Let's Excel Together
CANADIAN ACADEMY OF SPORTS NUTRITION

Lecture 50:

Post – Exercise Rhabdomyolysis

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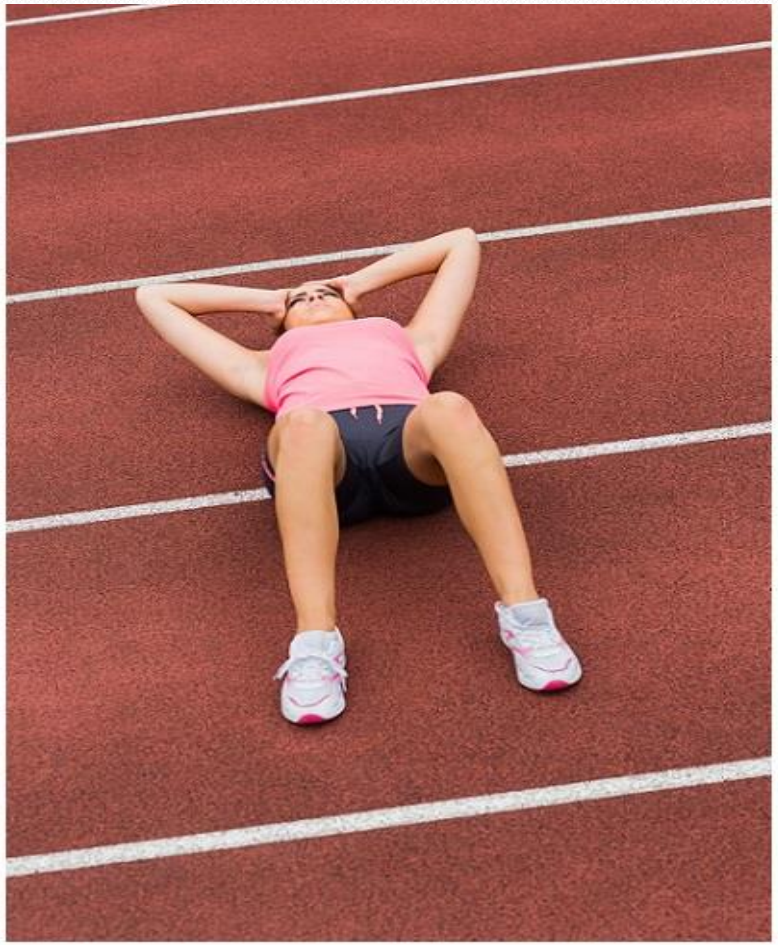
Rhabdomyolysis is the rapid breakdown of muscle fibers leading to the release of muscle protein named **myoglobin** in the blood stream followed by its appearance in the urine (**myoglobinuria**).

This condition occurs due to sudden and severe damages to muscle tissues during a strenuous exercise.

Untrained or amateur athletes are at greater risk for PER than elite athletes.

- **It is more common among athletes involved in aerobic activities, such as endurance runners especially marathon runners, cyclists, triathlons, soccer players, and football players.**



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- **Since athletes or health professionals notice this condition after a training or competition session, it is called as "post – exercise rhabdomyolysis (PER)" or "post – exercise myoglobinuria (PEM)".**

- **PER could happen in any sports and exercise.**

- **Myoglobin is an iron-containing protein in skeletal and cardiac muscles that gives the reddish color to them.**

- **It facilitates oxygen transfer to the mitochondria during intense exercise when intracellular oxygen starts declining.**

Other causes of rhabdomyolysis are:

- a) Crush injuries: car accident, falls, or building collapse such as in earthquakes.
- b) Severe burns.
- c) Prolonged seizures.
- d) Viral infections, such as flu and HIV.
- e) Electrical shock injuries, such as lightning strike.
- f) Muscular dystrophies.
- g) Low function thyroid.
- h) Polymyositis.
- i) Heat stroke.

- **j) Bacterial infections: salmonella, legionella, and tetanus.**
- **k) General anesthesia.**
- **l) Glycogen storage diseases.**
- **m) McArdle`s disease.**
- **n) Diabetic ketoacidosis.**
- **o) G – 6PD deficiency.**
- **p) Drug abuse: cocaine, amphetamine, phencyclidine, and heroine.**

- **q) Medications:**

1) Statins and fibrates (cholesterol – lowering agents).

2) Antipsychotic medications.

3) Antidepressant medications.

4) Diuretics.

5) Corticosteroids.

Potential risk factors among athletes for developing PER:

- a) Untrained athletes or beginners involved in an intense exercise.
- b) Exercise in a hot temperature.

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- **c) Previous history of PER.**
- **d) Unsolved pre – competition anxiety.**
- **e) Dehydration.**
- **f) Alcohol.**
- **g) Deficiency of the enzymes carnitine palmitoyltransferase I and II.**
- **h) Co – Enzyme Q 10 deficiency.**
- **i) Choline (vitamin B18) deficiency.**
- **j) Low levels of potassium, phosphate, and calcium.**

Signs and Symptoms of PER:

Mild forms of PER may not cause any noticeable symptoms. However, signs and symptoms in severe forms are:

- **a) Muscle weakness, aching, and tenderness.**
- **b) General weakness and fatigue.**
- **c) Dark, red, or cola colored urine.**
- **d) Sever exhaustion after exercise or a competition.**
- **e) Decreased urinary output.**
- **f) Swelling, bruise, or tenderness in affected muscles.**

- **g) Malaise.**
- **h) Feeling nauseous.**
- **i) Increased level of creatine kinase (CK) in the blood**
- **j) Increased potassium level (hyperkalemia).**
- **k) Decreased calcium level.**
- **l) Increased serum myoglobin.**
- **m) False positive results in urine for red blood cells.**

Complications of PER:

- a) Cardiac arrhythmias (irregular heartbeats) and cardiac arrest resulted from high levels of potassium.
- b) Damage to the kidneys.
- c) Compartment syndrome. It is an increased pressure within any enclosed spaces of the body (compartment), such as arms and legs. The excessive pressure compresses the arteries and nerves of the affected area leading to "5 Ps" (Pain, Paresthesia, Pulselessness, Paralysis, and Pallor).

Management and Nutritional Supports of PER:

- **PER requires an immediate medical attention due to life – threatening complications.**
- **The immediate and dangerous consequence of PER is hyperkalemia (a sudden increase in potassium level), which could lead to cardiac arrest and collapse during exercise or competition.**
- **Prevention is the best management.**

The following athletic and nutritional advices may help prevent from PER:

- **a) Avoid intense training sessions if you are an amateur or a beginner exerciser.**
- **b) Stop exercising if you felt sudden muscle ache and weakness.**
- **c) Avoid training in a hot weather.**
- **d) Avoid alcohol.**

- **e) Avoid caffeine.**
- **f) Stop taking creatine monohydrate if you were taking it already.**
- **g) Drink plenty of water before, during and after exercise.**
- **h) L – Carnitine: 3000 – 4000 mg a day. If you are competing in an endurance sport, have another 1000 mg about 30 – 60 minutes before competition.**

- **i) Co – Enzyme Q10: 200 – 300 mg a day with meals. If you are competing in an endurance sport, have another 100 mg about 30 – 60 minutes before competition.**

- **j) HMB (beta-Hydroxy beta-Methylbutyrate): 3000 – 4000 mg a day. If you are competing in an endurance sport, have another 1000 mg about 30 minutes before competition.**

- **k) Calcium: 1000 mg a day.**

- **l) BCAAs (branched-chain amino acids): 5 grams 30 minutes before training, 2 grams during training, and 3 grams within 30 minutes after training.**

- **m) Choline (Vitamin B18): 600 – 1200 mg a day. It is a new member of vitamin B family that may have a protective effect against PER.**

- **n) MCTs (Medium – Chain Triglycerides): 20 – 40 grams a day.**

- **o) Vitamin E: 400 – 800 IU a day. It may prevent exercise – induced muscle damage.**

- **p) A high quality multivitamins – multiminerals.**

Homework:

- **1) Describe the athletes who are at greater risk for developing PER.**
- **2) Describe your preventive measures to avoid developing PER.**