

# Underfueling and REDs

Underfueling and Relative Energy Deficiency in Sport are complex physiological conditions. To put them in simple terms:



Underfueling: Energy Expenditure > Energy Intake  
(Calories Burned) (Calories Consumed)

Underfueling → Low Energy Availability (LEA)

Long-term LEA → Relative Energy Deficiency in Sport (REDs)

At all levels of the cascade, your body is not receiving the energy it needs to support optimal health and performance.

## Why does underfueling happen?

Underfueling can happen for a variety of reasons, including, but not limited to:

- **Misunderstanding nutrition:**
  - Not knowing daily energy needs
  - Not knowing the energy demands of training
- **Disordered eating behaviors:**
  - Fear of weight gain
  - Equating leanness with performance
  - Intense performance pressure
  - Attempts to reduce body weight
  - Intentional calorie reduction
- **Diet culture:**
  - Following restrictive diets such as:
    - Low carbohydrate diets
    - Intermittent fasting
    - Paleo
    - Keto
- **Poor planning:**
  - Not having food to eat at meal times
  - Not having snacks before, during, and after training
- **Stress:**
  - Decreased appetite
  - Concerns over stomach pain during training

## What are the consequences?

Underfueling impacts both performance and physiological function. The longer the body is underfueled, the more serious the complications that can arise.

### Performance

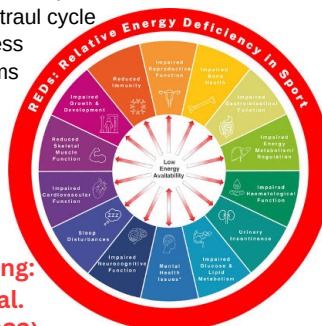
**Our muscles need energy to train, recover, and adapt. Without enough energy, all three will suffer. Complications can include:**

- Low motivation or low desire to train
- Sore muscles
- Persistent injuries or injury that won't heal
- Bone fractures
- Loss of lean muscle
- Decreased training performance
- Decreased competition performance
- Bonking during training
- Difficulty finishing training sessions

### Physiological Functioning

**Our body also needs energy to maintain our physical and mental health. With LEA, we can experience:**

- Mood swings
- Anxiety and depression
- Problems sleeping
- Altered hormonal regulation
- Altered menstrual cycle
- Loss of menstrual cycle
- Frequent illness
- Heart problems



(Further reading:  
Mountjoy et al.  
2014, 2018, 2023)

## How can I prevent it?

Prevention of LEA and REDs comes down to two ideas: Knowledge and Planning

- **Knowledge:**
  - Understand how much energy your body needs every day
  - Understand how much energy you expended during your training
  - Understand when you need to eat and fuel your body
  - Understand the signs of LEA
- **Planning:**  
Plan your...
  - Meals every day
  - Snacks throughout the day
  - Pre-training nutrition
  - Snacks for your rides
  - Post-training nutrition

### Practical Tips

1. Have quick, easy meals available at all times
2. Focus on high calorie snacks, such as trail mix or a PBJ
3. Carry snacks with you where ever you go
4. Add an additional snack to your day
5. Eat consistently throughout the day
6. Choose higher calorie drinks, such as Gatorade or lemonade

