

Relative Energy Deficiency in Sport (RED-S)

Athlete Information Sheet

What is RED-S?

RED-S is a state of athlete health where the functioning of multiple body systems and functions are impaired.

It is caused by a mismatch between energy intake from diet and the energy used in exercise.

When there is insufficient energy available, the body is unable to perform all its functions, resulting in a range of health and performance consequences.

This energy mismatch is known as “low energy availability (LEA)” and underpins the syndrome of RED-S.¹

RED-S may have serious short- and long-term health consequences, including reduced:

- ✓ Bone health
- ✓ Menstrual cycle function
- ✓ Energy metabolism
- ✓ Infection resistance
- ✓ Protein synthesis
- ✓ Cardiovascular health
- ✓ Psychological health

Common Symptoms of RED-S

- Altered menstrual cycle
- Fatigue, low energy
- Altered mood, poor concentration
- Under-performance, failing to improve
- Recurrent injuries
- Loss of enjoyment from sport
- Low mood

Who is at Risk of RED-S?

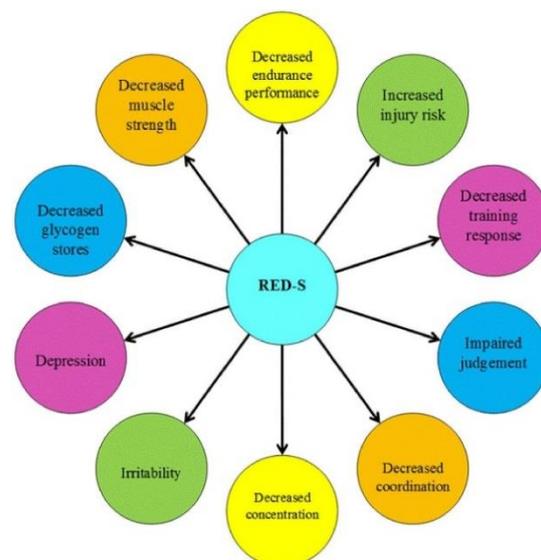
RED-S may affect both females and males.

New Zealand research has shown that over half of all active exercising females are at risk of LEA (and therefore RED-S).

Recreational athletes have been shown to have a higher prevalence of low energy availability (and therefore risk of RED-S) than their elite counterparts (which might reflect the education and support available for elite athletes).

Sports that have traditionally been more effected by RED-S include:

- those with an emphasis on leanness and physique (e.g. Gymnastics)
- Endurance sports where energy expenditure is significant (e.g. Distance running, cycling)



¹ For more detailed information on LEA refer to the [WHISPA LEA information sheet](#)

RED-S: Performance Consequences

In addition to direct health impacts, RED-S has a significant impact on athletic performance.

Specifically, RED-S results in a reduced:

- Response to training
- Competitive performance

Diagnosing and Treating RED-S

RED-S can be difficult to diagnose, and it may have multiple causes.

Where RED-S is suspected, a Medical Doctor should be consulted.

In an elite training environment, a full evaluation for RED-S may involve Doctors, nutritionists, psychologists, physiologists, coaches, and others.

A full 'work-up' for RED-S may involve a range of blood tests or imaging investigations.

Treatment for REDS includes:

- Recognition and Assessment
- Support from a multi-disciplinary team, led by a medical professional.
- Identifying and addressing causes
- Ensuring appropriate energy from the diet is consumed over time to meet the daily demands of exercise.
- Addressing energy expenditure through adapting training and competition loads, as necessary.
- Regular follow-up and review from the multi-disciplinary team.

Preventing RED-S

The key to preventing RED-S includes ensuring an adequate energy intake in relation to exercise needs. This may include:

A consistent approach to fuelling across the day with regular meals, snacks and recovery options that are appropriate in nutrients and total energy (calories).

Recognising that training days across a week and training phases throughout a year can be significantly different with regard to energy requirements – and energy intake should be modified to reflect this.

Avoiding prolonged periods without eating and optimising pre, during and post training or competition nutrition routines is vital to promote appropriate energy availability and reduce the risk of RED-S.

A performance nutritionist can assist in ensuring the energy you are consuming is appropriate for the demands of your sport.

For further information:

Speak with your HPSNZ medical, nutrition, psychology, or physiology team