When Does Your Runner Need a Medical Work-up?

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I have no financial disclosures

- Philadelphia College of Osteopathic Medicine
- Family Medicine Residency at Lancaster General Hospital (PA)
- Sports Medicine Fellowship at Penn State Hershey Medical Center (PA)

- Family Medicine
- Sports Medicine
- Human Performance Laboratory
- Beaverton (Nike), Hillsboro (Orenco Station), and Marquam Hill (Hospital)
- Mountainside H.S.

"Who is your primary care provider?"
When does your athlete need a medical work-up??

1. Cardiovascular Risk

2. Exercise Intolerance
When one's ability to perform physical activity is limited by symptoms such as early fatigue, shortness of breath, chest pain, palpitations, or light-headedness that cannot be explained by deconditioning or a known medical condition:

**Cardiovascular Disease**
- Coronary Artery Disease
- HOCM or other congenital defect
- Arrhythmia

**Pulmonary obstruction or restriction**
- Asthma
- EIB
- Vocal cord dysfunction
- Restrictive Lung Disease

**Metabolic Myopathy**
- Glycogen storage diseases
- Fatty acid oxidation defects
- Mitochondrial disorders

**OHSU Human Performance Lab**
- Physical exam and History (personal and family)
- Labs (pre / post if indicated)
- EKG
- Spirometry
- Cardiopulmonary Exercise Test
22 yo female, DOE since 9th grade

- Hx anxiety
- Negative resting spirometry
- No response to SABA
- Cardiac workup including ekg, echo, and right heart catheterization
- Severe post exercise stridor
- Atrovent without aero chamber

When does your athlete need a medical work-up??

1. Cardiovascular Risk
2. Exercise Intolerance
3. Dietary Restrictions

Herbivores!!!

- Should monitor iron, B12, and vitamin D levels
- Consider B12, omega 3, iron, vitamin D and zinc supplement in all vegans
- Possible to consume adequate iron and calcium without eating meat
- Total caloric intake and total protein consumption

Iron (Ferritin)

- If fatigued, vegan, or vegetarian, or starting training block for endurance or high altitude event, consider getting labs done to check for iron deficiency and or anemia
- Ferritin and Hemoglobin
- Low iron an epidemic among endurance athletes, especially females
- IDA reduces V02 max
- Very low iron (even if normal hemoglobin) can lead to decreased endurance capacity and potentially associated with stress fractures
- Ferritin <25 – supplement w/ once daily iron with 50mg vitamin C
- Ferritin: 10-50 – Increase your intake of dietary iron (ferme preferred)
Iron (Ferritin)

- Ferritin < 30 – supplement w/ once daily iron with 300 mg vitamin C
- Ferritin 30-90 – increase your intake of dietary iron (herme preferred)
- High altitude athletes aim for >100
- Do not consume for 6 hours post exercise
- Vegetarians consuming non-herme forms of iron require 80% more than omnivores due to poor bioavailability
- If no improvement from oral supplementation, consider IV route

Blackstrap molasses 2 Tbsp 7.2
Lentils, cooked 1 cup 6.6
Tofu 4 ounces 6.4
Spinach, cooked 1 cup 6.4
Bagel, enriched 1 medium 6.4
Chickpeas, cooked 1 cup 4.7
Tempeh 1 cup 4.5
Lima beans, cooked 1 cup 4.5
Black-eyed peas, cooked 1 cup 4.3
Swiss chard, cooked 1 cup 4.0
Kidney beans, cooked 1 cup 3.9
Black beans, cooked 1 cup 3.6
Pinto beans, cooked 1 cup 3.6
Turnip greens, cooked 1 cup 3.3
Prune juice 8 ounces 3.0
Quinoa, cooked 1 cup 2.8

Protein: 1.2-2.0 g/kg/day
Carbohydrates: 5-10 g/kg/day
Fats: At least 20% of caloric intake
Calcium, Vitamin D, Iron
Beta-alanine, Beet juice, BCAA???

When does your athlete need a medical work-up??

1. Cardiovascular Risk
2. Exercise Intolerance
3. Dietary Restrictions
4. RED-S and Overtraining Syndrome
Clinical Case

- 37 year old female
- Completed first sprint triathlon in March
- Tri club participating in Olympic distance triathlon in September
- Training 4 days a week for sprint tri
- One month later, now training daily, and doubling at least 3 days a week
- Trying to loose a few pounds by watching what she eats and sticking to primarily vegetarian diet

Functional Overreaching (FOR)

Nonfunctional Overreaching (NFOR)

Overtraining Syndrome (OTS)

- Resting HR 89 bpm
- Weight decreased 15 lbs in 3 months
- Spouse reports increased stress at home
- 3 muscle strains in past 1 month
- Missed last menstrual period
- Asks how she can speed up recovery between workouts
- Fatigue

Diagnosis of Exclusion; rule out other possible causes

- Environmental allergies
- Exercise asthma
- Mono
- Lack of sleep
- Energy/calorie deficiency
- Mental health
- Iron deficiency
- Other causes

https://www.researchgate.net/figure/Graph-illustrating-a-classic-pattern-of-overtraining-This-athlete-shows-a-decreasing_fig4_311449464
Female Athlete Triad

The IOC consensus statement: beyond the Female Athlete Triad—Relative Energy Deficiency in Sport (RED-S)

Margo Mountjoy,1 Jørnun Sundgot-Borgen,7 Louise Burke,3 Susan Carter,4 Naama Constantini,7 Constance Lebrun,6 Nanna Meyer,7 Roberta Sherman,8 Kathrin Steffen,1,9 Richard Budgett,9 Anne Ljungqvist9

Female Athlete Triad

The Lost Generation?
When does your athlete need a medical work-up??

1. Cardiovascular Risk
2. Exercise Intolerance
3. Dietary Restrictions
4. RED-S and Overtraining Syndrome
5. Joint Hypermobility

Stress Fractures

• Definition
• Risk factors
• The spectrum
• Diagnosis
• Grading of fractures
• High risk sites
• Return to play

Can they be prevented?

Intrinsic Risk Factors
• Growth plate
• Age (puberty and elderly)
• Level of conditioning
• Anatomical factors
• Psychological factors
• Muscle imbalance
• Foot strike
• Gait
• Menstrual irregularities
• Caucasian

Extrinsic Risk Factors
• Training workload
• Competition schedule
• Sport specialization
• Equipment
• Footwear
• Environment / playing surface
• Psychological factors
• Recovery time
• Nutrition

Diagnosis

• Pain that increases during workout, or does not resolve post-workout
• Cannot be explained by other cause
• Brief period of rest / rehab ineffective
• Tenderness to palpation of the bone
• Hop test (single leg)
• X-ray
• Presume and treat, consider repeat x-ray
• High risk area, or clinically necessary, obtain MRI
• Labs and DEXA
• Consider nutrition and psychology
Location, location...

Low Risk
- Medial femoral neck
- Femoral shaft
- Posteromedial tibia (shin)
- Metatarsals 1,4 (feet)
- Calcaneus (heel)
- Fibula
- SI joint
- Pelvis

High Risk
- Lateral femoral neck (tension)
- Anterior tibia (shin)
- Navicular
- 5th metatarsal
- Medial malleolus

Treatment
- Low risk - at least 3-6 weeks
  - Non weight bearing until able to walk pain free
  - Introduce non weight bearing / low impact activity to maintain fitness
  - 2 weeks before impact training
  - Gradual return to sport
- High risk - at least 10-12 weeks
  - Surgical consultation
  - Non weight bearing at least 4-6 weeks
  - Partial weight bearing
  - Low impact activity

Education
- Address risk factors
- Gradual return
- Utilize cross training to build/maintain fitness

The body’s ability to withstand physical stress, and thus the volume and intensity of exercise, should be individualized to the athlete.
When does your athlete need a medical work-up??

- Cardiovascular Risk
- Exercise Intolerance
- Dietary Restrictions
- RED-S and Overtraining Syndrome
- Joint Hypermobility
- Stress Fractures
- Diagnostic Imaging or Therapeutic Intervention

Would an imaging study potentially change the...

Prognosis?
Treatment approach?
Psychological impact on the athlete?
Ability to participate in upcoming race/competition?

Call to action!

PDX Sports Medicine Research Collaborative

RCT: Return to running protocol for tibial stress fractures
Thank You

References


References

- JAMA Cardiol. doi:10.1001/jamacardio.2018.4628
- https://journals.lww.com/acsm-csmr/fulltext/2015/05000/Overtraining_Syndrome.7.aspx