

Rhabdomyolysis *“New Mascot of First Responders?”*



“RATTLESNAKE BITES AT 12 YEAR HIGH IN CALIFORNIA”

Rhabdomyolysis

Save the Date - Saturday July 14, 2018 - 11am to 5pm
GRAND OPENING
Los Angeles County Fire Museum at the Mayne Events Center

SPECIAL GUESTS

Randolph Mantooth

Kevin Tighe

Mike Stoker

Brendan McDonough
Granite Mountain Hotshot

LOS ANGELES COUNTY FIRE MUSEUM
16400 Bellflower Blvd
Bellflower, CA
www.LACountyFireMuseum.com
www.facebook.com/LosAngelesCountyFireMuseum

Presented by Bill Masten, Retired Los Angeles County Fire Chief

Rhabdomyolysis

What is Rhabdo?

Rhabdo= Striated

Myo= Muscle

Lysis= Breakdown

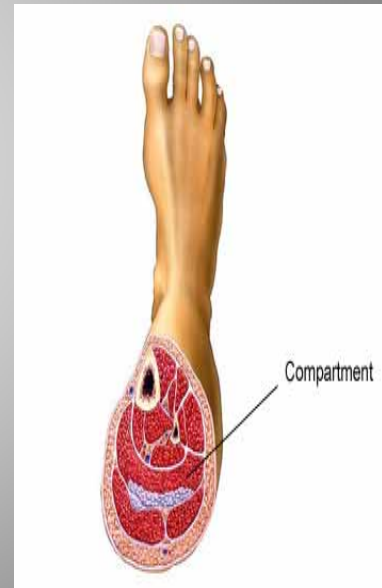
Rhabdomyolysis

- Condition where injured muscles release harmful substances into the bloodstream.
- These substances include **potassium**, **phosphate**, **creatin kinase**, and **myoglobin**.
- Large amounts of these substances may damage your kidneys and other organs.

Rhabdomyolysis

What are some causes?

- Crush Injury
- Compartment Syndrome
- Electrical Shock
- Burns
- Snake Bites & Spider Bites
- Prolonged Physical Exertion



Rhabdomyolysis

Risk Factors

- **Overexertion.**
 - **Poor conditioning.**
 - **Heat stress/stroke**
(working in extreme heat).
 - **Dehydration.**

Rhabdomyolysis

Risk Factors

- Prescription medications such as cholesterol-lowering **statins** and **antidepressants**.
- Over-the-counter medications such as **antihistamines**.
- **NSAID's**.
- Excessive **caffeine** intake.

Rhabdomyolysis

What can make you more susceptible?

- Pre-work out supplements.
- Energy Drinks.
- Hydration Strategy.

Rhabdomyolysis

30 Servings - Blue Razz

Serving Size: 1 Scoop (6.5g)
Servings Per Container: 30

Amount Per Serving	%DV **
Calories	5
Total Carbohydrate	1 g <1%
Vitamin C (as Ascorbic Acid)	250 mg 417%
Niacin (as Niacinamide)	30 mg 150%
Vitamin B6 (as Pyridoxal-5-Phosphate)	500 mcg 25%
Folic Acid	250 mcg 62%
Vitamin B12 (as Methylcobalamin)	35 mcg 583%
Calcium	20 mg 2%
Beta Alanine	1.6 g †
Creatine Nitrate	1 g †
Arginine AKG	1 g †
Explosive Energy Blend	371 mg †
N-Acetyl-L-tyrosine, Caffeine Anhydrous (150mg), Velvet Bean (Mucuna pruriens) seed extract, (standardized for L-Dopa), TeaCor™ Tetramethyluric Acid	

** Percent Daily Values (% DV) are based on a 2,000 calorie diet.
† Daily Value not established.

Other Ingredients:
Polydextrose, Natural & Artificial Flavors, Citric Acid, Malic Acid, Calcium Silicate, Silicon Dioxide, Sucralose, Acesulfame Potassium, FD&C Blue Lake #1.
TeaCor™ Tetramethyluric Acid is protected by Patents Pending, Serial No. 61/903,362; under exclusive global distribution by Compound Solutions, Inc.

What's in RSP Nutrition DyNO?

30 Servings - Fruit Punch

Serving Size: 1 Scoop (8.1g)
Servings Per Container: 30

Amount Per Serving	% Daily Value
Vitamin C (as Calcium Ascorbate)	60 mg 100%
Vitamin B3 (as Niacin)	75 mg 375%
Vitamin B6 (as Pyridoxine HCl)	.5 mg 25%
Folic Acid	200 mcg 50%
Vitamin B12 (as Cyanocobalamin)	6 mcg 100%
Vitamin B5 (as D-Calcium Pantothenate)	10 mg 100%
Calcium (as Dicalcium Phosphate)	64 mg 6%
Citrulline Malate	2,000 mg †
Beta Alanine (CarnoSyn™)	2,000 mg †
Agmatine Sulfate (AgmaMAX™)	500 mg †
Focus Blend	1,670 mg †
Taurine, L-Glycine, L-Tyrosine, N-Acetyl L-Tyrosine	
Acceleration Matrix	516 mg †
Caffeine Anhydrous, Dicafeine Malate (Infenergy™), Phenylethylamine Hydrochloride, N-Methyltyramine Hydrochloride, Higenamine Hydrochloride, Black Pepper Fruit Extract (BioPerine®), Rutaecarpine, Rhodiola Root	

* Percent Daily Values are based on 2,000 calories diet
† Daily value not established.

Other Ingredients:
Natural Flavors, Sucralose, Silicon Dioxide, Citric Acid, Acesulfame Potassium, and Red #40.
CAUTION: Product contains 400mg of pure Caffeine

Pre-Workout Supplements

Rhabdomyolysis

Sports/Energy drink brand Caffeine (milligrams)

- AMP Tall Boy Energy Drink, 16 ounces (oz.) 143
- Enviga, 12 oz. 100
- Full Throttle, 16 oz. 144
- Full Throttle Fury, 16 oz. 144
- Monster Energy, 16 oz. 160
- No Name (formerly known as Cocaine), 8.4 oz. 280
- Red Bull, 8.3 oz. 76
- Rockstar, 16 oz. 160
- SoBe Adrenaline Rush, 16 oz. 152
- SoBe No Fear, 16 oz. 174



Rhabdomyolysis

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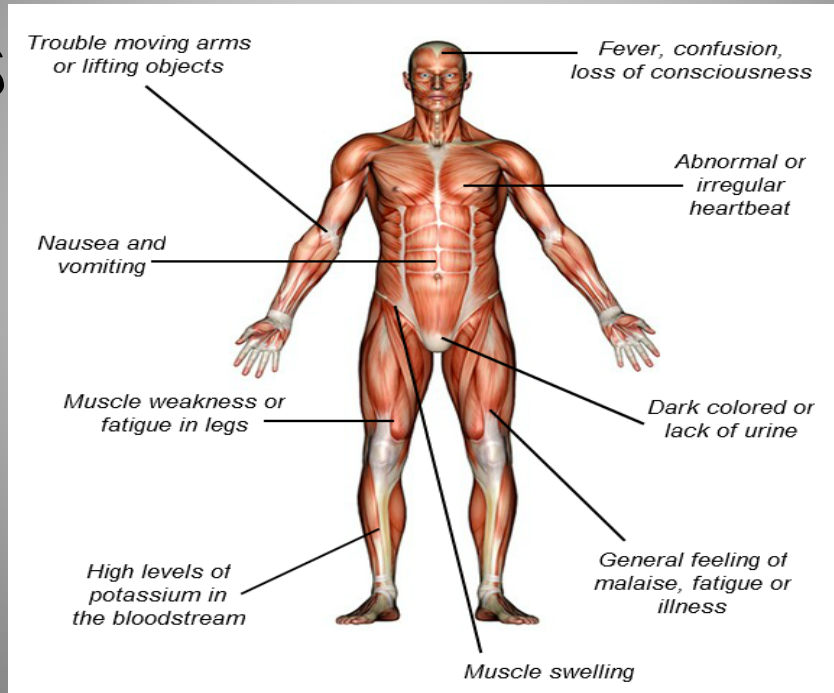
Rhabdomyolysis

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Rhabdomyolysis

SN's



Sx's

Rhabdomyolysis

Discolored Urine

Tea



Cola



Rhabdomyolysis

EKG Progression of Hyperkalemia

Mild
(5.5-6.5 mEq/L)



Peaked T Waves
Prolonged PR Segment

Moderate
(6.5-8.0 mEq/L)



Loss of P Wave
Prolonged QRS Complex
ST-Segment Elevation
Ectopic Beats and Escape Rhythms

Severe
(\geq 8.0 mEq/L)



Progressive Widening of QRS Complex
Sine Wave
Ventricular Fibrillation
Asystole
Axis Deviations
Bundle Branch Blocks
Fascicular Blocks

Rhabdomyolysis

How is rhabdomyolysis treated?

- Oral hydration.
- IV fluids (0-9% normal saline)
- Evacuation to ED for evaluation.
 - Serum CPK (Creatine Phosphokinase)
 - Serum +K
 - Urine pH
 - Cardiac Monitor

Rhabdomyolysis

Note: Crew leaders should print this page and carry it with them. In the event of a potential case of rhabdomyolysis, bring this sheet with you to the hospital, clinic, etc.

Exertional Non-traumatic Compartment Syndrome and Rhabdomyolysis in Wildland Firefighters

This wildland firefighter is presenting to your Emergency Department for evaluation of muscle pain along with possibly heat illness. Our wildland firefighters in the last several years have had an increased incidence of exertional non-traumatic compartment syndrome as well as rhabdomyolysis because of the prolonged exertion during fire response duties and training, carrying heavy loads (up to 110 lbs.) and arduous exertion for long periods of time across steep terrain. Several cases have become permanently disabling.

These firefighters tend to be stoic in regards to their injuries and pain, and don't normally complain of much until they can't deal with it. As a result, the pain tends to be an acute onset complaint. These two diagnoses are rare, often initially misdiagnosed, and difficult to identify, but please consider them high in your differential, so that we can keep these firefighters doing a job they love.

Classic signs/symptoms:

- Muscle pain/cramping
- Swelling of affected area of limb
- Weakness/decreased ROM of affected limb
- Dark, tea colored urine in rhabdomyolysis

Consider:

- Check serum CPK
- Value is considered positive if 5X's greater than the upper limit of that assay's reference range or above 1000 IU/L²
- If normal but high suspicion, admit for observation and serial CPK's q6hr x 12-24 hr¹

1. Criddle LM [2003]. Rhabdomyolysis: Pathophysiology, Recognition, and Management. *Crit Care Nurse* 23(6):14-30.
2. Khan FY [2009]. Rhabdomyolysis: A Review of the Literature. *Netherlands J Med* 67(9):272-283.

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Physicians Handout

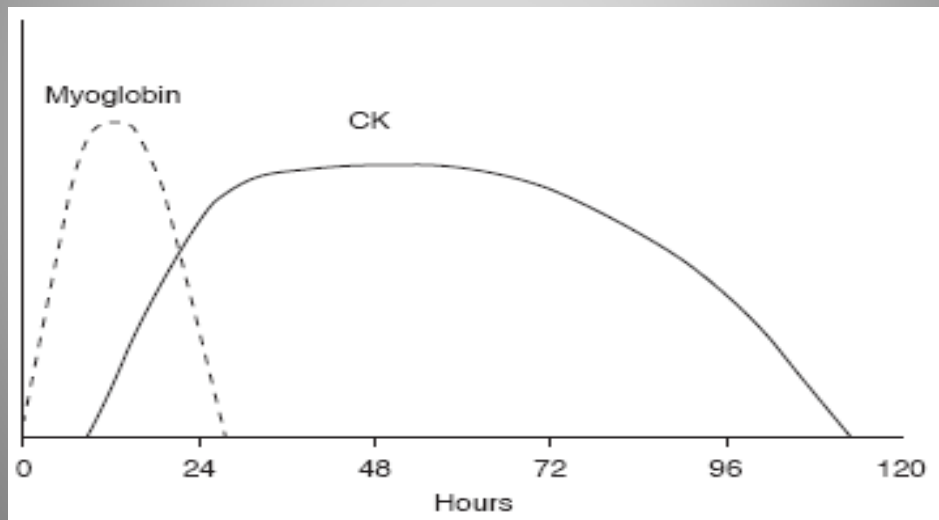


www.wildfiretoday.com/documents/Rhabdo_5_9_16.pdf

Rhabdomyolysis in Wildland Fire A review of reported cases

Rhabdomyolysis

Variations of Myoglobin and CPK during Rhabdomyolysis



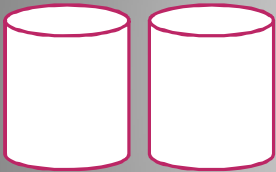
Rhabdomyolysis

Prevention is the key

- Conditioning
- Hydration
- Nutrition
- Listening to your body

Rhabdomyolysis

Hydration Strategy



2 - waters



1- Hydration Solution






Rhabdomyolysis



Rhabdomyolysis

Elite Hydration Science
 Low osmolarity and more sodium are the marks of medical grade hydration.

The Drip Drop Advantage

	Drip Drop	Sports Drinks	Pediatric Drinks	Apple Juice	Coconut Water
					
Osmolarity (mOsm)	235	355	250	730	288
Sodium (mEq)	60	20	45	0.4	4
Potassium (mEq)	20	3	20	26	79
Sugars (g)	24	55	24	116	45
Calories	125	200	95	480	170

All measurements are per 32 oz, 4 packets.

Osmolarity is important for keeping proper electrolytic balance in the blood stream.

Rhabdomyolysis

Returning to work

Phase One

1. Rest for 72 hours-oral hydration
2. Sleep 8 hours each night
3. Avoid excessive heat or cold
4. Follow up within 72 hours to repeat blood and urine tests (CPK levels)

Rhabdomyolysis

Returning to work

Phase Two

1. If tests normal, begin light activity, no strenuous physical activity.
2. Gradually increase light activity at your own pace for one week.
3. Follow up with PMD to assess full activity, (asymptomatic and normal blood/urine values).

Rhabdomyolysis

Returning to work

Phase Three

1. Gradually return to full physical activity, monitor for any return of symptoms.

High risk factors for Rhybdo reoccurrence

- CPK levels over 100,000.
- Heat stroke/exhaustion.
- Kidney injury
- Longer then normal recovery times.
- Muscle cramps and tenderness frequency.
- Suffered compartment syndrome.

Rhabdomyolysis



Questions??

Rhabdomyolysis

Test Questions:

1. Rhabdomyolysis is caused by an injury to a long bone. (T) (F)
2. A sign of Rhabdo may be discolored urine. (T) (F)
3. Physical exertion can cause Rhabdo. (T) (F)
4. Energy drinks help prevent Rhabdo. (T) (F)
5. Rhabdo can cause high potassium levels. (T) (F)

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Rhabdomyolysis

Thank You!