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FROM : National Wildfire Coordinating Group

REPLY TO : NWCG@nifc.gov

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SUBJECT : SAFETY ADVISORY : Rhabdomyolysis Epidemiological Study Results and Recommendations

May 10, 2011

Rhabdomyolysis Epidemiological Study Results and Recommendations

In December of 2010, the NWCG Risk Management Committee (RMC) requested a study, called an EPI-AID, through the Centers for Disease Control and Prevention (CDC). Since this type of study involves risk factors unique to a work environment, the National Institute for Occupational Safety and Health (NIOSH) provided technical assistance.

The CDC and NIOSH completed their case study and below is a summary of their conclusions and recommendations.

Rhabdomyolysis is the breakdown of muscle fibers resulting in the release of muscle contents (myoglobin) into the bloodstream. These releases can cause multiple symptoms and if left undiagnosed, can lead to kidney and muscle damage, and in rare cases results can be fatal.

The CDC Study concludes that the 10 cases of rhabdomyolysis they studied among wildland firefighters occurred during or close to either physical training or actual fire response activities involving high levels of physical exertion, often carrying heavy packs. Despite carrying the prescribed water supplies, dehydration played a significant role in over half the cases. Lack of acclimatization, use of medications or dietary supplements such as creatine, as well as caffeine intake, and other health conditions such as upper respiratory tract infections and flu-like

illnesses also were likely contributing factors.

The 10 firefighters varied in age, type of wildland firefighter unit, assignment geography, symptoms, and outcomes. In half of the cases symptoms started on the first day of training, a new crew assignment, or the first day after completion of a fire response. The time between symptom onset and reporting of symptoms to supervisors varied from 30 minutes to 2 days. The time between symptom onset and arrival to a medical facility varied from 1 hour to 6 days. Five firefighters experienced disability for at least 3 months following discharge, and three of these have permanent disability.

In some cases, firefighters' personal ethic to "tough it out" led to delays in reporting symptoms to supervisors. Lack of knowledge about rhabdomyolysis contributed to delays in reporting and diagnosis of symptoms, which led to delays in medical treatment. In a third of the cases, there were delays in diagnosis or missed diagnosis of the condition by health care providers.

Based upon medical literature research and this study, the following are some key recommendations provided by CDC and NIOSH (the full case study report can be viewed on the RMC website at: <http://www.nwccg.gov/branches/pre/rmc>):

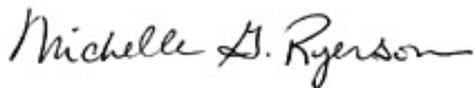
- 1) Provide the wildland fire community and health care providers with education materials as created by the CDC and NIOSH (**attached**).
- 2) Instruct those with signs or symptoms of rhabdomyolysis (or those accompanying the ill patient) to remind their healthcare provider that they are at risk of this condition due to the nature of their work and to ask for a blood test that identifies Creatine Kinase (CK) level.
- 3) Build flexibility into physical training programs for significant changes in weather. When ambient temperatures are much warmer than normal for the geographic area that firefighters are accustomed to working in, supervisors should increase the frequency of scheduled hydration breaks, and decrease weight of packs and gear carried in early part of training season.
- 4) Consider redesigning physical training program schedules to maximize physical conditioning safely. This may include redesigning of training schedule to allow a gradual increase of physical exertion rather than having the period of maximal physical exertion fall on the first few days of training. Also, use longer duration, submaximal exercise routines instead of repetitive exhaustive exercise routines. (FireFit offers a well rounded wildland firefighter fitness program: www.nifc.gov/Firefit)
- 5) Ensure new and returning firefighters are in good health and have

completed off season conditioning prior to engaging in rapid strenuous training routines.

The RMC's focus is on prevention and rapid medical response. We encourage these recommendations be implemented at the field level and the provided education materials are widely distributed and posted in common areas and provided to healthcare providers when firefighters seek medical care for heat/overexertion related medical conditions. Other longer term recommendations are being vetted through the RMC for consideration.

In addition to your agency-required illness and injury reporting system, please report any cases of rhabdomyolysis through the SAFENET system <http://safenet.nifc.gov/> so that these events can be tracked and we can improve trend tracking and mitigations. The ISUITE Injury/Illness module should also be utilized during large incidents so that incident related injuries and illnesses can be better tracked.

If you have questions or comments, please contact your agencies RMC representative (<http://www.nwcg.gov/branches/pre/rmc/contactus.htm>).



Michelle G. Ryerson
RMC Chair



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Rhabdomyolysis (often called rhabdo) is a medical condition resulting from the breakdown of damaged muscle tissue. Due to prolonged physical exertion, wildland firefighters are at increased risk for rhabdomyolysis. If not recognized and treated early, rhabdomyolysis can cause permanent disability and may be fatal.

What can increase your risk for rhabdomyolysis?

- Over-the-counter medications such as decongestants and antihistamines
- Certain antibiotics
- Dietary supplements such as creatine
- Some weight loss products
- Cholesterol lowering drugs known as statins
- Excessive caffeine intake

What are the signs and symptoms of rhabdomyolysis?

- Muscle aches or pains out of proportion for the amount of exercise done
- Muscle cramping
- Tea-colored or cola-colored urine

Rhabdomyolysis is often mistaken for heat stress and dehydration. It can occur in well-conditioned athletes doing their usual workouts, so DO NOT ignore these symptoms.

What wildland firefighters need to know



Rhabdomyolysis in Wildland Firefighters

Rhabdomyolysis can have deadly and debilitating consequences if not correctly identified in a timely manner. The symptoms of rhabdomyolysis can mimic those of heat stress and dehydration.

Share this with your healthcare provider

Due to the prolonged exertion wildland firefighters may undergo during training and fire response activities, they are at increased risk for rhabdomyolysis. Carrying heavy loads (e.g., pack weights up to 110 lbs) across steep terrain, heat stress, and dehydration are exacerbating factors encountered by firefighters as they do their job. Recently, several cases of rhabdomyolysis have been diagnosed in wildland firefighters with some becoming permanently disabled.

Clinicians should have a high index of suspicion for rhabdomyolysis in wildland firefighters who present for treatment for heat stress and dehydration, muscle pain, or exercise intolerance. **A serum creatine phosphokinase (CK or CPK) should be performed in wildland firefighters to ensure early diagnosis so that aggressive treatment can start as soon as possible.** Urinary dipsticks to check for myoglobin in the absence of red blood cells are not an accurate screening tool for rhabdomyolysis. Only a serum CPK can confirm or exclude this diagnosis.

Help keep our wildland firefighters safe by asking all patients about their work. Have a high suspicion for rhabdomyolysis among those who are wildland firefighters.



How do I know if I have rhabdomyolysis?

The only sure way is to seek medical care. A licensed healthcare provider will determine if you need to have a serum creatine phosphokinase (CPK or CK) test to look for muscle proteins in the blood. You cannot tell by symptoms alone if you have rhabdomyolysis.

Severe cases of rhabdomyolysis require hospitalization to monitor the heart and kidneys and to provide emergency treatment for dangerous heart rhythms and loss of kidney function. High rates of intravenous fluids are needed to flush out the muscle proteins and electrolytes without damaging the kidneys. If the kidneys fail immediate dialysis is needed. Sometimes kidney function does not recover, requiring a lifetime of dialysis.

Rhabdomyolysis can be treated without complications if it is recognized early.

What should I do if I have symptoms?

Listen to your body! If your muscles hurt more than expected, if you can't tolerate exertion that you previously could, or if your urine turns unusually dark you should:

- Stop your current activity
- Tell your supervisor or trainer about your symptoms
- Seek immediate care at the nearest medical center
- Ask to be checked for rhabdomyolysis

Reporting your symptoms is not a sign of weakness.

Early detection could save your career and your life!

