Cornell
Health

Relative Energy Deficiency in Sport (RED-S)

Live Well to Learn Well

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Appointments: Monday–Saturday

Check web for hours, services, providers, and appointment information

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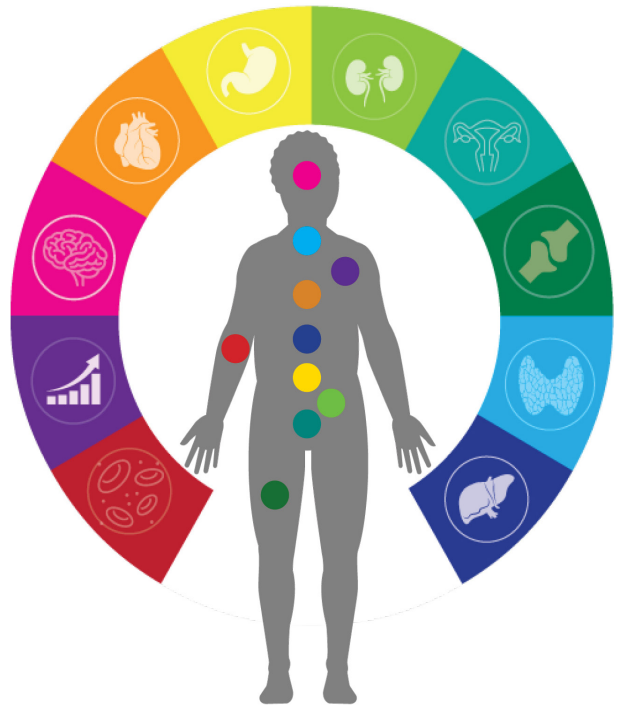
What is RED-S?

Relative Energy Deficiency in Sport (RED-S) describes a syndrome of poor health and declining athletic performance.

RED-S results from chronic **Low Energy Availability (LEA)**, which occurs when energy intake is insufficient to meet the energy required to fuel daily activities and training.

Adequate and consistent fueling strategies are key to avoid the negative performance and health consequences of LEA and RED-S. It's important to have enough energy ready and available to support your body's health, daily activity, academics, growth, and training. Recovery from exercise and healing from injuries also require additional energy and nutrients.



RED-S and LEA can negatively impact your cardiovascular, bone, metabolic, immunological, gastrointestinal, reproductive, and psychological health, and limit your athletic performance.

Symptoms of LEA & RED-S

- Fatigue – feeling tired most of the time
- Not seeing progress in training
- Unable to maintain or increase lean muscle mass
- Injury (having a reoccurring injury or an injury that does not heal)
- Illness (experiencing multiple colds/illnesses during the season)
- Low mood/depression
- Feeling irritable and/or unable to focus and concentrate
- Low iron (having difficulty maintaining healthy iron stores)
- Changes in reproductive function/hormones
- Irregular or absent menstrual cycles
- Lowered sex drive
- Gastrointestinal upset

Benefits of adequate fueling

- ☑ Energy to train harder = performance gains!
- ☑ Consistency of performance and longevity – performing well in the long-term
- ☑ Muscle/lean body mass gains
- ☑ Increased energy for focus in athletics and academic

How to avoid LEA & RED-S

Your body uses energy 24 hours a day. Fuel for the work required!

- Eat 3 meals a day, plus snacks. Include pre-exercise fueling and post-exercise recovery nutrition
- During heavy training, you may need to eat beyond your level of hunger. Focus on energy-dense nutritious foods like nuts, nut butters, dried fruit, cheese, granola, juice, milk/chocolate milk, and protein shakes.
- Eat adequate carbohydrates. About half of your plate should come from starches (i.e. rice, pasta/noodles, bread, potatoes, beans, cereals/oats).
- Balance your plate by including protein and fat sources at each meal.
- Remember to include "fun foods" or treats.
- Seek medical and nutrition advice through a Sports Dietitian or other health care provider.

Over

Fueling tips

Pre-exercise fueling ideas:

- Protein or fuel bar
- Energy chews
- Toast or toaster waffles
- Vanilla wafers
- Goldfish
- Pretzels
- Crackers
- Animal crackers
- Pita chips
- Dried fruit
- Fresh fruit

Recovery fueling ideas:

- Chocolate milk, a protein shake, or smoothie
- Greek yogurt or cottage cheese and fruit
- Protein bar (such as Clif Builder Bar or Gatorade Whey Protein Bar)
- Tart cherry juice with protein added (for example, Cheribundi protein drink)
- Sandwich with meat, hummus, or nut butter (for example, peanut butter and jelly sandwich)
- Cheese sticks and pretzels, pita chips, or fruit
- Glass of soy milk and vanilla wafers, gingersnaps, or animal crackers
- ... and/or have a complete meal within about 30 to 60 minutes after your training!

How to get support

Schedule an appointment with a Cornell Health nutritionist. Call 607-255-5155 or visit h*ealth.cornell.edu/appointments*.

NCAA athletes may also reach out to their team's sports nutritionist or athletic trainer.

Consequences associated with LEA & RED-S

Health effects:

- Hormonal alterations (such as decreases in testosterone production and menstrual dysfunction)
- Loss of bone density
- Risk of nutritional deficiencies
- Increased cardiovascular risk
- Increases in anxiety or depression
- Decreased immune function/ increased risk of illness
- Decreased growth and development/ decreased gains in lean body mass
- Suppressed metabolic rate and increased body fat storage

Performance effects:

- Decreased endurance
- Decreased muscular strength
- Decreased glycogen (energy) stores
- Increased injury risk
- Increased irritability
- Lowered training response
- Lowered coordination
- Decreased concentration
- Decreased judgement