This document was generated to provide recruits with information regarding a potentially serious medical condition that they should be aware of when conducting any vigorous training program like a law enforcement academy.

Rhabdomyolysis is a serious syndrome due to a direct or indirect muscle injury. It results from the death of muscle fibers and release of their contents into the bloodstream. This can lead to complications such as renal (kidney) failure. This occurs when the kidneys cannot remove waste and concentrated urine. In rare cases, rhabdomyolysis can even cause death. However, prompt treatment often brings a good outcome. Here's what you need to know about rhabdomyolysis.

Rhabdomyolysis Causes

There are many causes of rhabdomyolysis. The most common causes include:

- The use of alcohol or illegal drugs such as heroin, cocaine or amphetamines
- *Extreme muscle strain, especially in someone who is an untrained athlete. This can happen in elite athletes too, however. And it can be more dangerous if there is more muscle mass to break down.*
- A crush injury such as from an auto accident, fall, or building collapse
- Long-lasting muscle compression such as that caused by prolonged immobilization after a fall or lying unconscious on a hard surface during illness or while under the influence of alcohol or medication
- The use of medications such as antipsychotics or statins, especially when given in high doses

Other causes of rhabdomyolysis include:

- Electrical shock injury, lightning strike, or third-degree burn
- A very high body temperature (hyperthermia) or heat stroke
- Seizures
- A Metabolic disorder such as ketoacidosis
- Diseases of the muscles (myopathy) such as congenital muscle enzyme deficiency or Duchenne's muscular dystrophy
- *Viral infections such as the flu, HIV, or herpes simplex virus*
- Bacterial infections leading to toxins in tissues or the bloodstream (sepsis)

A previous history of rhabdomyolysis also increases the risk of having rhabdomyolysis once again.

Rhabdomyolysis Signs and Symptoms

Signs and symptoms of rhabdomyolysis may be hard to pinpoint. This is largely true because the course of rhabdomyolysis varies, depending on its cause. And, symptoms may occur in one area of the body or affect the whole body. Also, complications may occur in early and later stages.

The following are common signs and symptoms of rhabdomyolysis:

- Muscle pain, especially in the shoulders, thighs or lower back
- Muscle weakness or trouble moving arms or legs
- Abdominal pain
- Nausea or vomiting
- Fever, rapid heart rate
- Confusion, dehydration, fever, or lack of consciousness
- Dark red or brown urine; reduced or no urine output
- Blood tests for creatine kinase, a product of muscle breakdown and urine tests for myoglobin, a relative of hemoglobin that is released from damaged muscles can help diagnose rhabdomyolysis. Other tests may rule out other problems, confirm the cause of rhabdomyolysis, or check for complications.

- Common complications of rhabdomyolysis include very high levels of potassium in the blood which can lead to an irregular heartbeat or cardiac arrest and kidney damage (which occurs in up to half of patients). About one in four also develop problems with their liver. A condition called compartment syndrome may also occur after fluid resuscitation. This serious compression of nerves, blood vessels, and muscles can cause tissue damage and problems with blood flow.

Rhabdomyolysis Treatments

- Early diagnosis and treatment of rhabdomyolysis and its causes are keys to a successful outcome. You can expect full recovery with prompt treatment. Doctors can even reverse kidney damage. However, if compartment syndrome is not treated early enough, it may cause lasting damage.
- If you have rhabdomyolysis, you will be admitted to the hospital to receive treatment for the cause. Treatment with intravenous (IV) fluids helps maintain urine production and prevent kidney failure. Rarely, dialysis treatment may be needed to help your kidneys filter waste products while they are recovering. Management of electrolyte abnormalities (potassium, calcium and phosphorus) helps protect your heart and other organs. You may also need a surgical procedure (fasciotomy) to relieve tension or pressure and loss of circulation if compartment syndrome threatens muscle death or nerve damage. In some cases, you may need to be in the intensive care unit (ICU) to allow close monitoring.
- Most causes of rhabdomyolysis are reversible.
- If rhabdomyolysis is related to a medical condition, such as diabetes or a thyroid disorder, appropriate treatment for the medical condition will be needed. And if rhabdomyolysis is related to a medication or drug, its use will need to be stopped or replaced with an alternative.
- After treatment, discuss with your doctor any needed limitations on diet or activity. And, of course, avoid any potential causes of rhabdomyolysis in the future.