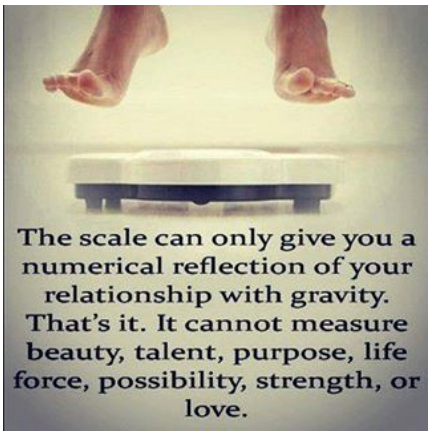
CALORIES



What is Energy Availability?

Energy availability (EA) is the amount of energy (from calories consumed) your body has left over after exercise to be used for normal physiological processes such as cellular maintenance and reproduction.

Causes of Low EA

Low EA usually results from not consuming enough calories to match the amount of energy expended during exercise. Disordered eating practices are a common cause of low EA but athletes who expend large amounts of energy during prolonged exercise training **can become energy deficient without eating disorders or dietary restriction**. Even the most well-intentioned athlete may have difficulty meeting their nutritional needs due to lack of knowledge, time and financial constraints.

Effects of Low EA

Menstrual Dysfunction

One study found that low EA caused a disruption in reproductive function regardless of the cause of low EA (i.e., exercise or caloric restriction). This was the first study to show that low EA and not the "stress" of exercise causes the menstrual dysfunction. **The prevalence of secondary amenorrhea (no menstrual cycle for > 90 days) among female endurance athletes can be as much as 10 times higher than the general population. It has been reported to be as high as 65% in long-distance runners.**

Difficulty Maintaining Muscle Mass and Recovering from Injury

When EA is low, carbohydrate, protein, and nutrient intakes are probably also low. Not consuming enough carbohydrates means the body relies more on protein during exercise and therefore, there is not enough protein to maintain and repair muscle tissue. **These dietary inadequacies can lead to increased risk of fatigue, muscle weakness, injuries and infections.**

Effects on Bone Health (Stress Fractures)

In athletic populations, incidences of stress fractures are generally highest among female runners and those athletes with low body fat may experience stress fractures linked to menstrual irregularities and/or low energy and nutrient consumption. Endurance runners compared to athletes participating in moderate to high-impact, non-lean-build sports show a significantly higher prevalence of low bone mass. **Menstrual irregularity, and the associated bone mineral loss, is associated with a greater incidence of stress fractures in runners.** A study of female collegiate runners found a much higher percentage of stress fractures in runners reporting and irregular menstrual history compared to runners reporting regular menstruation.

Suppresses Type 1 Immunity (Defense Against Viruses)

Endurance athletes frequently suffer from upper respiratory infections caused by viruses. One study surveyed Swedish team members participating in the Olympic Games (2002, 2004) and found that those participating in disciplines emphasizing leanness made more frequent attempts to lose weight, trained longer, and reported almost twice as many illnesses, primarily upper respiratory infections, during the preceding 3 months.

References

Beals, K.A. (2013). Nutrition and the Female Athlete: From Research to Practice. Boca Raton, FL: CRC Press.

Loucks, A.B., Kiens, B. & Wright, H.H. (2011). Energy availability in athletes. Journal of Sports Sciences, 29(1), S7-S15.

Wentz, L. Z. (2011). Females Have a Greater Incidence of Stress Fractures Than Males in Both Military and Athletic Populations: A Systemic Review. Military Medicine, 176(4), 420-430.

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