

# AI-03115 Thigh Muscle Cramp

Owner	© Rigel Arcayan
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Thigh Muscle Cramps (00033) A 59m endurance cyclist and swimmer, stent #1. 2008 (42) and stent #2 in 2010 and zero MACE since 2010 and been cycling in Cebu City for almost 4 years now. He knows hydration, nutrition and legs had been on high mileage per week with the recent previous record of 50 miles last week (around 5 hours of bike ride at noon time start). Today, he did the same route, same electrolytes but did 63 miles, finished around 6 hours at the same start time around noon. At hour 5, he started experiencing cramps in the right inner thigh upon exertion. He managed to replenish sustenance at one of the bake shop and consumed a bread with a meatball inside, 500ml of electrolytes and a banana. Post activity meal was just a banana and double espresso. He took a shower and attempted to take a nap but an acute onset of cramps in both of the inner thigh upon getting out of bed. Perform a DDX of incident and explain why now? He has been cycling for years but not 63 miles. The normal one day event is around 40 miles. What needs to change and countermeasure for cramping.

Excellent case. Let's perform a structured differential diagnosis and management analysis of this incident using a sports medicine and exercise physiology lens.

## **CASE SUMMARY**

Patient: 59M endurance cyclist & swimmer, with prior CAD and two stents (2008, 2010); no MACE since 2010.

Event: Completed 63 miles (6 hours) of cycling at midday heat in Cebu (~32–34°C).

Hydration/nutrition: Similar to previous rides (50 miles), used electrolytes; consumed ~500 mL during ride + banana + bread + espresso after.

Symptoms: Cramping started at hour 5 (right adductor) → bilateral thigh cramps after shower and rest.

Baseline: Weekly high mileage; typical rides 40 mi.

Notable difference: Longer duration (6 h vs 5 h), greater distance (63 mi vs 50 mi), mid-day heat.

## 1 DIFFERENTIAL DIAGNOSIS (DDx)

Possible Cause	Mechanism	Supporting Clues	Against
1. Exercise-Associated Muscle Cramps (EAMC)	Neuromuscular fatigue → increased $\alpha$ -motor neuron excitability, decreased Golgi tendon inhibition	Localized to active muscle group (inner thigh), occurs late in exercise or post-exercise, resolves with stretching	Most likely
2. Sodium/Fluid Depletion	Excessive sweat $\text{Na}^+$ loss → extracellular fluid contraction → altered muscle excitability	Cebu heat, >5 h ride, limited replacement (~500 mL)	Would likely involve multiple muscle groups; thirst, dizziness absent
3. Glycogen Depletion / Energy Deficit	Prolonged exertion → muscle energy exhaustion → altered $\text{Ca}^{2+}$ handling	Only light carb intake; 6 h ride; post-ride only banana + espresso	Strongly contributes
4. Peripheral Fatigue / Overuse	Neuromuscular junction fatigue with prolonged repetitive use	Longest ride to date; onset after 5 h	Fits pattern
5. Electrolyte imbalance ( $\text{K}^+$ , $\text{Mg}^{2+}$ , $\text{Ca}^{2+}$ )	Minor serum shifts under stress → excitability changes	Unlikely primary unless chronic low $\text{Mg}^{2+}$ intake	Possible additive role
6. Medication related (e.g., statin)	Myopathy, fatigue	If on statins post-stent	Needs verification

Primary DDx:

# Exercise-Associated Muscle Cramps (EAMC) due to neuromuscular fatigue compounded by mild sodium deficit and glycogen depletion.

## 2 WHY NOW?

A.

### Cumulative Fatigue Threshold

- 63 mi > habitual 40–50 mi rides = ~25–50% increase in duration.
- Adductor group likely under-trained for this distance/time.
- Neuromuscular fatigue decreased inhibitory feedback from tendon organs → sustained depolarization → cramp.

B.

### Heat & Sweat Loss

- Cebu mid-day humidity & radiant heat → ↑ sweat rate (1–1.5 L/h typical).
- Only ~500 mL electrolyte consumed = severe net loss (~5–7 L deficit) → muscle excitability changes.

C.

### Carbohydrate Deficit

- At 6 h of moderate-high intensity, glycogen likely near zero.
- Bread + banana insufficient → energy exhaustion → impaired ATP-Ca<sup>2+</sup> handling → prolonged contraction.

D.

### Post-exercise Circulatory Shift

- Shower + lying down → reduced venous return → transient ischemia in fatigued muscles → delayed cramp trigger.

### 3 WHAT NEEDS TO CHANGE

Domain	Problem	Adjustment
Hydration strategy	Underhydration ( $\leq 500$ mL/6 h)	Target 500–750 mL/hr in heat with 400–700 mg Na <sup>+</sup> /L (commercial electrolyte or DIY mix).
Fueling strategy	Insufficient carb intake	30–60 g carbs/hr (bananas, gels, bars, isotonic drinks). Pre-ride meal: 100–150 g complex carbs. Post-ride: 1 g/kg carbs + 0.3 g/kg protein.
Heat management	Midday start worsens dehydration	Shift start to early morning (5–6 AM); wear light-colored, ventilated kit.
Training load	Sudden jump from 50 → 63 mi	Increase long ride mileage by $\leq 10\%$ per week. Include adductor stretches & neuromuscular conditioning.
Post-ride recovery	Espresso only = poor replenishment	Include electrolyte + carb + protein recovery drink within 30 min.

### 4 COUNTERMEASURES & ACTION PLAN

**A.**

#### Acute Cramp Relief

- Immediate passive stretch of adductor (hip abduction).
- Gentle massage + electrolyte drink (with Na<sup>+</sup>/K<sup>+</sup>).
- Avoid lying flat right after intense rides.

**B.**

#### Preventive Routine

1. Pre-ride:
  - 500 mL electrolyte 1 h before.
  - Light carb breakfast (oatmeal, banana).
- 2.
3. During ride:

- 500–750 mL fluids/hr.
- 30–60 g carbs/hr (1 gel or ½ banana every 30–45 min).

4.

5. Post-ride:

- 1 L fluids + 60 g carbs + 20 g protein.
- Avoid only caffeine on empty stomach.

6.

7. Training:

- Include strength/stretch of adductors, hamstrings, quads.
- Replace long rides >5 h with progressive adaptation.

8.

**C.**

### **Medical/Metabolic Considerations**

- Check labs ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ) if recurrent.
- Review cardiac meds (diuretics, statins) for cramp risk.
- Annual cardiac check given stent history, though low current MACE.

✓ Summary Diagnosis:

**Exercise-Associated Muscle Cramps precipitated by neuromuscular fatigue, glycogen depletion, and mild sodium deficit during prolonged high-heat cycling beyond trained capacity.**

Would you like me to create a tabulated ride nutrition/hydration template (pre-, during-, post-) tailored to Cebu's climate and 5–6 hour endurance rides? It can serve as your reusable reference for all future rides.