



**STOP  
SPORTS  
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SPORTS TIPS

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*A STOP Sports Injuries  
Collaborating Organization*

## THE FEMALE ATHLETE TRIAD

The benefits of physical activity for women and girls are well established. Regular physical activity helps build and maintain bone strength, lower cholesterol and blood pressure, decrease symptoms of anxiety and depression, control weight and build lean muscle. These benefits can be gained with moderate or strenuous exercise five days a week.

However, when strenuous exercise is combined with inadequate calorie intake, serious health consequences can occur. The Female Athlete Triad is an interrelationship among menstrual cycle changes, inadequate calorie intake and decreased bone density in female athletes. Athletes may be affected by one or more of the components of the Triad.

### MENSTRUAL CYCLE CHANGES

Menstrual function disturbances in athletes can vary from longer than normal cycles (called oligomenorrhea) to completely missing periods (called amenorrhea). The low estrogen associated with amenorrhea in athletes can adversely affect muscle function, cholesterol levels and reproduction.



# FEMALE ATHLETE TRIAD

## INADEQUATE CALORIE INTAKE

It is useful to think of an athlete's calorie intake in terms of "energy availability", which is the amount of energy consumed in the diet minus the amount of energy used during exercise. The amount of energy left over is the "energy availability" to carry out other body functions, such as growth, development, and reproduction.

While some athletes may have an eating disorder, such as anorexia or bulimia, many do not meet the criteria for eating disorders or simply do not understand how many calories they need to eat to compensate for their amount of exercise.

## BONE DENSITY

Athletes affected by the Triad may have bone density that is less than expected for their age and may even have bone density low enough to be considered osteoporotic or in the early stages of bone loss. As a result, the athlete may experience stress fractures. More importantly, in adolescent athletes, who are still building bones, the athlete may not build enough bone, increasing their risk for fractures later in life.

The longer an athlete has had menstrual cycle changes and inadequate energy availability, the more likely she is to experience a stress fracture.

## RISK FACTORS

Athletes involved in sports at an elite level, endurance sports or aesthetic sports (i.e. gymnastics or skating) are at an increased risk for the Triad, but athletes in ANY sport may be affected.

## HOW IS THE FEMALE ATHLETE TRIAD TREATED?

If you suspect that you or someone you know is affected by the Triad, you should make an appointment with a sports medicine physician familiar with the Triad or your regular doctor if you do not know of a sports medicine doctor. Usually, the doctor will order laboratory tests to evaluate hormone function and, sometimes, a bone density test. If the athlete has a suspected stress fracture, x-rays and, possibly, an MRI may be performed. The mainstay of treatment of the Triad is increasing calorie intake to improve energy availability. Significant improvements in bone density are seen with improved calorie intake and weight gain, although the decreased bone density associated with the triad is not always completely correctable. Improving energy availability also restores normal menstrual function. Even though taking an oral contraceptive pill ("The Pill") will allow the athlete to have normal periods, it is unlikely to improve bone density.

A dietician can help the athlete determine how many calories they need to eat each day and if they are missing any important nutrients in their diet.

Athletes who meet the criteria for eating disorder will need treatment with a therapist or psychologist who specializes in eating disorders.

## EXPERT CONSULTANTS

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Sports Tips provide general information only and are not a substitute for your own good judgement or consultation with a physician. To order multiple copies of this fact sheet or learn more about sports injury prevention, please visit [www.STOPSportsInjuries.org](http://www.STOPSportsInjuries.org).