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## Amenorrhea in Adolescent Athletes

*Committee on Sports Medicine*

A minority of female athletes participating in ballet, gymnastics, distance running, rowing, and cycling, as well as other sports activities, occasionally experience menstrual and associated physiologic changes. Women competing in the sports of ballet and gymnastics have been reported to have a particularly increased incidence of primary and secondary amenorrhea, decreased bone density, stress fractures, and symptoms of anorexia nervosa. [1-4] Results of several studies have indicated decreased levels of circulating estrogen as well as other metabolic changes. [1,3-7]

Research designed to determine the etiology of the amenorrhea and the associated changes has shown mixed results.

Low body fat cannot be linked in a causative fashion to hormonal changes or decreased levels of circulating estrogen. Early studies linking minimum body fat and menarche, as well as maintenance of regular menstrual cycles, have not been replicated. [8] However, measurement of percentage of body fat may be helpful in assessing the nutritional status of athletes.

Ballet and gymnastics are perceived by some to be activities that are stressful psychologically. Although stress has been shown to cause amenorrhea, studies to date have not demonstrated the presence of significantly increased levels compared with age-matched girls not participating in ballet and gymnastics. [9]

Some authors have postulated that tall, thin athletes who may be genetically at risk for delayed maturation are naturally attracted to these sports. [10] Some of the delays may relate to preselection. However, no evidence currently exists proving a definite relationship between preselection and the physiologic changes in these athletes.

There is an increased emphasis by athletes, coaches, judges, and spectators on a slender physique for female gymnasts and ballet dancers. Several investigators have shown dietary intakes of adolescent ballerinas that are inadequate in calories, nutritional components, vitamins, and minerals. [2,6] The most common findings demonstrated in amenorrheic athletes are high intensity of exercise combined with poor nutritional status. Fasting and purging may be encouraged and anorexia nervosa or bulimia hidden in all athletic populations. Coaches need to be educated regarding the seriousness of these behaviors.

Recommendations for dealing with sports-related amenorrhea in adult women have included thorough physical examinations (including pelvic examinations) and endocrine evaluations, as well as estrogen and calcium supplementation. [11] Some of those recommendations are probably appropriate for adolescent athletes. Endocrine evaluation including studies of follicle-stimulating hormone, luteinizing hormone, thyroxine, prolactin, and estradiol should be performed if the athlete has menarche delayed greater than 1 year beyond the age of onset of menses of other female family members or if menses cease for 6 or more months after regular menses have been established. Pregnancy should always be ruled out early in the course of amenorrhea. In situations in which family history is not available, primary amenorrhea should be considered if menarche has not occurred by age 16 years and prompt evaluation initiated. Most adolescent athletes make adequate amounts of estrogen and will have withdrawal bleeding following progestin challenge. The use of supplemental estrogen in the young amenorrheic girl should not be routinely implemented. These young athletes should be encouraged to decrease the intensity of their exercise and to improve their nutritional intake. However, older athletes may be appropriately supplemented with estrogen.

The following recommendations are appropriate.

1. Preparticipation evaluations should include a focus on menstrual function and dietary practices.
2. Education and counseling should be provided to athletes, parents, and coaches regarding adequate intake of nutrients to maintain normal growth and development. [12]
3. During the active season, routine monitoring of menstrual function, growth velocity, dietary changes, weight changes, and, when possible, skin fold thickness should be performed.
4. The possibility of anorexia nervosa should be explored and when diagnosed treated in the same manner as anorexia nervosa in nonathletes.
5. Athletes whose diets provide less than 1200 mg/d of calcium should be supplemented to maintain an intake of 1200 to 1500 mg/d.
6. Amenorrheic athletes within 3 years of menarche should be counseled to decrease the intensity of exercise and improve their nutritional intake, especially protein. The use of hormonal therapy for these younger girls is generally not advised.
7. Because pregnancy continues to be a risk in amenorrheic athletes who are sexually active, the possibility of pregnancy should always be assessed as part of the evaluation.
8. The mature amenorrheic athlete (generally greater than 3 years past menarche or age 16 years), if found to be hypoestrogenemic, may benefit by receiving estrogen supplementation. Optimal therapy has yet to be determined, but supplementation with low-dose oral contraceptives (<50 mug of estrogen per day) is reasonable.

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*The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.*

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