



# CENTER FOR THE FEMALE ATHLETE

*Presented by Sportsmetrics™ and Cincinnati SportsMedicine Research and Education Foundation*

## Relative Energy Deficiency in Sport (RED-S) & the Female Athlete Triad (FAT)

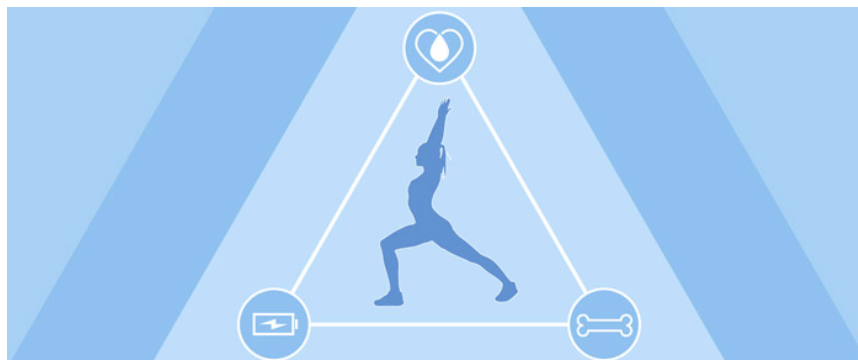
What athletes need to know for their health and athletic performance

### RED-S

The syndrome of RED-S refers to impaired physiological function including, but not limited to, **metabolic rate, menstrual function, bone health, immunity, protein synthesis, cardiovascular health** caused by relative energy deficiency. The cause of this syndrome is energy deficiency relative to the **balance between dietary energy intake and energy expenditure** required for health and activities of daily living, growth and sporting activities.

### FAT

The female athlete triad is a continuum of three different but interconnected health issues: **energy availability, menstrual function, and bone health**. FAT is secondary to inadequate energy intake in the face of high exercise-related energy expenditure, resulting in a net energy deficit and low energy availability

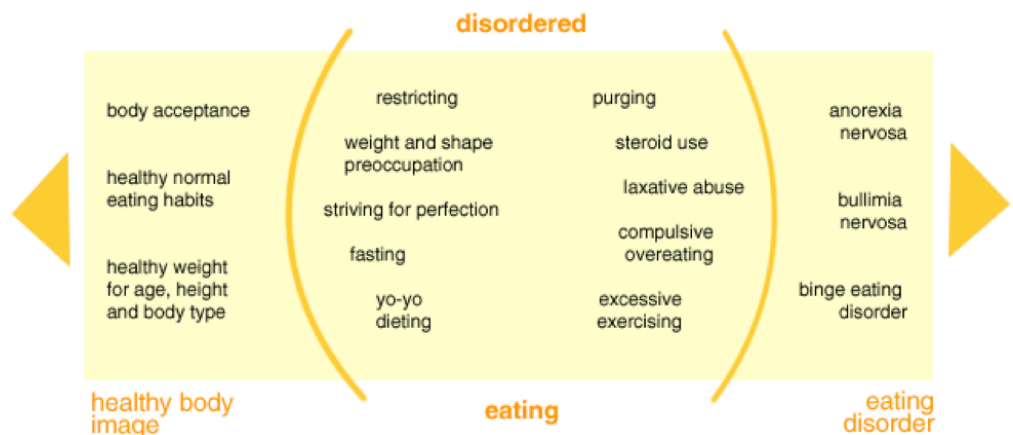


*60% of high performance athletes experience at*

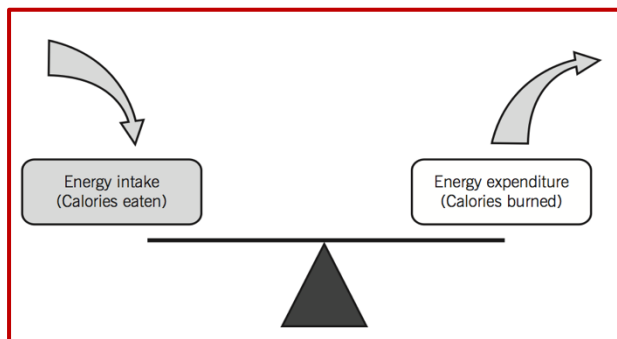
least one of the three FAT symptoms

Low energy availability is secondary to one of the following four pathways:

- (1) disordered eating,
- (2) intentional weight loss without disordered eating,
- (3) inadvertent undereating,



- (4) clinical eating disorders



What you need to know about energy availability...

A deficiency in energy is related to the balance between dietary energy intake (EI) and the energy expenditure (EE) required to support homeostasis, health and the activities of daily living, growth and sporting activities.

In order to perform at your best, your body needs fuel. How you fuel your body plays a critical role in maintaining proper energy stores

Risks to improper energy availability includes injury and illness such as...

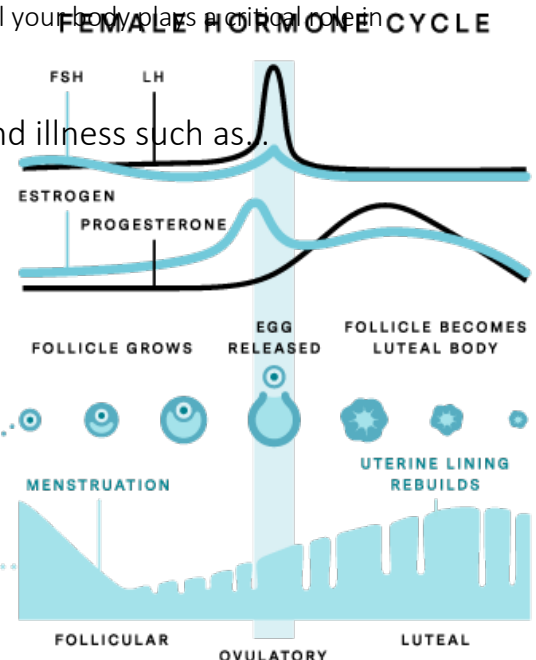
- **Menstrual dysfunction**

*Primary amenorrhoea*- no menarche by age 15 years

*Secondary amenorrhoea*- absence of three consecutive cycles post-menarche

*Oligomenorrhea*- a cycle length greater than 45 days

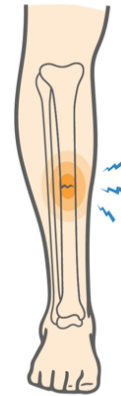
*Functional hypothalamic amenorrhea*- absence of menses, commonly associated with exercise and stress



*Athletes who don't have regular cycles  
are 2-4x at risk for stress fractures*

- A spectrum of disordered eating and clinical eating disorders

*It has been reported that 32% of female athletes regularly participate in weight control behaviors, such as self-induced vomiting and laxative or diuretic abuse whereas the prevalence of disordered eating in non-athletes is less than 5%.*



- Stress reactions and fractures

*When your body does not have energy availability, your body starts to break down your bones leading to stress related bone injuries.*

*Bone density is directly influenced by your hormonal and nutritional health therefore, if you have dysfunction in your menstrual cycle or in your eating, you may be at an elevated risk for a bone injury.*

*90% of a females peak bone mass is accumulated by the age 18.*

The first step in treating low energy availability includes meeting with a sports nutritionist to perform in-depth nutritional counseling. Diet quality also is an issue as this may directly related to bone health; calcium and Vitamin D intake must be adequate.

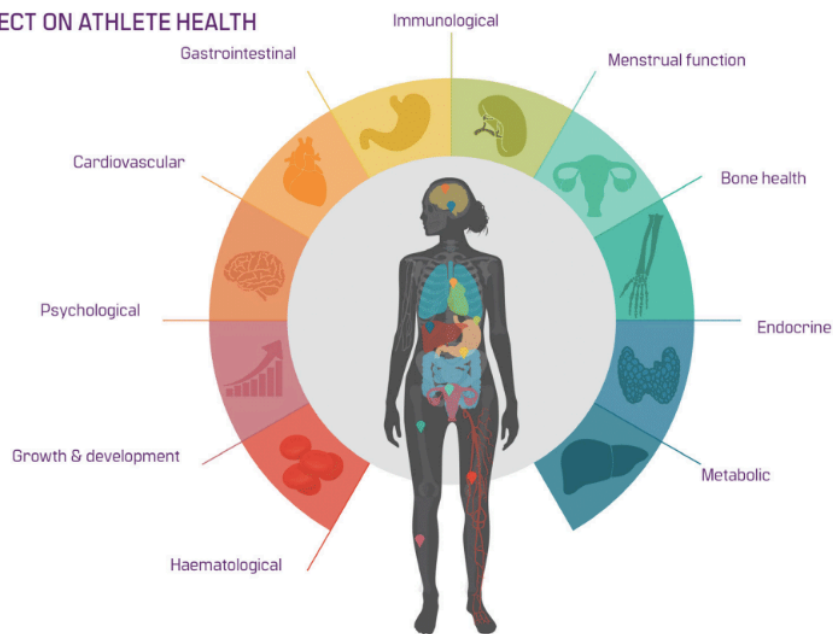
Maintaining optimal energy may be accomplished by either

*decreasing energy expenditure*

*or*

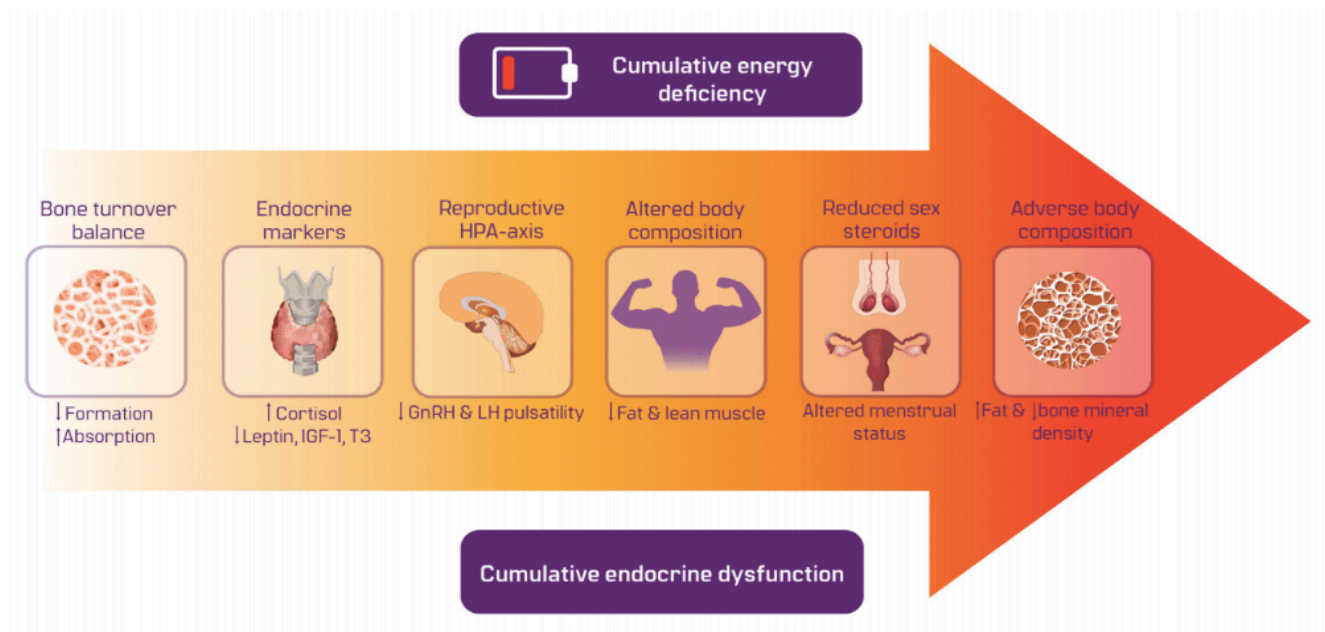
*increasing energy input.*

## EFFECT ON ATHLETE HEALTH



Talk with your doctor if...

- *You experience one or more elements of the female athlete triad*
- *If you have had fluctuations in your weight due to your sport*
- *If you have a restrictive diet*
- *If you have or have had a stress fracture in the past*



- *If you are experiencing any irregularities in your periods*

RED-S and FAT should be diagnosed and treated by a health care professional. Diagnosis and treatment will be different for every athlete depending on their risk factors. If you or an athlete you know is at risk, talk with your doctor to find resources in your area.

Sources:

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