RELATIVE ENERGY DEFICENCY IN SPORT

The female athlete

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Objectives

1. Define Female Athlete Triad, LEA, & RED-S
2. Identify high-risk RED-S signs & symptoms
3. Anticipate complications of RED-S to ensure patient safety & optimize performance
4. Define RED-S management principles

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A Moving Target ...

- ACSM 1992: Menstrual dysfunction + Energy imbalance + Bone health

Female Athlete Triad

Low Energy Availability (LEA)

- ACSM 2007: objective, equation for EA based on EEE

- BJSM 2014, IOC 2023: emphasis on spectrum of disorder & inclusivity

Relative Energy Deficiency in Sport (RED-S)

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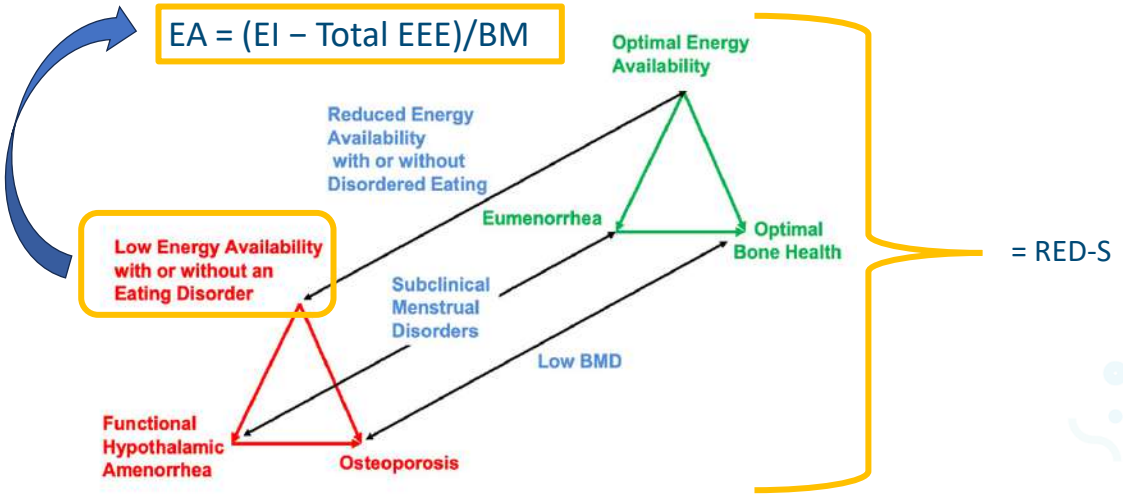
RED-S



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Epidemiology

Prevalence of secondary amenorrhea:

- General population: 2-5%
- Athletes/Sport: ???
  - Difficult to quantify, difficult to identify
  - Differs based on sport
    - 69% dancers
    - 62% runners
    - 33-60% of Nordic skiers*

Eating Disorders Awareness week, and a Brave Enough book excerpt!

https://jessiediggins.com/

*Smith EM, Drager K, Groves EM, Gabel L, Boyd SK, Burt LA. New approach to identifying elite winter sport athletes' risk of relative energy deficiency in sport (REDs). BMJ Open Sport Exerc Med. 2025 Jan 30;11(1):e002320. doi: 10.1136/bmjsem-2024-002320. PMID: 39897986; PMCID: PMC11784212.

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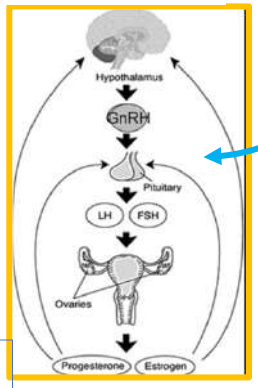
RED-S

2023 International Olympic Committee's (IOC) consensus statement on Relative Energy Deficiency in Sport (REDs)

Margo Mountjoy,[1,2] Kathryn E Ackerman,[3] David M Bailey,[4] Louise M Burke,[5] Naama Constantini,[6] Anthony C Hackney,[7] Ida Aliisa Heikura,[8,9] Anna Melin,[10] Anne Marte Pensgaard,[11] Trent Stellingwerff,[8,9] Jorunn Kaiander Sundgot-Borgen,[12] Monica Klungland Torstveit,[13] Astrid Uhrenholdt Jacobsen,[14] Evert Verhagen,[15] Richard Budgett,[16] Lars Engebretsen,[16] Uğur Erdener[17,18]



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Mountjoy M, Ackerman KE, Bailey DM, et al. Br J Sports Med Epub. doi:10.1136/bjsports-2023-106994.

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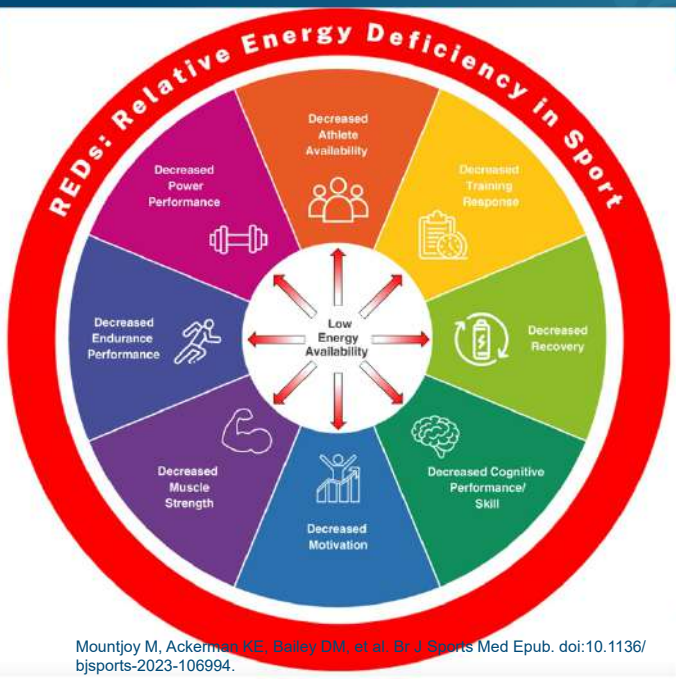
Patient Presentation



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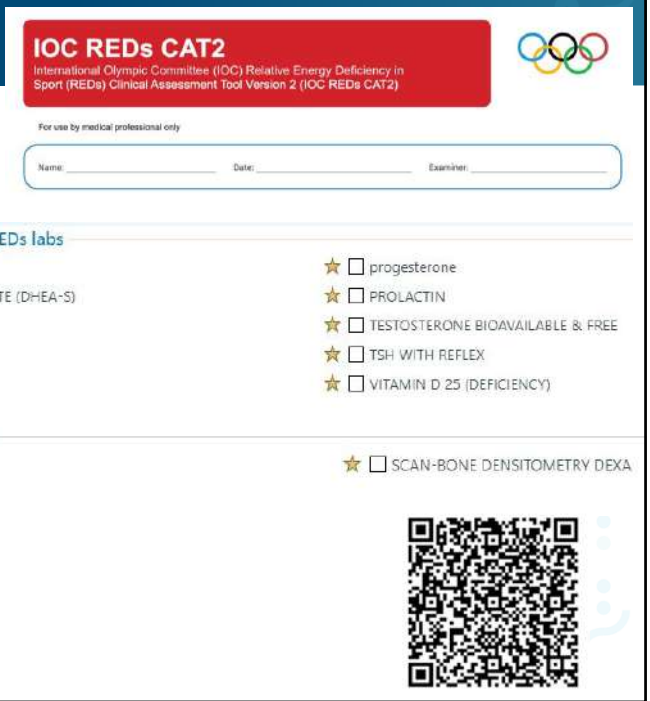
RED-S Screening

- **HPI**
  - Injuries: BSI?
  - Nutrition, DE
  - Repro: LMP, menarche,
    - Obstetric*
  - FHx
  - ROS***
- Objective/physical exam
  - VSS, weight *
  - PHQ-9, GAD-7, LEAF-Q,
  - Derm**
- Labs



IOC REDs CAT2

International Olympic Committee (IOC) Relative Energy Deficiency in Sport (REDs) Clinical Assessment Tool Version 2 (IOC REDs CAT2)

For use by medical professional only

Name: Date: Examiner:

female athlete REDs labs

- ☆ ☐ CALCIUM
- ☆ ☐ DHEA-SULFATE (DHEA-S)
- ☆ ☐ ESTRADIOL
- ☆ ☐ FSH
- ☆ ☐ HcG
- ☆ ☐ LH
- ☆ ☐ progesterone
- ☆ ☐ PROLACTIN
- ☆ ☐ TESTOSTERONE BIOAVAILABLE & FREE
- ☆ ☐ TSH WITH REFLEX
- ☆ ☐ VITAMIN D 25 (DEFICIENCY)

Stress Fracture

- ☆ ☐ *Calcium
- ☆ ☐ *Vit D-25
- ☆ ☐ SCAN-BONE DENSITOMETRY DEXA

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RED-S Screening

- "**severe** primary indicators"
  - **Primary amenorrhea:** menarche >15, or 14 w/o secondary signs
  - **Prolonged secondary amenorrhea >12 months**
  - low free T or total T
- "primary indicators"
  - **Secondary amenorrhea**: skipped menses, absence of 3-11 consecutive cycles
  - Sub-clinically low T or total T
  - 1+ **"high risk" stress fractures**
  - **2+ "low risk" stress fractures**
  - Sub-clinically low T3/Thyroid dysfunction
  - Deviation in growth curves in pediatric patients
  - **Abnormal DEXA scans**
  - Diagnosis of **DSM-V eating disorder**
- "**secondary** indicators"
  - Oligomenorrhea (>35days)
  - Elevated LDL or TC
  - Single "low risk" stress fracture within 6 months of menstrual changes

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DEXA Scans

T Score	Z Score
• Compared to female age at highest BMD (ie: late 20's) • Typically >65yo • Post-menopausal • **T-score < -2.5 = osteoporosis**	• Compared to an **age**-matched female with optimum BMD • Cannot compare to highest BMD (often younger than 30yo) • Used for (hopefully) menstruating pt • **Problematic if Z-score < -1.0** • **< -1.0 = LBM for WB athletes** • Most specific FN or Total Hip (whichever is lowest)

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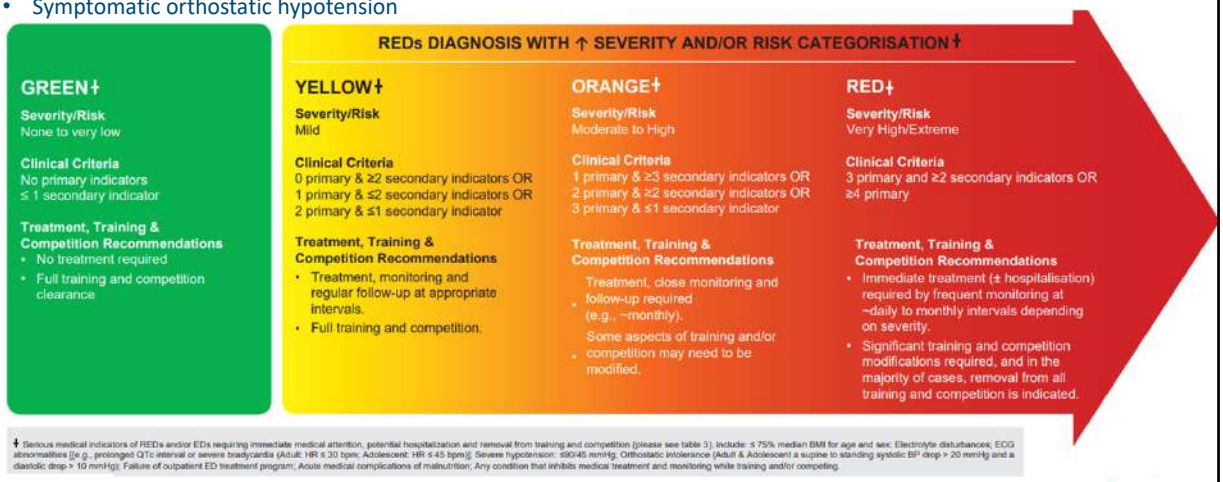
RED-S Management

Other potential indicators:

- extreme bradycardia <40bpm in adults, or <50bpm in adolescents
- Symptomatic orthostatic hypotension



https://stillmed.olympics.com/media/Documents/Athletes/Medical-Scientific/Consensus-Statements/REDs/IOC-REDs-CAT-V2.pdf

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RED-S Management

1. Ensure safety:
   - Risk stratification
   - Sport participation clearance
     - Role for "contracts"
2. Create a multidisciplinary medical team:
   - Team physician
   - Athletic trainer
   - Sports Nutrition / dietician
   - Sports psychologist / psychiatrist
   - +/- Endo, Gyn
   - **coaches
3. Diligent & frequent follow up:
   - Determined by medications started/stopped

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Take Home Points

1. Don’t be scared of the mensurating female
2. RED-S has complicated pathophysiology, but recognizing it doesn't have to be
   - RED CAT-2
3. Diagnosing RED-S is important for sport performance, but paramount for the athlete's long-term health

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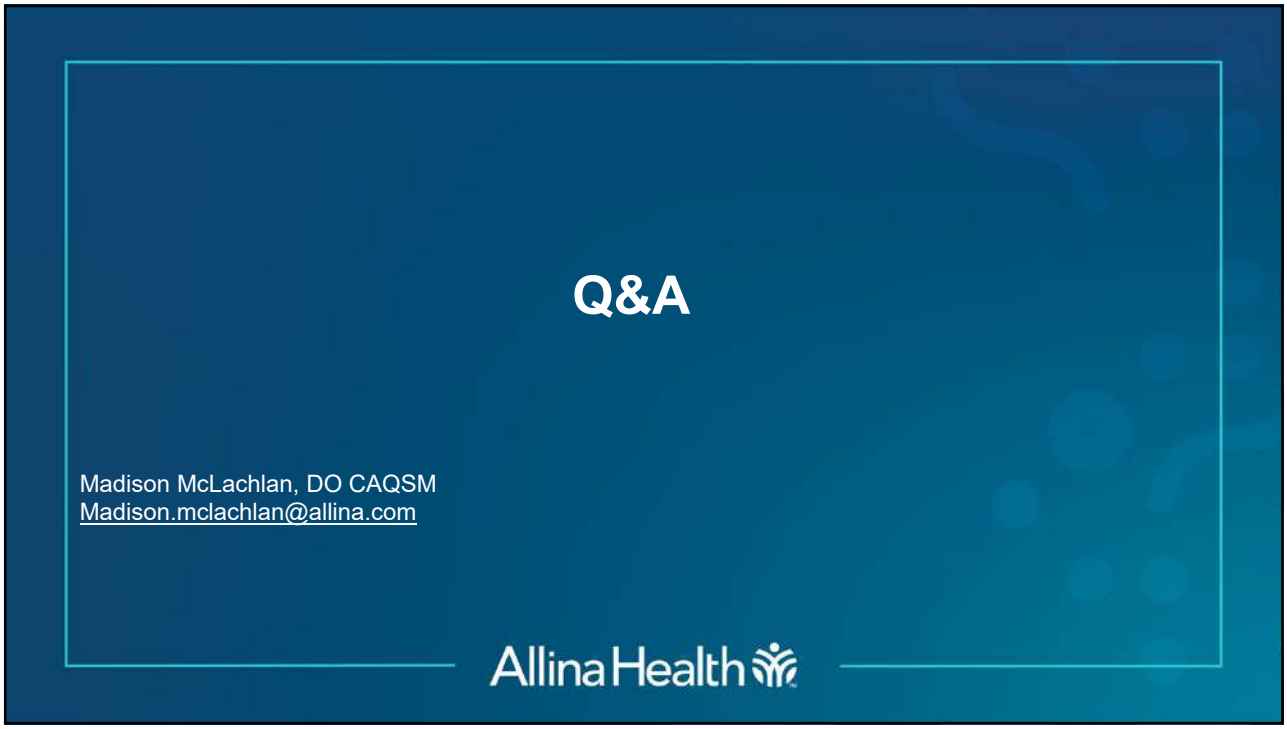
Q&A
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