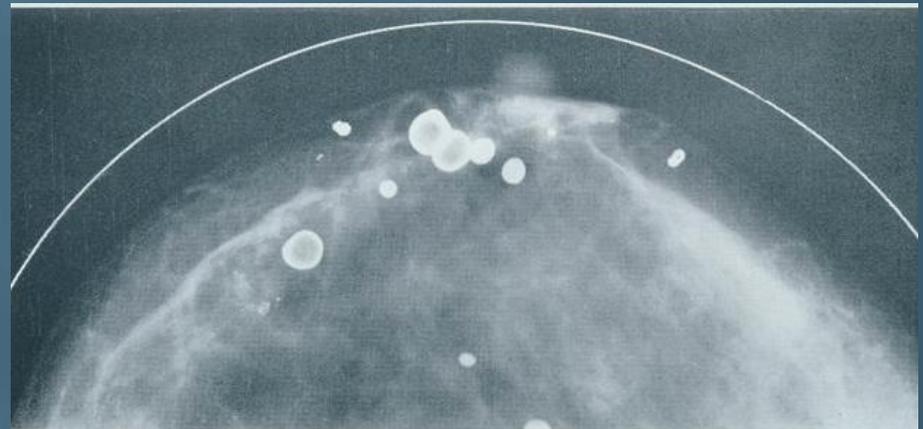
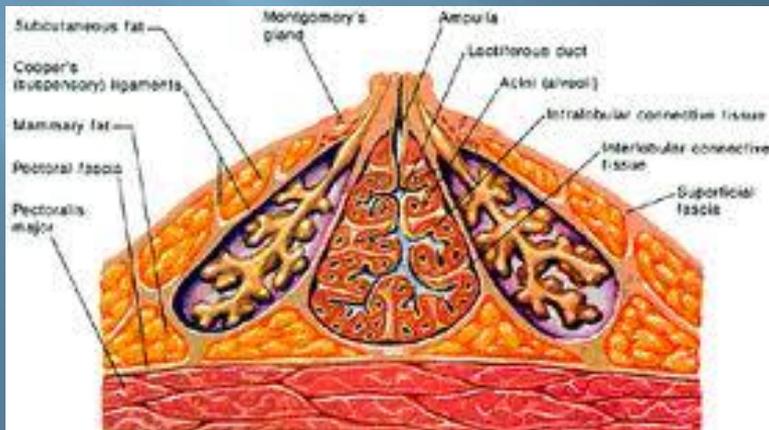
Breast Contusion



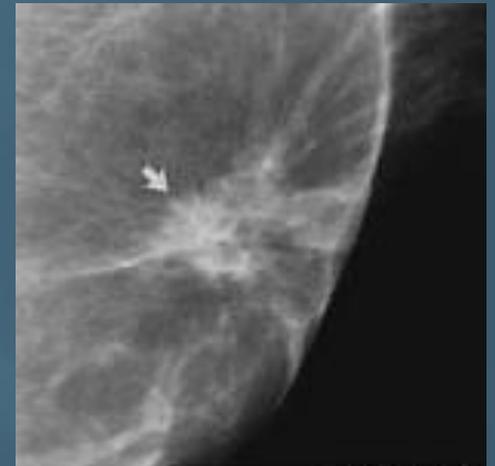
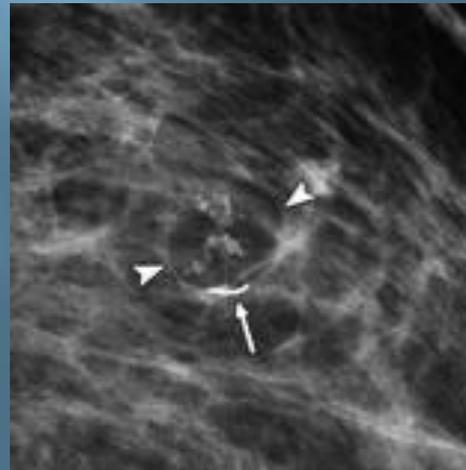
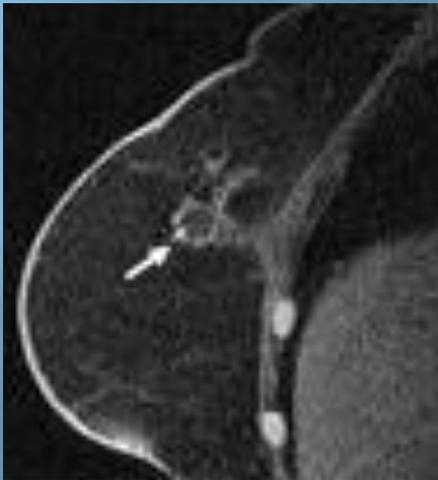
- ❖ Regular contusions are usually mild
- ❖ Involve superficial capillary rupture
- ❖ Apply ice; analgesia; firm support

Breast Hematoma

- ❖ Sometimes surgical aspiration may be necessary
- ❖ Traumatic Fat necrosis may occur



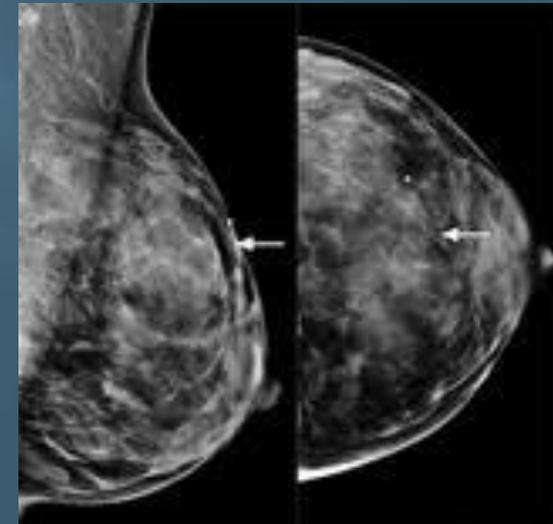
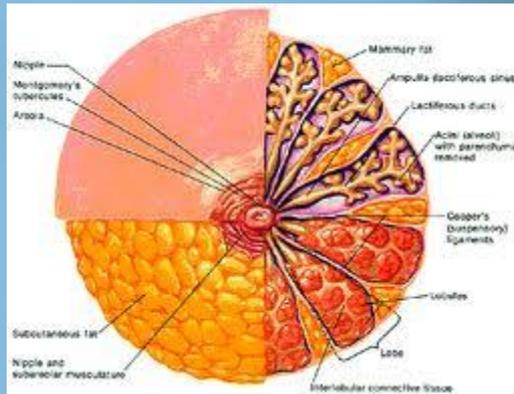
Traumatic Fat Necrosis Mammogram



Mondor's Disease

- ❖ Thrombophlebitis of the superficial veins of the breast
- ❖ The athlete may or may not recall injury
- ❖ Usually subsides spontaneously with symptomatic management
- ❖ Tenderness gradually decreases over a period of 3 to 4 weeks
- ❖ Disappears by 6 to 8 weeks

Mondor's Disease



Saddle

All Saddles Are not Created Equal!



- ❖ Generally women have wider pelvic bones than men in proportion to height.
- ❖ “Women’s saddles” tend to be wider than males’, but may not offer significant improvement.
- ❖ Proper padding for comfort varies.

Gender and Pelvic Motion during Seated Cycling

- ❖ 2007 J. L. Sauer et al investigated the effects of gender, power, and hand position on 3-D pelvic motion during seated stationary cycling.
- ❖ 26 experienced cyclists: 12 males; 14 females
- ❖ Each subject was custom fitted to a stationary bike and rode at 3 power outputs while the kinematics of a triad of motion-capture markers characterized pelvic motion.
- ❖ Differences in pelvic motion were not explained by ischium width or hamstring flexibility.
- ❖ Average anterior pelvic tilt was negatively correlated with lumbar flexibility in males.
- ❖ Female road cyclists exhibited greater anterior tilt in the drops hand position than their male counterparts.

Gynecological Conditions and Injuries



- ❖ Vulvar vestibulitis syndrome
- ❖ “Bicyclist’s vulva”
- ❖ Vaginitis
- ❖ Pelvic injuries
- ❖ Vulvar trauma

Bicycling and Sexual Health

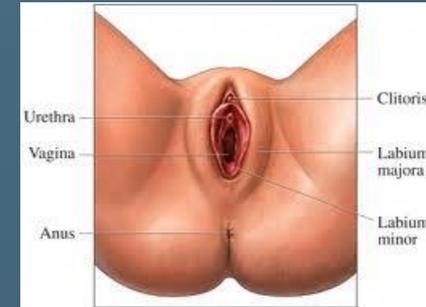
- ❖ May 2012 study by Partin, Connell, Schrader et al at Yale (J Sex Med) studied 48 women; cycled min 10 miles/week.
- ❖ Their own bikes and saddles were used on a trainer.
- ❖ Subjective and measured responses, including use of a specialized pressure map.
- ❖ Handlebars positioned lower than the saddle were significantly associated with increased perineum saddle pressures and decreased genital sensation.
- ❖ Suggests possible modifiable risk factors for the female cyclist.



Vulvar Vestibulitis Syndrome or Vulvodynia

- ❖ Pain is the main symptom: burning, stinging, feeling of rawness or irritation
- ❖ Can occur when prolonged pressure is applied to the vulva
- ❖ An acute onset which becomes a chronic problem
- ❖ Evaluation: Hx/P.E.; cultures; KOH exam; biopsy of any suspicious areas
- ❖ No uniform treatment approach /variable responses: meds; PT; surgery; laser; support group
- ❖ Gynecological referral and follow-up

“Bicyclist’s Vulva”



- ❖ Unilateral vulval hypertrophy in competitive female cyclists (labia majus)
- ❖ Usually asymptomatic
- ❖ Histology: reactive fibroblastic and myofibroblastic proliferation; vessels with old thrombosis and recanalization
- ❖ Possible alteration in lymphatic circulation in vulvoperineal area (hx of vulval macrotrauma)
- ❖ Unilateral nature?

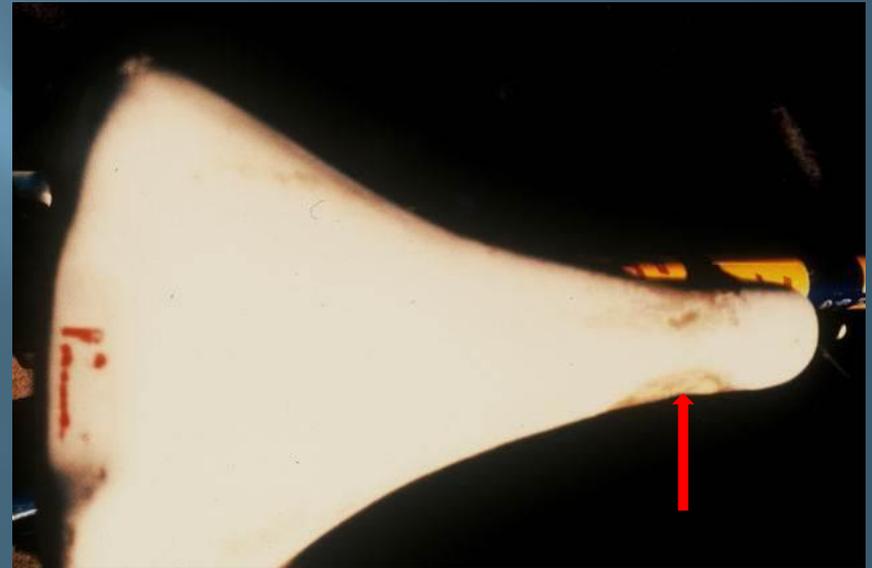
Vulvar Hypertrophy: Case presentation

- ❖ 28 year old female cyclist
- ❖ Referred by gynecologist
- ❖ Unilateral labial enlargement
- ❖ No hx of injury/trauma
- ❖ Nontender
- ❖ No lymphadenopathy
- ❖ Skin clear



P.E. - Biomechanics

- ❖ Leg length discrepancy
- ❖ Right leg shorter
- ❖ Drifts to the right when riding
- ❖ Saddle shows increased wear on R
- ❖ Bike fit correction for LLD
- ❖ New saddle



Yeast Vaginitis

- ❖ Predisposing factors in women cyclists
- ❖ Importance of meticulous personal hygiene:
 - early change of clothing after riding
 - washing of cycling shorts after each use
 - prompt cleaning of the area and thorough drying
- ❖ Use of appropriate antimycotic creams and tablets

Vulvar Hematoma

- ❖ Straddle bicycle accident
- ❖ X-ray pelvis to rule out pelvic fx
- ❖ Evaluate the integrity of the vagina, urethra, bladder and anus
- ❖ Ice first 48 hours; then heat
- ❖ If expanding – refer to surgery
- ❖ Occasionally hospitalization required and catheterization
- ❖ Most treated as outpatient



Endocrinology & Gynecology

- ❖ The Female Athlete Triad
- ❖ The Menstrual Cycle
- ❖ OCPs and Athletic Performance



Female Athlete Triad: Definition

1992
ACSM 1997



ACSM 2007

Energy Deficiency



Menstrual Dysfunction

Decreased bone mass/
Skeletal problems

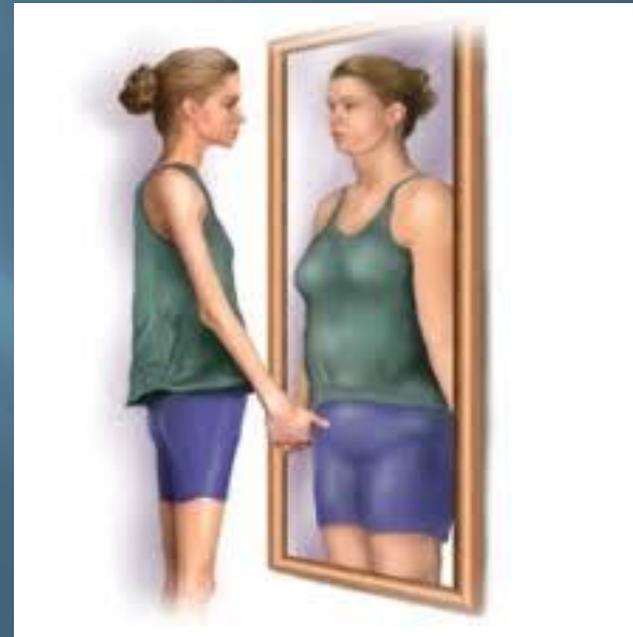
Prevalence



Full triad: 1.2-4.3% (Nichols, Beals, Sundgot-Borgen)

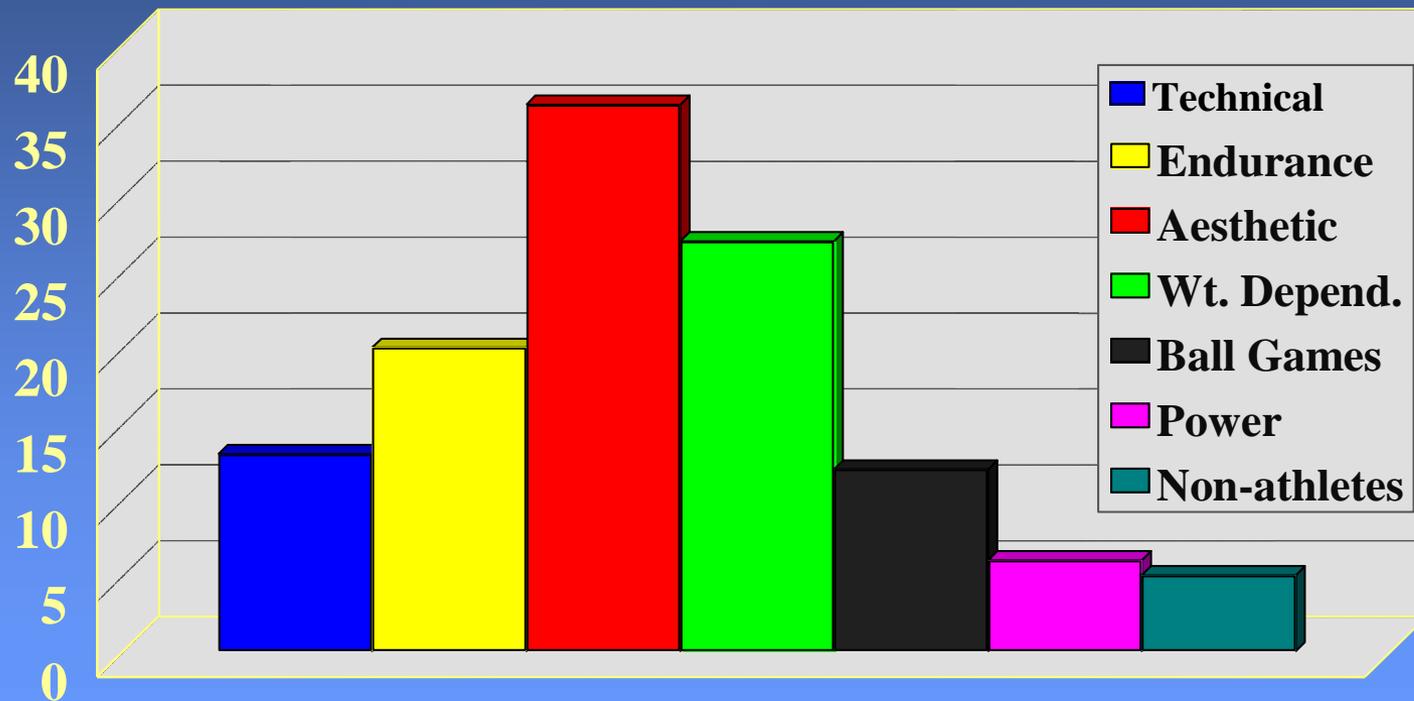
Epidemiology of “Disordered Eating” in the “FAT”

- ❖ The prevalence is unknown as eating disorders are often hidden.
- ❖ Estimates vary from 4-39% for AN & BN.
- ❖ Eating disorder behaviors exist on a continuum from skipping meals to using diet pills, diuretics, or laxatives, to purging to AN.
- ❖ The hallmark is distorted body image.
- ❖ Up to 62% of college athletes practice some form of pathologic weight control behavior.





Prevalence of Eating Disorders: Female Athletes



Sundgot-Borgen, J

Factors Associated with Increased Risk for Eating Disorders

- ❖ Chronic dieting
- ❖ Low self-esteem
- ❖ Family dysfunction
- ❖ Physical or sexual abuse
- ❖ Perfectionism
- ❖ Pressures from teammates / coach
- ❖ Lack of nutrition knowledge

Sport Risk Factors

- ❖ Sports with subjectively scored performance
- ❖ Endurance sports
- ❖ Sports with body contour revealing competition clothing
- ❖ Sports using weight categories
- ❖ Sports emphasizing pre-pubertal body habitus
- ❖ Over-trained and undernourished



Health Consequences of Eating Disorders

MORTALITY:

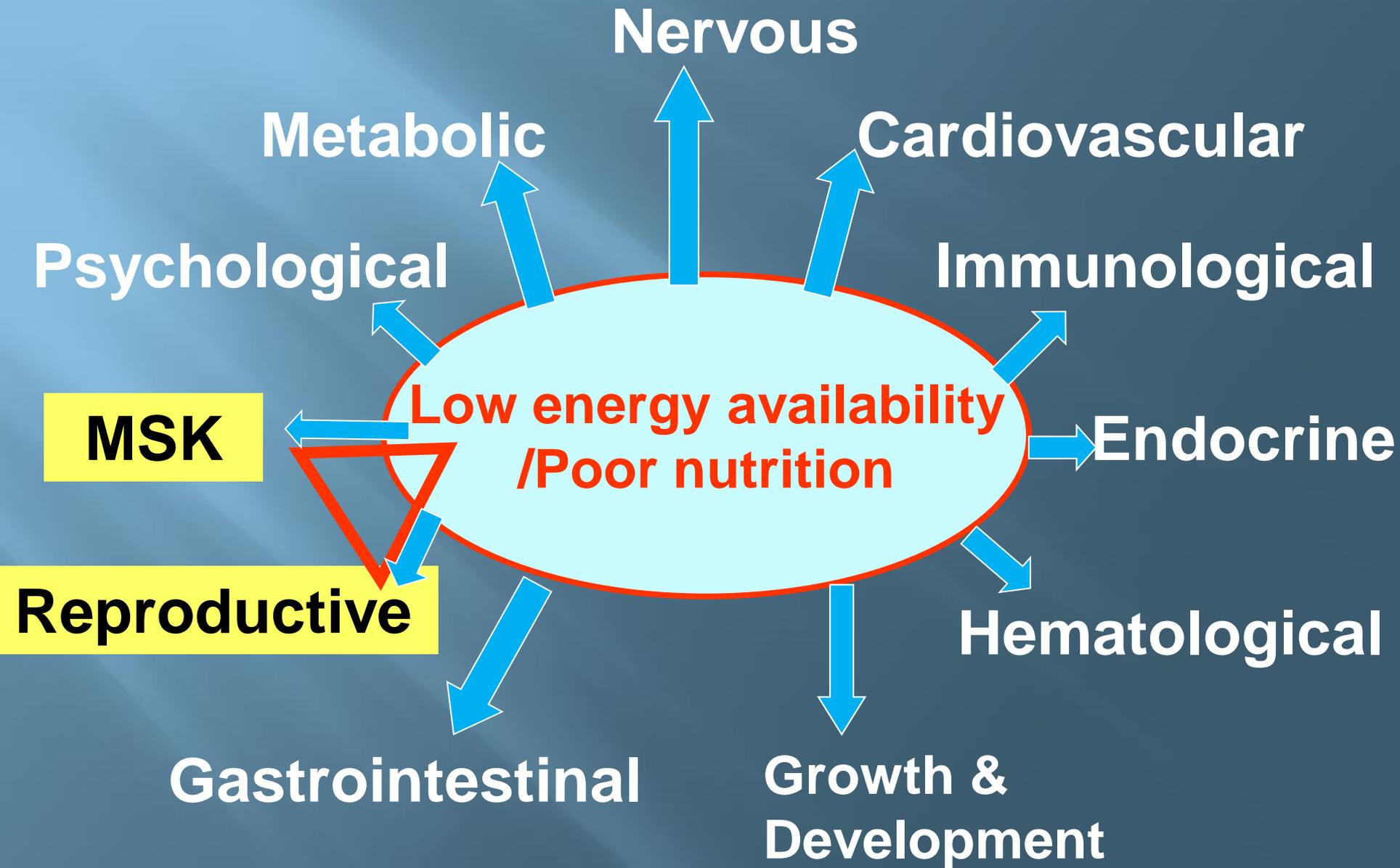
10 – 18% will die prematurely from medical problems or psychological problems leading to suicide

Health Consequences of Eating Disorders

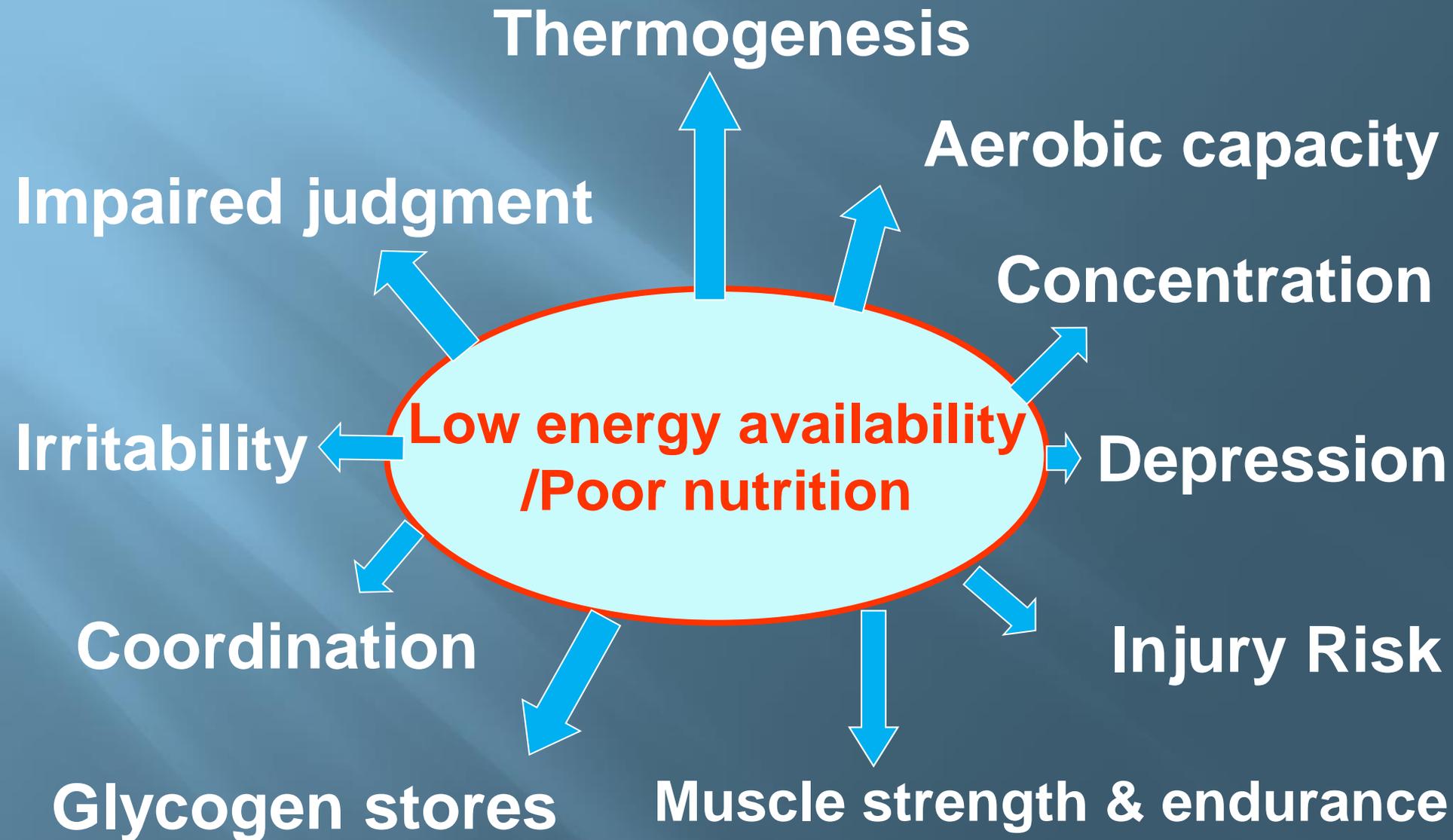
MORBIDITY:

- ❖ Reproductive function
- ❖ Irreversible bone loss
- ❖ Psychological problems
- ❖ Gastrointestinal disorders
- ❖ Thermoregulatory dysfunction

Health Consequences

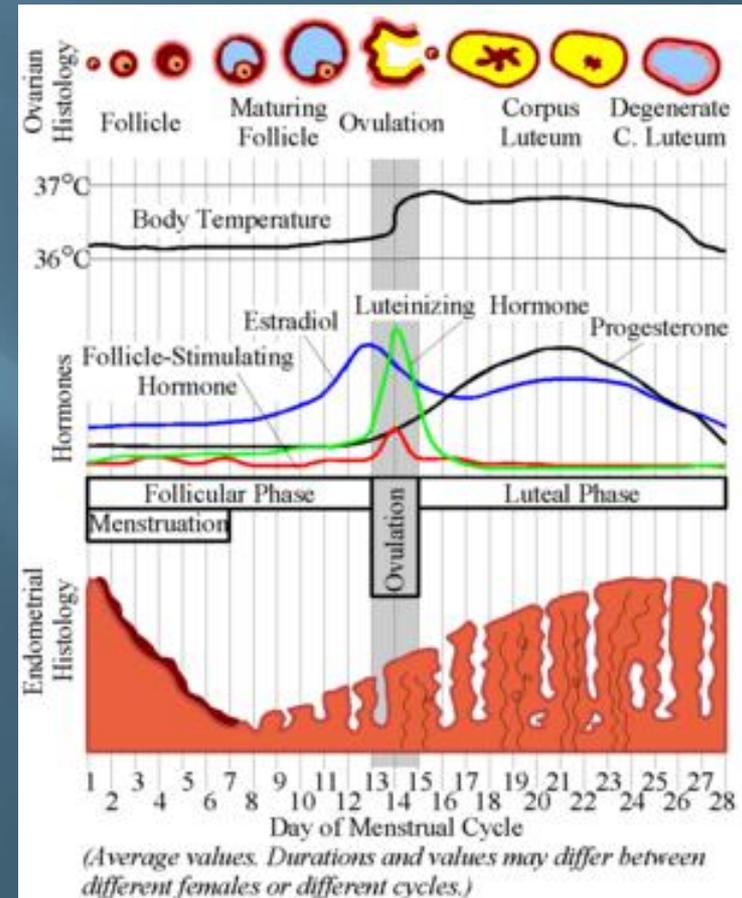


Performance Consequences



Menstrual Disorders / Amenorrhea

- ❖ Normal cycles:
 - 23-35 days; 10 -13x/yr
- ❖ Oligomenorrhea:
 - >35 days; 3-6x/yr
- ❖ Amenorrhea:
 - Absence of menses 3 mos or
 - < 3 cycles /yr
 - Primary amenorrhea
 - Secondary amenorrhea



Prevalence of Amenorrhea

- ❖ 2 – 5% in general population
- ❖ 1 – 44% in female athletes

Prevalence of MD Among Athletes

	Non-athletes	2-5%
	Ball Games	12%
	Swimming	12-30%
	Running	6-43%
	Gymnastics	60% +



Health Consequences of Amenorrhea - Known

- ❖ Infertility
- ❖ Decreased bone mass / osteoporosis
- ❖ Cholesterol abnormalities

Training-Related Menstrual Dysfunction

- ❖ Luteal phase deficiency: short luteal phase, decreased progesterone levels, normal cycle length and menses
- ❖ Anovulatory cycles
- ❖ Exercise-associated amenorrhea: can be reversed by an increase in calorie intake or a reduction in training intensity
- ❖ **Remember to rule out pregnancy!**



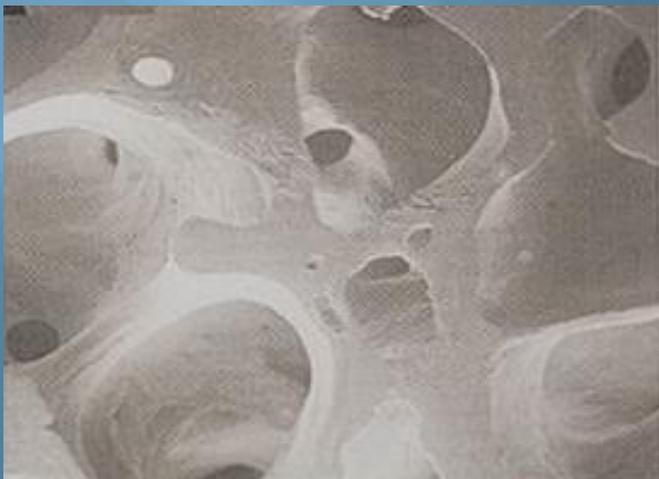
Evaluation of Amenorrhea

- ❖ Hx and PE
- ❖ Pregnancy Test, Estradiol, Progesterone, FSH/LH, TSH/T4, Prolactin, Testosterone, DHEA-S
- ❖ Progesterone challenge



Osteoporosis

A disease characterized by low bone mass and microarchitectural deterioration of bone tissue leading to enhanced skeletal fragility and increased risk of fracture

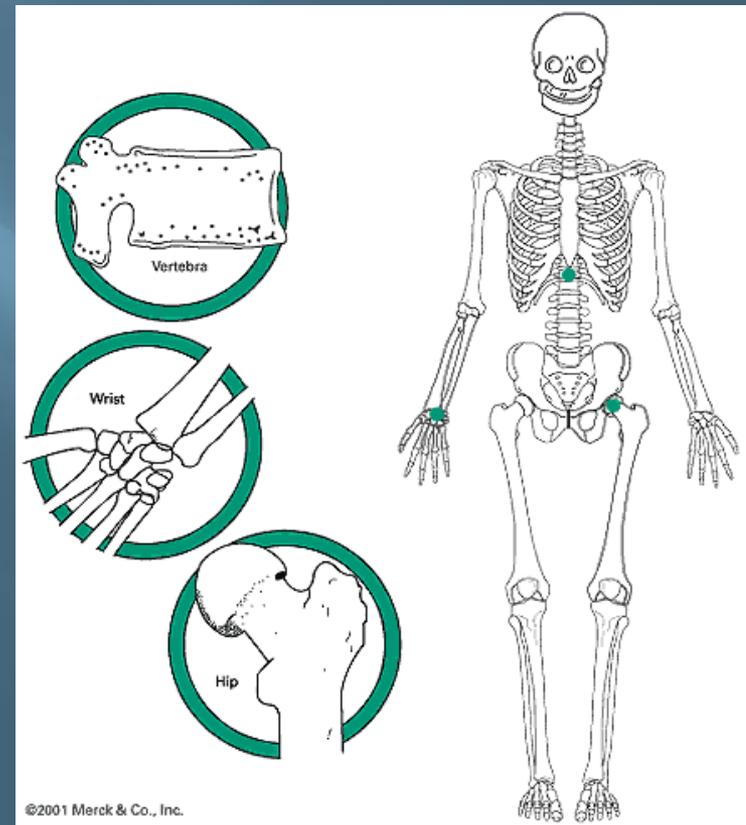


Importance of Peak Bone Mass

- ❖ Peak bone mass achieved by early adulthood serves as the “bone bank” for the remainder of adult life
- ❖ Bone resorption begins after attainment of peak bone mass (age 25-30) at a rate of 0.3-0.5% per year

Health Consequences of Osteoporosis

- ❖ Premature bone loss
- ❖ Increased stress fractures
- ❖ Increased fractures spine, femoral neck, sacrum, pelvis



Bone Loss in the Amenorrheic Athlete

- ❖ Athletic amenorrhea of duration > 3 yrs may not be entirely reversible
- ❖ Evidence exists that some bone can be regained if the athlete resumes normal menses or with associated wt gain, but values still remain low and do not normalize (*Drinkwater*)

Gender Differences in Racing Injuries

- ❖ 2002 R Kronisch et al studied acute MTB racing injuries of males and females.
- ❖ 22 females, 71 males during 8 year study period
- ❖ Overall injury rate:
0.77 % females; 0.40% males
- ❖ **Fxs: 45.5% females; 21.1% males**
- ❖ Women were 1.94 x more likely to sustain an injury
- ❖ **And 4.17 x more likely to sustain a fx**



Prevention

- 1) Pre-participation Examination - early recognition and intervention
- 2) Multi-disciplinary Team - sensitivity
- 3) Education – dispel myths regarding body weight, appearance, and performance
- 4) Secondary Prevention

Treatment



- ❖ Multidisciplinary team
- ❖ Threshold for intervention
- ❖ Referral mechanism
- ❖ “Return to Play”

Return To Play Guidelines

- ❖ 2014 Female Athlete Triad Coalition Consensus Statement
- ❖ Risk stratification point system

Risk Factors	Magnitude of Risk		
	Low Risk = 0 points each	Moderate Risk = 1 point each	High Risk = 2 points each
<i>Low EA with or without DE/ED</i>	<input type="checkbox"/> No dietary restriction	<input type="checkbox"/> Some dietary restriction [‡] ; current/past history of DE;	<input type="checkbox"/> Meets DSM-V criteria for ED*
<i>Low BMI</i>	<input type="checkbox"/> BMI ≥ 18.5 or $\geq 90\%$ EW** or weight stable	<input type="checkbox"/> BMI $17.5 < 18.5$ or $< 90\%$ EW or 5 to $< 10\%$ weight loss/month	<input type="checkbox"/> BMI ≤ 17.5 or $< 85\%$ EW or $\geq 10\%$ weight loss/month
<i>Delayed Menarche</i>	<input type="checkbox"/> Menarche < 15 years	<input type="checkbox"/> Menarche 15 to < 16 years	<input type="checkbox"/> Menarche ≥ 16 years
<i>Oligomenorrhea and/or Amenorrhea</i>	<input type="checkbox"/> > 9 menses in 12 months*	<input type="checkbox"/> 6-9 menses in 12 months*	<input type="checkbox"/> < 6 menses in 12 months*
<i>Low BMD</i>	<input type="checkbox"/> Z-score ≥ -1.0	<input type="checkbox"/> Z-score $-1.0^{***} < -2.0$	<input type="checkbox"/> Z-score ≤ -2.0
<i>Stress Reaction/Fracture</i>	<input type="checkbox"/> None	<input type="checkbox"/> 1	<input type="checkbox"/> ≥ 2 ; ≥ 1 high risk or of trabecular bone sites†
Cumulative Risk (total each column, then add for total score)	___ points +	___ points +	___ points = ___ Total Score

	Cumulative Risk Score [‡]	Low Risk	Moderate Risk	High Risk
<i>Full Clearance</i>	0 – 1 point	<input type="checkbox"/>		
<i>Provisional/Limited Clearance</i>	2 – 5 points		<input type="checkbox"/> Provisional Clearance <input type="checkbox"/> Limited Clearance	
<i>Restricted from Training and Competition</i>	≥ 6 points			<input type="checkbox"/> Restricted from Training/ Competition-Provisional <input type="checkbox"/> Disqualified

Cyclists' Stories



- ❖ Catherine Marsal 4X World Champion 1987-90
- ❖ Leontien Zijlaard-van Moorsel World Champion; Olympic Gold Medalist
- ❖ Dotsie Bausch Olympic Silver Medalist



Contraception for the Female Cyclist

- ❖ Consider the unique needs of the cyclist
- ❖ OCP
- ❖ Transdermal estrogen and progesterone
- ❖ IUD
- ❖ Implants
- ❖ Injectable
- ❖ Barrier methods



OCP & Athletic Performance

- ❖ Results of the small number of research studies to date are conflicting.
- ❖ Use of different types of OCPs (monophasic or triphasic) and different formulations
- ❖ Varied definitions of the OCP phases
- ❖ 2004 Redman et al, 5 female rowers using a triphasic OCP; improved anaerobic performance with low E2 and P4
- ❖ 2008 Rechichi et al, 13 female cyclists/triathletes using a monophasic OCP; endurance test 1-h cycle at 3 x during cycle
 - No difference in endurance performance



The Pregnant Cyclist

- ❖ Many studies have shown that exercise of moderate intensity is safe during uncomplicated pregnancy.
- ❖ ACOG guidelines
- ❖ Enlarging abdomen affects center of gravity and balance.
- ❖ Higher handlebar and more upright riding position may be preferred.
- ❖ Adequate calories and fluid intake



Postpartum



- ❖ Body changes persist for 4 to 6 weeks pp
- ❖ Gradual return to exercise program
- ❖ Individual variations
- ❖ Adequate fluid and nutritional intake
- ❖ Advice for nursing women
- ❖ The exercise should be stress relieving and not stress provoking

Conclusion

- ❖ The female athlete has different needs and unique medical concerns
- ❖ Future research to address these concerns
- ❖ Recognize the need to screen female athletes differently from male athletes
- ❖ Extend lessons learned in the care of the elite female athlete into your practice



Further Information

- ❖ Female Athlete Triad Coalition
- ❖ www.femaleathlete triad.org
- ❖ IOC Triad Prevention Program
- ❖ July 2010 Healthy Body Image 4 videos
www.olympic.org/hbi
- ❖ 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad, American College of Sports Medicine *BJSM* 2014,48:289; *Clin J Sport Med* 2014;24:96-119





Questions?

