



# Exertion And Officer Safety: Physiological Implications In Resistive Encounters

*The physiological factors present when officers use force, many of which stem from the stress response within the body, will impact not only an officer's perceptions, but also their ability to respond effectively.*

**By Richard Kay**

One important factor is the **fatigue threshold**, 'the sudden physical exhaustion experienced during a force encounter when an officer cannot effectively perform to either control a subject or defend ones self'.

Officers only have a short time in a violent confrontation to gain control of a subject before the officer's energy is spent, placing them at a dangerous disadvantage. This condition will be experienced despite the added strength that adrenalin provides, creating a sudden depletion of strength. Officers are at an added physical disadvantage due to the personal duty equipment that they carry.

The fatigue threshold is a physiological phenomenon. Normally when a person is exerting themselves physically (i.e. jogging, cycling, etc) they are performing aerobic exercise. The body is generally able to sustain such workouts for prolonged periods, because it is able to keep a steady flow of oxygen and fuel to the muscles. Aerobic ('with oxygen') contrasts to anaerobic ('without oxygen') in both duration and intensity of the muscular contractions involved.

Anaerobic exercise (i.e. weight training, sprinting) is faster and more intense, with the muscles contracting so quickly and/or powerfully that oxygen in the body cannot provide enough fuel to sustain it aerobically. Instead, the body tries to keep up by using glycogen it produces and processes without the advantage of oxygen to feed the muscles. This is far less efficient than aerobic exercise, but when the body is exerting too much explosive muscle movement too quickly, the anaerobic process is the only alternative.

During anaerobic exercise, the body uses much more energy than it does aerobically. This is not only because of the intensity, but also because of the types of muscles used. Aerobic exercise primarily uses slow twitch (ST) muscles, or muscles used for endurance, which contract slower but are able to maintain steady contractions over longer periods.

Fast twitch (FT) muscles are capable of faster, more explosive motion, but they burn much more energy than ST muscles. An officer will depend on FT muscles in a confrontation. Controlling a resistive subject requires explosive motion (e.g. swinging a baton, blocking, striking, clutching, sprinting, etc.) and a high level of intense, forceful contraction or tension (e.g. prying a subject's arms out from under them, keeping a subject from grabbing the officer or weapons, holding a subject down, etc.).

When overall fitness is an occupational

requirement, as it is for public safety personnel, aerobic exercise alone may not provide a well-balanced exercise program. In particular, muscular strength, especially upper body muscular strength, may be neglected, and the metabolic pathways involved in anaerobic metabolism that generate energy during high intensity/low duration tasks are not exercised at peak aerobic exercise levels.

Most people are not used to such intense muscle exertion. Proper training will improve the body's performance under such conditions, but it is intense, high energy, task-specific training. It is time consuming and challenging to train for such encounters. But even proper physical training does not eliminate the fatigue threshold – it just buys officers a little more time.

Hitting the fatigue threshold is not the same as just being tired – it is the experience of sudden exhaustion to the point that you cannot physically function. Because the body is required to produce energy so quickly to feed the insatiable FT muscles, it correspondingly builds up a waste product faster than it can expel it.

The waste product is lactic acid. If the body is unable to either keep the muscles fed (through respiration and blood flow) and/or remove the lactic acid during the lactic acid fermentation process (lactic acidosis), the muscle will simply stop contracting – shut down!

Lactic acid shuts down the muscle in approximately 30 seconds of maximum intensity exercise, while the time to re-establish pH takes approximately 15 minutes when not doing high intensity training. Thirty seconds is not much time to control a resisting subject at the extreme end of an intense force encounter. The average officer will be lucky if they have two or three minutes of effective strength in an all-out confrontation. The lactic acid waste simply backs up the anaerobic process so much that the affected muscles stop functioning. In other words, the muscles are literally starved and suffocated; they then become non-responsive.

A person hitting the fatigue threshold may also experience symptoms of light-headedness and nausea. In a healthy person, this condition is only temporary. Once the body has time to rest and recover, the muscles will work fine, although muscle soreness is common the day after from lactic acid residue in the muscles. Although the condition is temporary, the recovery period takes time – precious minutes an officer cannot spare in a confrontation, especially with a violently resistive subject.



## Exertion And Exhaustion

There is a significant decline in environmental awareness and memory following just 60 seconds of all-out exertion. Research findings from officer exhaustion studies show significant conclusions:

- 60 seconds of all-out exertion, which an officer might expend in trying to control a resistive subject, can deplete the average officer's physical reserves and put their safety in peril
- environmental awareness and memory are also affected adversely, hampering an officer's ability to deliver accurate, detailed statements and testimony once a confrontation is over
- even officers in top condition are not immune to the rapid drain of physical prowess and cognitive faculties resulting from a sustained physical engagement.

If officers cannot resolve a struggle quickly, a tactical withdrawal or escalation to a higher level of force may be necessary and justified for personal survival. Investigators and courts need to understand that an officer who does not provide details surrounding a physical conflict is not necessarily being deceptive, malicious or uncooperative.

The speed at which officers deplete their physical resources can range from 15-60 seconds. After that, intensity of effort shows a sharp decline. In effect, officers delivering a concerted and sustained physical effort tire themselves out in a matter of seconds, even for officers with a high level of personal fitness and fighting skill. Fitter officers, who work faster and more powerfully, expend greater effort and thus exhaust their presumably greater reserves in roughly the same time as those less fit and skilled.

Officer exertion is closely associated with incomplete and faulty memories of what they experienced. Officers exerting themselves remember less visual and auditory information and make greater errors in recall. As exhaustion takes over, cognitive resources tend to diminish. The ability to fully shift attention is inhibited, so even some potentially relevant information tends to get screened out. Ultimately, memory is determined by where the focus of attention was during an event

Fear conditioning through training apparently enables simple processing of threat and danger cues to continue on some level despite the impact of exhaustion and anxiety. However, the ability to respond effectively to such cues would be gravely degraded in an exhausted state.

## Implications

The closer an officer gets to their personal fatigue threshold, the more dangerous the situation becomes, not only to the officer, but often to the subject as well. Once the fatigue threshold is reached or passed without controlling a resisting subject, the officer may easily be overcome and harmed should the subject be so inclined. How does this translate to use of force incidents?

Officers in this situation often use increasing levels of force which without explanation may appear excessive, to gain control before they reach their impending fatigue threshold. This point may be reached roughly from 30 seconds to five minutes, depending upon a number of factors:

- intensity of the physical altercation
- number of officers and subjects involved
- physical condition of officer and subject
- environmental conditions (heat, humidity, cold, etc)
- officer equipment (duty belt, vest, uniform, etc)
- mental/emotional strength (will to overcome/ survive)
- recovery time or breaks in the altercation.

The most important reason to have a clear understanding of the fatigue threshold is because it changes the dynamics of a force encounter. If an officer knows they are about to reach their own fatigue threshold – and most often they will know it is coming – they must act quickly and decisively to control the subject. At that point it may even appear to an observer that the officer is winning, but the reality is he is about to hit the wall. When that happens, all advantages evaporate. So what will a reasonable officer do?

A reasonable officer understands that any subject who is willing to resist with such intensity that they can bring the officer to the limits of their strength is dangerous and cannot be allowed to overcome the officer or control the outcome. If the subject has a history of violence, has threatened the officer, or possesses a weapon, it may be necessary for the officer to consider and employ greater levels of force than may otherwise appear objectively reasonable.

This may not look good to witnesses, but appearances to the untrained eye should not dictate our standard of objective reasonableness. The law requires we place ourselves in the officer's shoes, taking into account their physical condition at the time of the encounter. The fatigue threshold may play a prominent role in such an analysis.

The legal system puts a great deal of emphasis on witness accounts, particularly those of

professional witnesses like officers. After a violent confrontation, it is commonly believed that officers are capable of recalling relevant particulars, such as subject position, number of blows, time sequences, verbal comments and the position of colleagues. Public safety is quite unique within the cognitive field, since officers are expected to operate in a dual-task mode of taking action whilst remembering information. In real-world conflicts, substantial aspects of visual details may remain unnoticed by active or involved witnesses while being noticed and attended by passive witnesses.

If investigators and reviewers do not understand these implications, an officer's memory errors or omissions after an intense physical struggle may unjustly affect their credibility. We think we have a lot of attentional resources working for us at all times, but in reality we do not.

This highlights the importance of tactical pre-assessment in deciding whether to engage or temporarily back off from potential physical conflict. Officers need to read situations better before getting physically involved, knowing they have a limited capacity for all-out exertion. Hopefully officers, trainers, investigators and reviewers will better appreciate the justification in desperate circumstances for escalating force in order to end a dangerous fight quickly. The longer physical engagement lasts, the more at risk an officer is to the dire consequences of exhaustion. Very quickly, an officer can reach the point of not having the energy or the ability to physically overcome resistance.

The physiological process for the existence of the fatigue threshold has been clearly documented. What needs to be more clearly established is the scope of its impact – how long it takes for fatigue to strike at various levels of intensity, what the best exercise regimens are for maximising anaerobic stamina, what techniques officers can employ to best marshal their strength in a confrontation, and soon.

The fatigue threshold is an important concept for officers to understand. Getting into a life-on-the-line confrontation is rare for most officers, but offering near-exhaustion as a justification for escalating force in circumstances where it is a factor would be more credible to juries and review boards if more was known about the phenomenon.

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