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OVERTRAINING AND FATIGUE SYNDROME IN ELITE ATHLETES

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OVERTRAINING AND FATIGUE SYNDROME IN ELITE ATHLETES

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Definitions

Overreaching:
Excessive Exercise volume or intensity → reduced sport-specific athletic performance
Temporary impairment
Supercompensation → Increased performance

Functional overreaching
Increased training load
Short term (days – weeks)
Good: Supercompensation

Non-functional overreaching
Intense training load
Long term (weeks – months): 6 weeks – 8 months
Other symptoms: psychologic, neurologic, endocrinologic
Bad: Symptoms, time out of training

Overtraining Syndrome (OTS)
Maladaptive response to excessive exercise without sufficient rest
Extreme non-functional overreaching?
More than 2 months: 2 years – no recovery
Severe varied symptoms
Bad: symptoms, time out of training, secondary complications, potential career ending

OTS
Continuum from non-functional overreaching?
Additional stressor?
Multi-factorial?
Individual and unique to each athlete?

Prevalence
Overreaching:
Common
Up to 60%

Overtraining: Unexpected and Paradoxical Deconditioning
Much less common
Approx. 15%
Mostly studied in endurance athletes
Less evidence in resistance athletes
Common in Wrestling

OTS: Signs & Symptoms
Underperformance & Fatigue
Multi-system & severe
Hormonal, immunologic, neurologic, and psychologic impairments
Other background risk factors and harmful behaviour:
Insufficient intake of Carbohydrate, Protein, Calorie
Poor sleep habits and quality
Excessive cognitive effort

Sympathetic (anaerobic sports):
Insomnia
Irritability
Agitation
Tachycardia
Hypertension
Restlessness

Parasympathetic (aerobic sports):
Fatigue
Depression
Bradycardia
Loss of motivation
Other:
  Anorexia; Weight loss
  Lack of mental Concentration
  Frequent Muscles soreness
  Anxiety
  Unrefreshing sleep

OTS: Diagnosis
Challenging:
  Retrospective and duration dependent by definition
  No single diagnostic test or biomarker
  Multi-factorial
  Differential diagnosis
  Detailed thorough history and physical examination
  Training and competition load
  Recovery: awareness, appropriate duration and techniques
  Background harmful clinical behaviour
  Past Medical History
  Relevant systemic examination

OTS: Diagnostic tests
  Screening for organic conditions
  History and examination led
  asthma, thyroid disease, primary mood disorder, adrenal disease, diabetes, iron deficiency, anemia, infection, malnutrition, oncologic condition, rheumatologic condition, renal, liver disease, …
  Tests to consider:
  FBC, ESR, CRP, U&E, biochemistry and metabolic profile, Haematenics, CK, TFT, LFT, rheumatology screening, ANA, serum and salivary immunoglobulins, vitamin D, vitamin B12, folate, serologies for viral hepatitis, toxoplasmosis, cytomegalovirus/Epstein–Barr virus, …
    ✓ No definite biomarker
    ✓ Performance test (response to two maximal tests, 4 hours apart) + physiologic markers of deconditioning: differentiate between OTS and Non-functional OR
    ✓ ↓ GH, cortisol and prolactin response to non-exercise stimulation tests → ↓ pace and performance
    ✓ ↓ testosterone → ↓ muscle mass
    ✓ ↑ oestradiol & ↓ testosterone / oestradiol → psychological and metabolic:
        Depression, confusion, fatigue, reduced strength
        Muscle catabolic state, lower metabolic rate, higher body fat,

Screening & Prevention
  Multifactorial, Harmful behaviour and other Risk Factors
  Unique to individual athlete
  Principles of optimal load and monitoring

Regular monitoring
  External load: quantify training and competition load
    • hours of training, distance run, weight lifted, number of games played
    • other: life events, daily hassles or travel
  Internal load: physiological and psychological response
- RHR, Max HR, Rate of Perceived Exertion
- Well-being questionnaires, regular urinary hydration tests, body composition and weight monitoring

Identify early signs:
- abnormal body fat gain, paradoxical muscle loss, worse libido, mood

Summary
- Functional and non-functional overreaching vs overtraining syndrome
- Complex multi-factorial individual, not a single easy correlation with loading: unexpected paradoxical deconditioning?
- Diagnosis challenging, need to rule out possible organic causes
- Role of screening and monitoring in prevention