



Training for the Female Athlete, Children, and Special Populations



Factors Important to Women Involved in Vigorous Training

- Responses of females to training are similar to males
 - Thermoregulation impaired during luteal phase of menstrual cycle
- Concerns for female athletes:
 - Exercise and the menstrual cycle
 - Eating disorders
 - Bone mineral density
 - Exercise during pregnancy



» Exercise and Menstrual Disorders

- Amenorrhea
 - Cessation of menstruation
 - Called “athletic” amenorrhea
 - Due to multiple factors
 - Amount of training
 - Psychological stress
 - Body composition
- Training and menstruation
 - No reason to limit training during menstruation
 - Dysmenorrhea
 - Painful menstruation due to prostaglandins
 - May limit training due to discomfort

» Relationship Between Training Distance and the Incidence of Amenorrhea

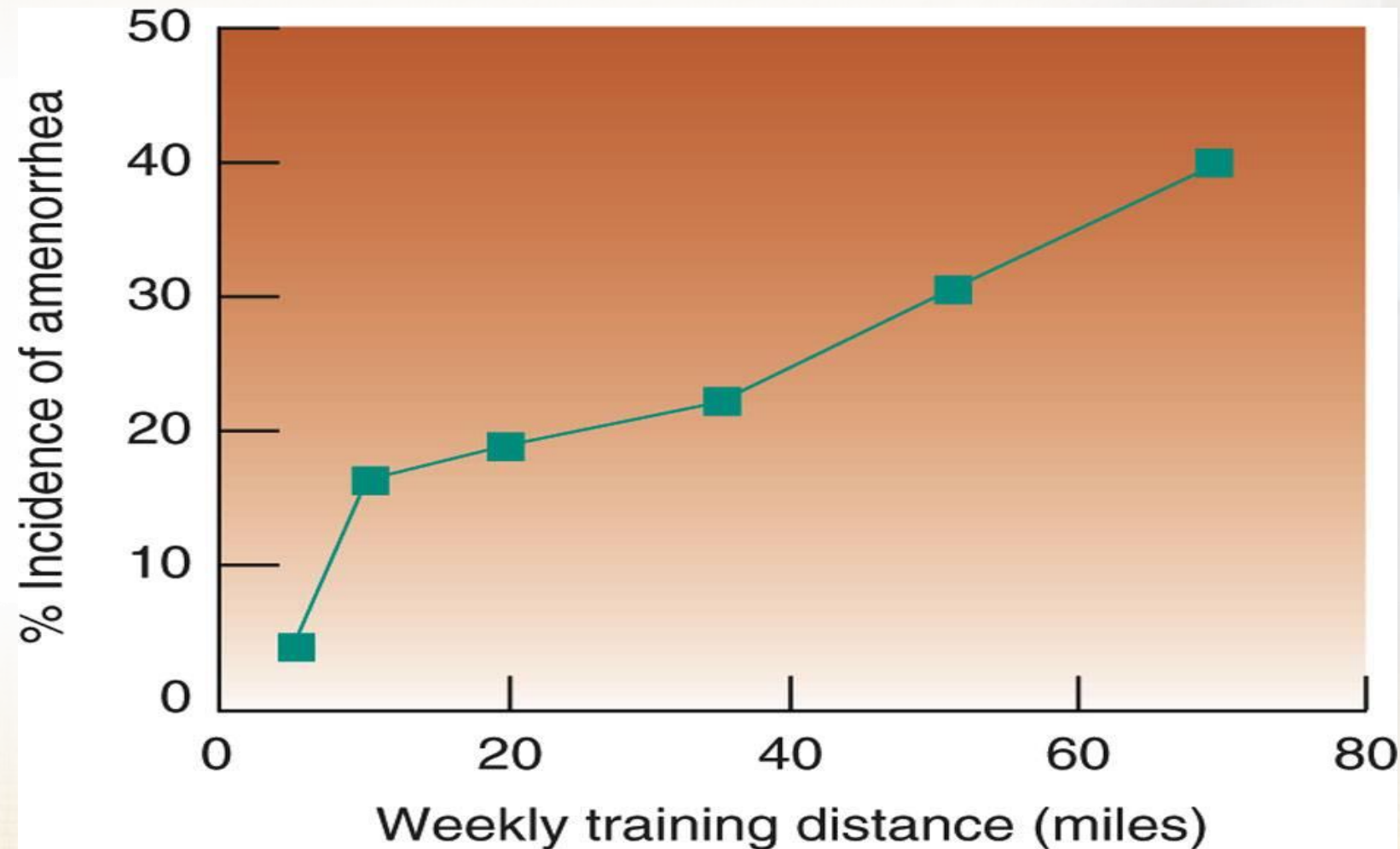


Figure 22.1

» The Female Athlete and Eating Disorders

- Eating disorders affect both male and female athletes
- Anorexia nervosa
 - Extreme steps to reduce body weight
 - Starvation, exercise, laxative use
 - Effects:
 - Excessive weight loss, amenorrhea, death
- Bulimia nervosa
 - Pattern of overeating followed by vomiting
 - Effects:
 - Damage to teeth and esophagus



» Warning Signs for Anorexia Nervosa

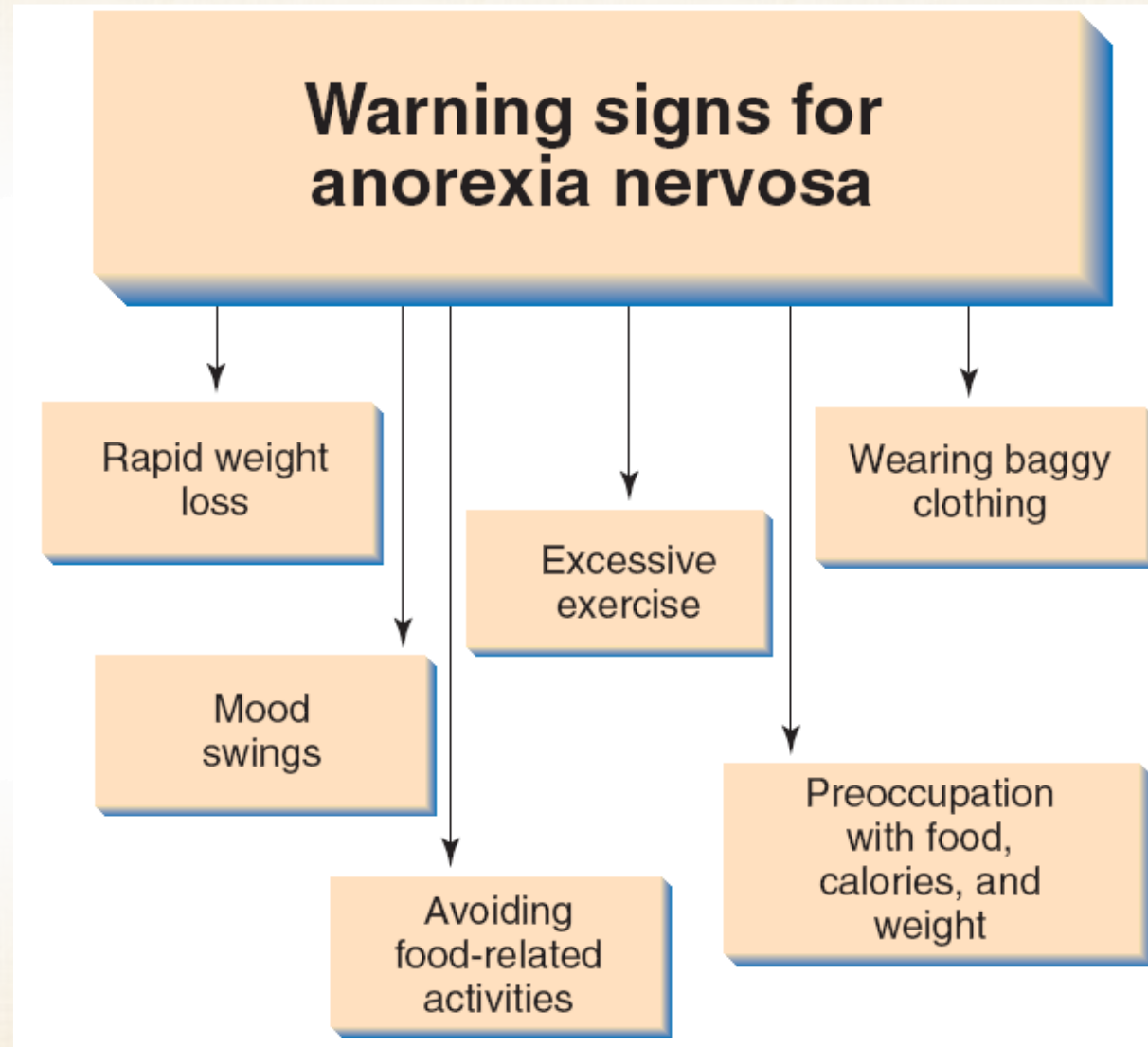


Figure 22.2

» Warning Signs for Bulimia

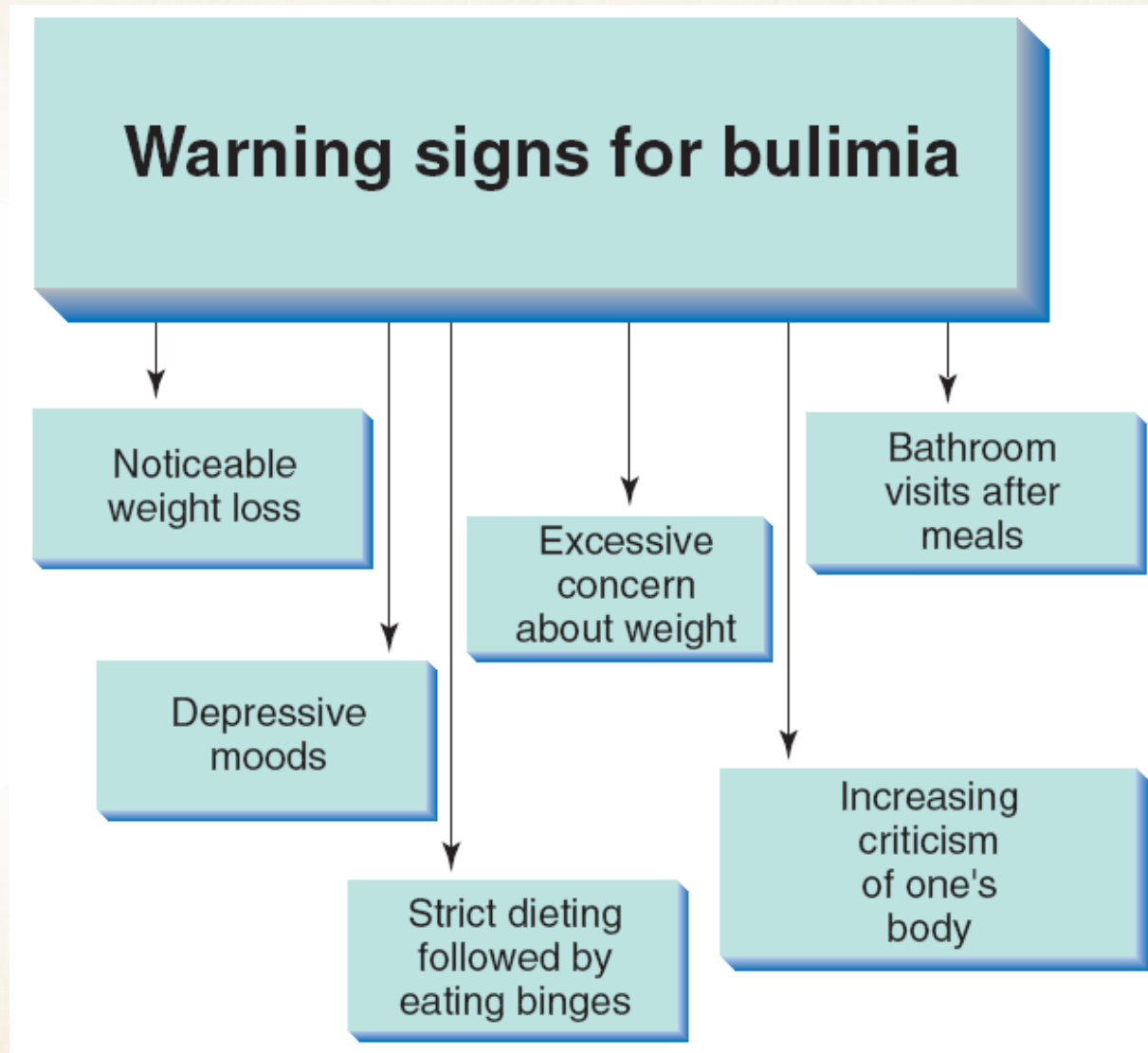


Figure 22.3

» Bone Mineral Disorders

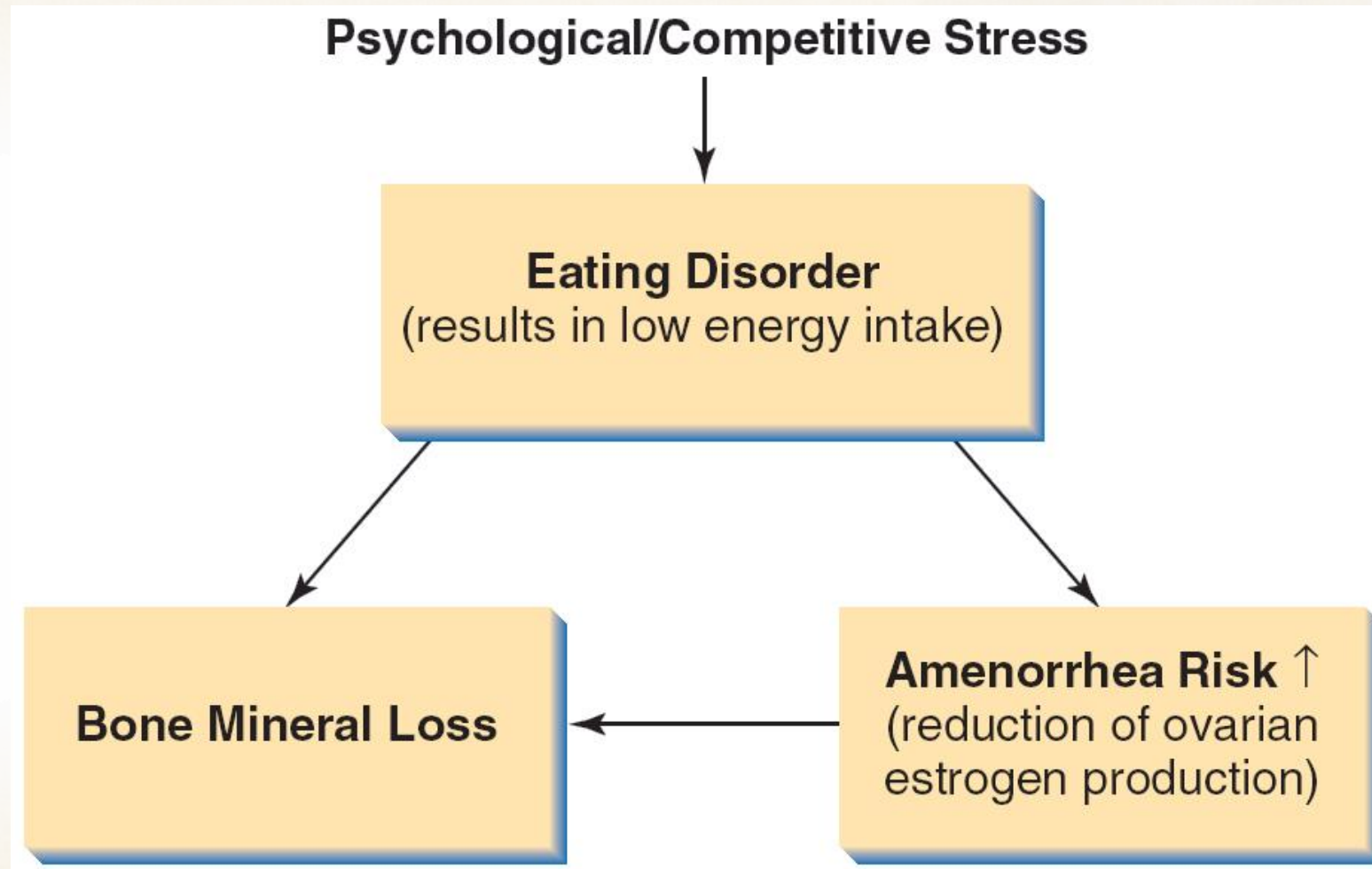
- Osteoporosis
 - Loss of bone mineral content
- Major causes:
 - Estrogen deficiency due to amenorrhea
 - Inadequate calcium intake due to eating disorders

» The Female Athlete Triad

- Interrelated health problems
 - Amenorrhea
 - Eating disorders
 - Bone mineral loss
- Prevalence
 - 4% of all female athletes meet criteria for triad
 - 26% possess at least two components
- Eating disorder can lead to:
 - Diminished intake of calcium and vitamin D
 - Amenorrhea and low blood levels of estrogen
 - Both can lead to low bone mineral density



» The Three Components of the Female Athlete Triad



» Exercise During Pregnancy

- Most women can safely perform low-to-moderate intensity exercise during pregnancy
- Female athletes may maintain active training program if they
 - Monitor body temperature to prevent hyperthermia
 - Aquatic exercise is recommended
 - Maintain adequate hydration
 - Consume fluids at regular intervals (every 15 min)
 - Monitor fluid balance by measuring body weight
 - Reduce training intensity and volume as pregnancy advances
 - Regular examinations by physician

» Risk of Knee Injury in Female Athletes

- Female athletes are at higher risk of certain knee injuries compared to men
 - ACL injury
- Reasons
 - Fluctuation in hormones during menstrual cycle
 - May influence ACL structure
 - Knee anatomy
 - May be due to greater joint laxity
 - Dynamic neuromuscular imbalance
 - Imbalanced strength, proprioception, and landing biomechanics

» In Summary

- The incidence of amenorrhea in female athletes appears to be highest in distance runners and ballet dancers when compared to other sports. Although the cause of amenorrhea is not clear, it appears likely that multiple factors (e.g., the amount of training and psychological stress) are involved.
- There appears to be little reason for female athletes to avoid training during menstruation unless they experience severe discomfort due to dysmenorrhea.

» In Summary

- Some experts have estimated that as many as 50% of elite female athletes experience some type of eating disorder. Two of the more common eating disorders are anorexia nervosa and bulimia.
- The three most common health problems facing the young female athlete are amenorrhea, eating disorders, and bone mineral loss; collectively, these problems have been called the “female athlete triad.”

» Sports Conditioning for Children

- **Training and the cardiopulmonary system**
 - Improvements in VO_2 max similar to that of adults
 - No risk of permanent cardiovascular damage as a result of training
- **Musculoskeletal system**
 - Training may optimize growth in children
 - Concerns of damage to articular cartilage and epiphyseal growth plate
 - Premature closure of growth plate
 - Injuries can be avoided by attention to proper technique

» Location of the Growth Plate

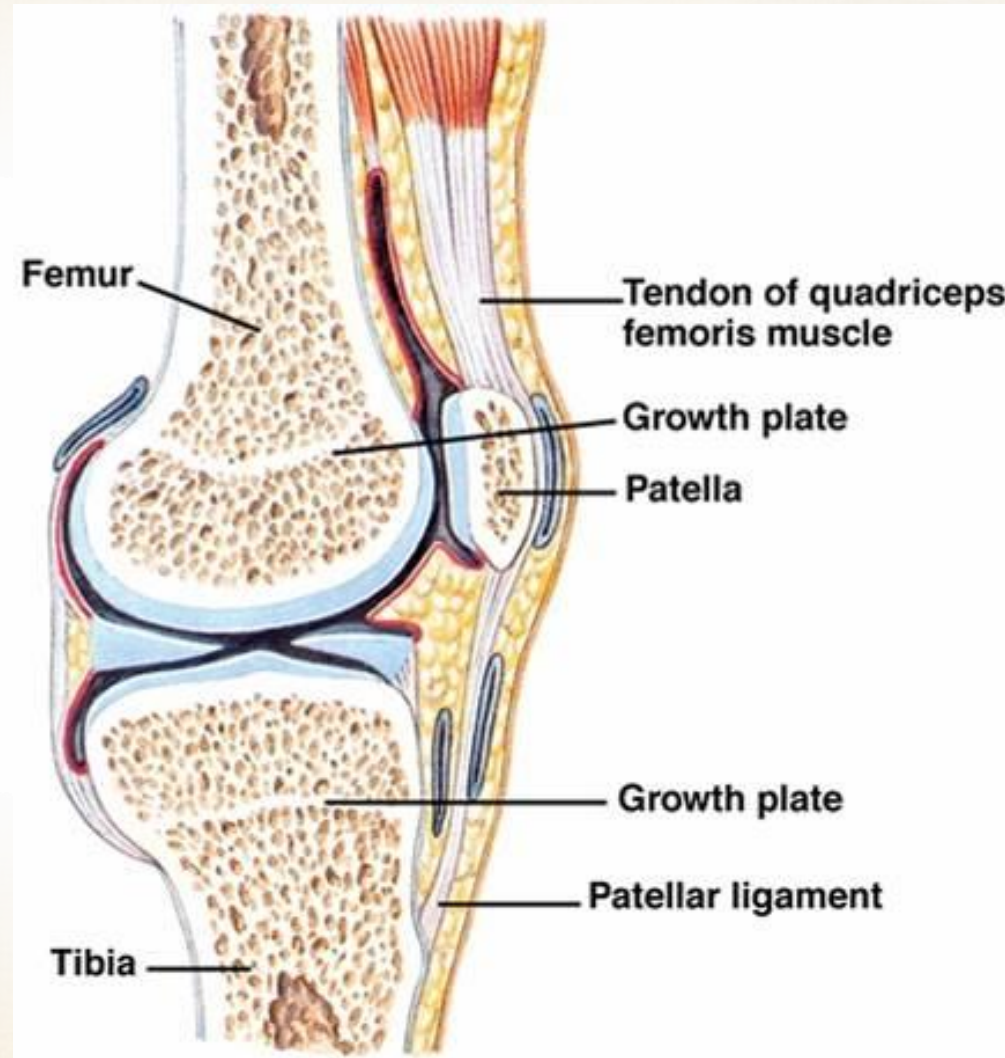


Figure 22.5



Risk of Sudden Cardiac Death in Young Athletes

- Risk of sudden cardiac death in healthy young athletes is low
 - 1 in 250,000
- Cardiac abnormalities
 - Hypertrophic cardiomyopathy
 - Congenital abnormalities of coronary arteries
 - Aortic aneurysms
 - Congenital stenosis of mitral valve
- Medical screening can reduce risk
 - Medical history and physical exam

» In Summary

- Some experts have estimated that as many as 50% of elite female athletes experience some type of eating disorder. Two of the more common eating disorders are anorexia nervosa and bulimia.
- The three most common health problems facing the young female athlete are amenorrhea, eating disorders, and bone mineral loss; collectively, these problems have been called the “female athlete triad.”

» Competitive Training for Diabetics

- Type 1 diabetics who are free from complications should not be limited in type or quantity of exercise
 - Can obtain the same benefits as nondiabetics
- Safe participation depends on ability to avoid hypoglycemia
 - Combination of exercise, diet, and insulin for optimal blood glucose control
 - Have carbohydrate snack available during exercise
- Insulin injection site
 - Should be away from working muscle to prevent increased rate of uptake and hypoglycemia

» In Summary

- Type 1 diabetics who are free of diabetic complications should not be limited in the type or quantity of exercise.
- The key for safe sports participation for the type 1 diabetic is for the athlete to learn to avoid hypoglycemic episodes.

» Training for Asthmatics

- **Asthmatics may safely participate in all sports**
 - With the exception of SCUBA diving
 - Provided that exercise-induced bronchospasm is controlled
 - Should keep a bronchodilator inhaler handy during exercise
- **Asthmatics and SCUBA diving**
 - May be safe for those who have normal airways at rest and do not exhibit exercise-induced bronchospasm

» In Summary

- Asthmatics can safely participate in all sports with the possible exception on SCUBA diving, provided they are able to control exercise-induced bronchospasms via medication or careful monitoring of activity levels.
- The question of the safety of an asthmatic participant in SCUBA diving continues to be unanswered. Nonetheless, recent evidence suggests that asthmatics who do not exhibit exercise-induced asthma and have normal airways at rest are at no greater risk during diving than are healthy individuals.

» Epilepsy and Physical Training

- Epilepsy is characterized by seizures
 - Loss of consciousness, muscle tremor, and sensory disturbances
- Mixed opinions on whether exercise induces seizures
 - Concern about injury
 - Blow to head causing a seizure
 - Injury during a seizure
- Participation in exercise should be determined on a case-by-case basis
 - Depending on type of epilepsy and sport considered

» In Summary

- Questions about safe participation for epileptics in training programs must be answered on an individual basis.
- The benefit-risk ratio of sports participation may vary greatly from case to case and depends on the type of epilepsy involved and the sport being considered.



Thank You!

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