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The Female Athlete Triad

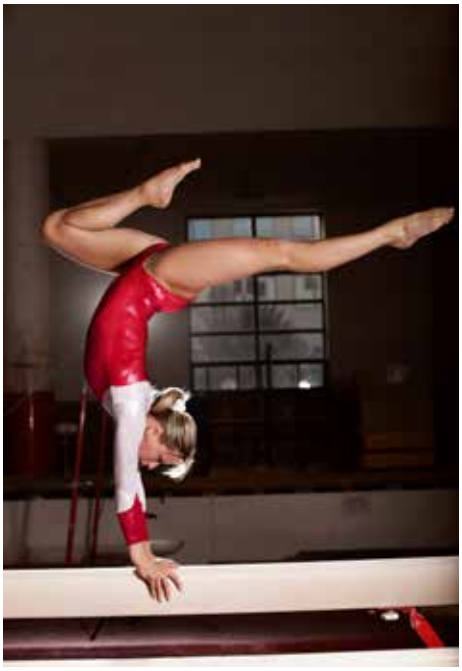
By Elizabeth Joy, MD, MPH, President, Female Athlete Triad Coalition

The Female Athlete Triad is a term used to describe three distinct but interrelated conditions, including, low energy availability, menstrual dysfunction and low bone mineral density. Low energy availability is a term that is used to describe the condition that occurs if a female has low stored energy (low body weight for height), and/or low energy intake (insufficient calorie intake) and/or high levels of energy expenditure (lots of physical activity and/or exercise). The state of low energy availability can result in disruption of the normal menstrual cycle or delay the onset of a female's first menstrual period. This is referred to as delayed menarche. Delayed menarche is defined as not having had your first menstrual period by age 15. In those females who have had their first period, but have low energy availability, their periods may get farther apart, or they may go away completely. Periods that occur every 35-90 days are referred to as "oligomenorrhea". Periods that are farther than 90 days apart, or completely absent, are referred to as "amenorrhea".

Low energy availability may occur unintentionally as a result of inadequate dietary intake relative to very high levels of exercise training. More often, it occurs as a result of intentional dietary restriction in the setting of disordered eating or an eating disorder such as anorexia nervosa or bulimia nervosa. A number of health problems can occur as a result of low energy availability leading to disrupted menstrual function. Infrequent or absent menstrual periods can result in low estrogen levels in the blood, which in turn leads to lower than expected bone mineral density. Amongst athletes, especially those that perform a weight bearing and/or impact sport like long distance running or basketball, the combination of these activities and low bone mineral density increases the likelihood of getting bone stress fractures. Stress fractures are serious injuries and can be a season ending and in some, a career ending injury.

Any female athlete is at risk for the Female Athlete Triad. However, athletes who participate in aesthetic sports like gymnastics, figure skating, diving and dance, or in sports where leanness confers a competitive advantage like long distance running, are more likely to be affected by any component of the Triad. We recommend that female athletes in high school and college undergo yearly preparticipation screening with a team physician or sports medicine physician who screens for the Triad with the questions listed in Table 1.

Athletes identified as having any one component of the Triad, should be carefully screened for the other aspects.



While disruption of the menstrual cycle is a relatively common consequence of low energy availability, it's important to make sure that other conditions are not resulting in menstrual disruption, specifically pregnancy and thyroid disease. Similarly, there are other conditions that can result in lower than expected bone mineral density. These conditions should be considered by a healthcare provider when evaluating an athlete with low bone mineral density.

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Table 1.
Female Athlete Triad Preparticipation Physical Evaluation Questions

- Have you ever had a menstrual period?
- How old were you when you had your "first menstrual period ?"
- When was your most recent menstrual period?
- How many periods have you had in the past 12 months?
- Are you presently taking any female hormones (estrogen, progesterone, birth control pills)?
- Do you worry about your weight?
- Are you trying to or has anyone recommended that you gain or lose weight?
- Are you on a special diet or do you avoid certain types of foods or food groups?
- Have you ever had an eating disorder?
- Have you ever had a stress fracture?
- Have you ever been told you have low bone density (osteopenia or osteoporosis)?

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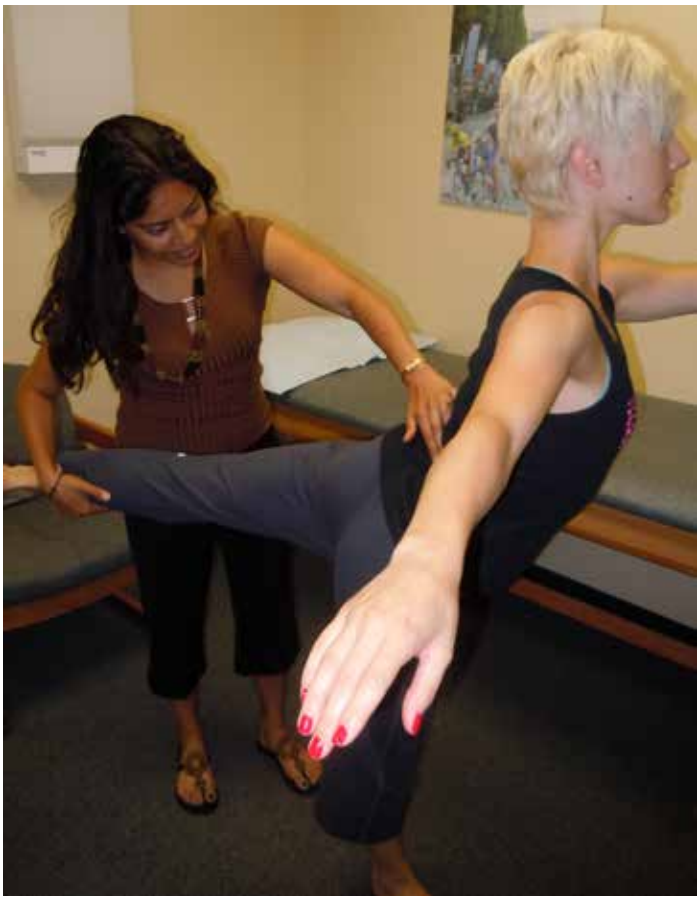

Comprehensive evaluation of the athlete affected by the Triad includes a physical and laboratory evaluation by a healthcare provider. Usually an evaluation of dietary intake by a registered sports dietitian, and oftentimes an evaluation by a mental health professional, especially if there is evidence of disordered eating or an eating disorder. Bone mineral density is often assessed using a tool called a DXA (pronounced DEXA) scan. The DXA scan provides a number of scores. In the high school, college and young adult female, the "Z-Score" is used to make clinical decisions and NOT the "T-Score". A Z-Score greater than 0 is normal. A Z-Score between -1 and 0 is still considered normal, but in the setting of the Triad should prompt discussion about the relationship between low energy availability, menstrual function and bone health – this is especially true if a prior DXA is available for comparison and was previously greater than 0. A Z-Score between -1 and -2 in a weight bearing athlete is concerning and would indicate that bone health has been negatively affected. A Z-Score less than -2 indicates significant bone loss.

Treatment of the Triad should be focused on establishing adequate energy availability to meet energy demands of exercise, activities of daily living and in the younger athlete, growth. Although every person's energy (or calorie) needs are different, research has found that achieving Energy Availability of 45 kilocalories per kilogram of fat free mass per day is associated with regular menstrual cycles. Fat free mass can be calculated (by measuring body fat percentage) or estimated. An example of this is provided in Figure 1. In this example of a 120 lb 18 year old female, she would require 2011 kcal per day to support healthy reproductive function.

A recent paper *(2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad*) written by members of the Female Athlete Triad Coalition, and published in the B*ritish Journal of Sports Medicine*, *Clinical Journal of Sports Medicine* and *Current Sports Medicine Reports*, and endorsed by several medical professional societies also outlines the use of medications that may be considered in the treatment of women and girls who are affected by the Triad. However, it bears repeating that the primary treatment efforts should be focused on achieving adequate energy intake and adequate stored energy relative to energy expenditure. Medications such as birth control pills to initiate or regulate menstrual function should be used in those cases as outlined in the Consensus Statement.

The Consensus Statement also provides physicians with guidance regarding clearance and return to play for athletes affected by the Triad. The paper developed a "Magnitude of Risk" tool that includes known risk factors that can be identified and scored leading to Risk Stratification and Recommendations. The risk factors included in this tool include: 1) presence or history of an eating disorder or disordered eating; 2) Current body mass index (BMI); 3) Age of first menstrual period; 4) Number of menstrual periods in the past 12 months; 5) Bone mineral density as measured by DXA scan; 6) History of bone stress fractures or stress reactions.

Using the Magnitude of Risk and Risk Stratification tools, a physician can then inform the athlete where she lies on the continuum, and develop a plan to achieve health and guide safe participation in sports or exercise.

In conclusion, exercise and sport participation improve health and quality of life for females of all ages. The Female Athlete Triad can be a consequence of participation, the same way that knee injuries can be a part of football participation. We should not discourage females from participating in sport, instead we should screen for risk factors and the conditions that make up the Triad, and treat it appropriately with the goal of returning the affected athlete back to her sport or activity.

Figure 1.
Calculating Energy Availability to Achieve Menstrual Regulation

18 years old
120 lb female
120 lb ÷ 2.2 = 54.5 kg
18% body fat
Fat Mass = 54.5 X 0.18 = 9.8 kg
Fat Free Mass = 54.5 – 9.8 = 44.7 kg
45 kcal X 44.7 kg = 2011 kcal/day

5 Things To Ask Your Doctor About Low Back Pain

By Bradford Mitchell, MD

1 What causes low back pain?

There are many causes of low back pain. Fortunately, the most common causes are not conditions that require urgent intervention. Muscle and/or ligamentous injury, irritation of small joints of the lower spine, and inflammation along lumbar discs are common causes of low back pain that often improve without targeted treatment. Low back pain is usually the result of either a single injury or from overuse. Using poor technique when lifting heavy objects is a common cause of low back pain, so ensuring you lift with your legs and get help with heavier objects can help prevent injuries. Rarely, things like nerve damage, fractures and even cancer can cause low back pain.

2 Is there anything I can do to improve my low back pain?

Yes. If you have a soft-tissue injury to your back, applying heat, stretching, and massage helps to prevent lower back muscles from becoming tight and can improve pain. Over the counter pain medications, such as Advil (Ibuprofen) and Aleve (Naproxen) can also help improve pain and inflammation.

3 When should I see a physician?

You should see a physician if heat, stretching, massage, and over the counter pain medications do not alleviate your pain, or if you have any additional symptoms that could be a sign of a more serious condition. Some of these more concerning symptoms (often called "red flag" symptoms) are fever, a recent fall or trauma, numbness, tingling, weakness, bladder or bowel changes or a history of cancer.

4 Should I get X-rays or an MRI?

Rarely. As studies show that the majority of low back pain is caused by conditions that improve with or without targeted therapy, it is only necessary to do imaging in cases where a reasonable period conservative management does not improve pain or in some cases where pain is also associated with red flag symptoms.

5 What are my treatment options if my pain persists?

For the small percentage of cases of low back pain that do not resolve after a period of conservative management, treatment is targeted at the underlying cause after the appropriate work up by your physician identifies the etiology. Often, those with low back pain for a period of time become deconditioned; a return to activity program can be helpful in these cases. For some conditions, physical therapy focusing on trunk, core, and lumbar spine muscles has been shown to help improve back pain. Rarely, prescription medications, steroid injections or surgery are indicated but only for certain conditions.

COACH'S CORNER

By Daren Molina, MD

Asthma is a common problem seen in athletes that involves wheezing, coughing, and difficulty breathing. As Spring rolls around, asthma and seasonal allergies may be more commonly seen in your athletes. It is common for athlete's with asthma to have exercise induced asthma (EIA) as well. Athletes with asthma can be at risk of having trouble breathing whether playing indoors or outdoors. Several steps can be taken to help your athletes participate safely.

1 PREPARE. Asthma may present for the first time during sports participation. The first line treatment for asthma involves inhaled albuterol. Albuterol inhalers should be available and labeled for each athlete with known asthma. Athletes with asthma should be identified during their pre-participation physical exams. They should be under the care of a doctor for their asthma. Paperwork for a therapeutic use exemption may be needed depending on the requirements of the sport's governing body.

2 IDENTIFY SYMPTOMS. A few of the most commonly seen symptoms in asthma are shortness of breath, trouble breathing, wheezing, coughing and chest pain. Athletes with EIA can begin to experience these during or after a workout. Many times athletes' asthma may become worse with colds and other upper respiratory infections so be aware they may need more breaks or additional monitoring under those conditions.

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3 PREVENTION. It is best to prevent EIA before it starts. Athletes with known EIA should use their medication prior to all workouts, including practices and games. This is usually two puffs of their albuterol inhaler given about 15 - 30 minutes prior to athletic activity. This medication is usually effective for 2-4 hours. Depending on the severity of their asthma, an athlete may be required to take other daily preventative medications, as prescribed by their doctor. Athletes with asthma commonly have concomitant seasonal allergies and eczema. Treating their allergies may help their asthma as well.

4 ON FIELD TREATMENT. Some athletes whose practices or competitions last over two hours may begin to show signs of their medication wearing off. If an athlete with known asthma begins to have trouble breathing, coughing, wheezing, or even chest pain, he or she should take two more puffs of their albuterol inhaler.

5 CALL FOR HELP. If an athlete with asthma is not improving after two rounds of two puffs each of inhaled albuterol, then emergency medical attention should be sought.

Choosing Wisely: Management of Female Athlete Triad

By Caitlyn C. Mooney MD

Choosing Wisely is an initiative of the American Board of Internal Medicine and supported by multiple medical societies, including the American Medical Society for Sports Medicine. Each society was asked to contribute five diagnostic tests or treatments that both physicians and patients should question. The highlight this quarter is the AMSSM's "number three" recommendation:

Don't prescribe oral contraceptive pills as initial treatment for patients with amenorrhea or menstrual dysfunction due to the female athlete triad (defined as low energy availability with or without disordered eating, menstrual dysfunction, and low bone mineral density).

The female athlete triad is a complex medical condition seen in physically active women and girls that includes a spectrum of conditions related to three inter-related components including: 1. Low energy availability (which may or may not include disordered eating or clinical eating disorders) 2. Menstrual dysfunction including amenorrhea 3. Low bone mineral density including osteoporosis. Early identification and medical management is important as athletes with any component of the triad are at risk for serious complications including eating disorders, stress fractures, osteoporosis/risk of low bone mineral density for life, reproductive dysfunction, as well as various other complications.

As the underlying cause of both menstrual dysfunction as well as low bone mineral density is less available energy than is required by the body for functioning the treatments that are most successful aim to eliminate this gap in energy. The goal of initial treatment is to reverse recent weight loss and both increase energy intake and decrease energy expenditure to eliminate the deficit. If an eating disorder is also present this will need to be treated as well. The goal is to have resumption of menses as this appears to be also required to normalize bone mineral levels, as estrogen also needs to be normalized to optimally increase the bone mineral density.

Oral contraceptives can be used to produce menses however it does not change the factors in the body that lead to the abnormal menstruation as well as the low bone mineral density. Thus while an athlete may resume having periods, she will continue to have metabolic factors that impair bone health. Thus treating the energy deficit and restoring spontaneous menstruation is the goal for treating the female athlete triad. If after a year of treatment aimed at increasing available energy through non- pharmaceutical interventions does not result in improvement, an oral contraceptive can be added to the initial management. Oral contraceptives alone have not been shown to increase bone mineral density and thus should not be used initially to address menstrual dysfunction in athletes, as it does not correct the underlying cause of the dysfunction that is an energy deficit.

Visit www.femaleathletetriad.org for more information about the symptoms, prevention, and management of this common condition. Additional information for medical professionals can be found in the ACSM's 2007 Position Statement on the Female Athlete Triad as well as the *2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad*.

Visit Choosing Wisely for more information on this campaign.

Choosing Wisely®
An initiative of the ABIM Foundation

Editor-in-Chief: Jeffrey Bytomski, DO AMSSM is a multi-disciplinary organization of 2,700 sports medicine physicians dedicated to education, research, advocacy and the care of athletes of all ages. The majority of AMSSM members are primary care physicians with fellowship training and added qualification in sports medicine who then combine their practice of sports medicine with their primary specialty. AMSSM includes members who specialize solely in non-surgical sports medicine and serve as team physicians at the youth level, NCAA, NFL, MLB, NBA, WNBA, MLS and NHL, as well as with Olympic teams. By nature of their training and experience, sports medicine physicians are ideally suited to provide comprehensive medical care for athletes, sports teams or active individuals who are simply looking to maintain a healthy lifestyle. Find a sports medicine physician in your area at www.amssm.org.