



Cite as: 2010 (6) AELE Mo. L. J. 501
ISSN 1935-0007
Special Articles Section - June 2010

Force and the Fatigue Threshold: The Point of No Return

By Jeffry L. Johnson, J.D., M.P.A.

Contents

- Scientific Explanation
- Fatigue Threshold: The Risk of Total Shutdown
- Impact on Force Encounters
- Typical Scenario
- Reasonable or Excessive?
- Conclusion: More Research Needed
- Biographical Information and Notes

❖ Introduction

Much research and writing has been done in recent years on the physiological factors that come into play when a law enforcement officer uses force. These factors, many of which stem from the “fight or flight” response within the body, will impact not only an officer’s perceptions, but also his or her ability to use force effectively. One such factor, unrelated to fight or flight, I have referred to in previous writing as the “*fatigue threshold*.”¹

This is a term actually borrowed from the physical sciences. In engineering, it means the stress level at which steel or wood will crack, bend or break. In our usage, the fatigue threshold can be defined as *the sudden physical exhaustion experienced during a force encounter when an officer cannot effectively perform to either control a suspect or defend himself*.²

An officer only has a short time in an all out fight—in extreme cases less than a minute—to gain control of a suspect before the officer’s energy is spent, placing him or her at a dangerous disadvantage. This condition will be experienced despite the added strength

adrenalin provides (which a suspect will also have the advantage of). It is what we more commonly call, “hitting the wall,” experiencing a sudden depletion of strength. Modern officers are at an added physical disadvantage due to the personal equipment they carry, specifically, wool uniforms, twenty-pound belts, and motion-constricting, heat-retaining ballistic vests.

❖ Scientific Explanation

The fatigue threshold is not a contrived concept but a physiological phenomenon. Normally when a person is exerting him or herself physically, such as jogging, riding a bike or an elliptical machine, they are performing *aerobic* exercise. The body is generally able to sustain such workouts for long periods of time. This is because it is able to keep a steady flow of oxygen and fuel to the muscles. Aerobic literally means exercise “with oxygen.” This can be contrasted to *anaerobic* exercise, which is different in both duration and intensity of the muscular contractions involved. 3

Anaerobic exercise is faster and more intense, like strength, weight training or sprinting. The key difference is that the muscles are contracting so quickly and/or powerfully that oxygen the body is taking in cannot provide enough fuel to sustain it aerobically (a condition known as *hypoxia*). Instead, the body tries to keep up by using glycogen or sugar it produces and processes without the advantage of oxygen to feed the muscles. This is a far less efficient process 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 we primarily use. When we exercise aerobically, i.e., jogging or biking, we primarily use *slow twitch* (ST) muscles, or muscles used for endurance. These muscles “twitch” or contract slower, but are able to maintain steady contractions over longer periods. Contrast this with *fast twitch* (FT) muscles. These are capable of faster, more explosive motion. Their downside? FT muscles burn much more energy than ST muscles.

It is these FT muscles that an officer will be depending on in a fight. Fighting or wrestling with a suspect requires explosive motion (e.g., swinging a baton, blocking, punching, kicking, grasping, clutching, sprinting, etc.), and a high level of intense, forceful contraction or tension (e.g., prying a suspects arms out from under him, keeping him from grabbing the officer or his weapons, holding him down, etc.).

It is worth noting that the comprehensive online encyclopedia, Wikipedia, under its definition of “*aerobic exercise*,” specifically notes:

When overall fitness is an occupational requirement, as it is for athletes, soldiers, and *police* and fire personnel, *aerobic exercise alone may not provide a well-balanced exercise program*. In particular, muscular strength, especially upper-body muscular strength, may be neglected. Also, the metabolic pathways involved in anaerobic metabolism (glycolysis and lactic acid fermentation) that generate energy during high intensity, low duration tasks, such as sprinting, are not exercised at peak aerobic exercise levels. 4

For an officer, arm and upper body strength are critical. Most people—including many cops—aren’t generally used to such intense muscle exertion. You can better understand this concept if you’ve ever tried to wrestle or box. Novices tend to be surprised at how short a time they are able to perform the activity, and how quickly their strength is sapped. Two minutes is a lifetime when you’re boxing. Many people will not even be able to lift their arms after much less time than that.

Of course, proper training will improve your body’s performance under such conditions, but it’s not like running on the treadmill; it’s intense, often bone jarring, high impact, task-specific training. It’s time consuming and challenging to train for such encounters. But even proper physical training doesn’t eliminate the fatigue threshold—it just buys the officer a little more time.

❖ **Fatigue Threshold: The Risk of Total Shutdown**

Hitting the fatigue threshold is not the same as just being tired; it’s 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 either to 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!* Think of an automobile with the engine running. If someone were to stick a banana in the tailpipe (a movie reference comes to mind), cutting off the exhaust’s ability to escape the engine, the car would simply stop running. One second it’s running, the

next it's stopped...caput...dead!

Lactic acid shuts down the muscle in approximately 30 seconds of maximum intensity exercise, while the time scale of reestablishing pH takes place over approximately 15 minutes when not doing high intensity training. Consequently, the duration of anaerobic exercise is short. Because the fast lactic acid buildup prevents the body from exercising longer, the body cannot exercise past its allotment of glycogen and then proceed to fatty acid metabolism. 5

Thirty seconds is not much time to control a resisting suspect. Of course that's on the extreme end of an intense force encounter. That said, an officer will be lucky if he or she has two or three minutes of effective strength in an all out fight. 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. 6 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 we've all experienced muscle soreness the day after a particularly intense or new workout, caused by lactic acid residue in the muscles).

Although the condition is temporary, the recovery period takes time—precious minutes an officer can't spare in a fight. There are no time outs when you're fighting a combative felon who would like nothing better than to "take you down." Once that happens, he has total access to all weapons, and can use them as he so pleases. It's a cop's worst nightmare. Imagine suddenly losing all strength. You're barely able to lift your arms, run, or maybe even stand up. You're helpless, yet you have someone on top of you who wants nothing more than to disable you or a victim you're trying to protect. Can you understand why no cop ever wants to be in that position? You'll do anything to avoid it, including using what may otherwise be considered excessive force.

❖ **Impact on Force Encounters**

The closer an officer gets to his or her personal fatigue threshold, the more dangerous the situation becomes, not only to the officer, but often to the suspect as well. Once the

fatigue threshold is reached or passed without placing a resisting suspect in handcuffs or otherwise restraining him, the officer may easily be overcome, then injured or killed should the suspect(s) be so inclined. How does this translate to use of force incidents?

We will often see officers in this situation using increasing levels of force—force that without explanation may appear excessive—to gain control before they reach their impending fatigue threshold. This point may be reached roughly from thirty seconds to five minutes into a fight, depending upon a number of factors, including:

- Intensity of the physical altercation
- Number of suspects involved
- Number of officers involved
- Officer's physical condition
- Suspect's physical condition
- Environmental conditions (heat, humidity, cold, etc.)
- Officer's personal equipment (heavy belt, vest, wool uniform, etc.)
- Mental/emotional strength of combatants (will to overcome/survive)
- Recovery time or breaks in the altercation

Even though we talk about 1-5 minutes, in an all out fight, don't figure on most people being able to hold out for more than two minutes or so. This issue cannot be over-emphasized; it is an area that has largely been overlooked until now.

❖ Typical Scenario

I recall one particular video that hit YouTube a couple of years ago. It showed two LAPD officers on top of a prone suspect on the street. The short clip was filmed by someone in the crowd with a cell phone camera. The prone suspect was on his back with his arms tight in front of him like a boxer. The officers were holding his arms, apparently struggling with him to get him cuffed. Suddenly one of the officers repeatedly struck the suspect in the face. It didn't look so good on tape for the officers. The clip ended shortly thereafter.

What really happened? This suspect was a known gang member, who had attempted to evade officers in a vehicle pursuit with a stolen car, then in an extended foot pursuit. They finally caught up to him and had him on the ground. But he wouldn't allow them to handcuff him. He locked his arms. The officers were exhausted, breathing very hard. They were also being surrounded by a hostile crowd. My bet is they knew they didn't

have much time to resolve this ordeal. How close were the officers to their fatigue threshold? That's hard to say, but if they were (and maybe even if they weren't), their actions in striking the suspect with distraction blows could have been their only option to control the suspect. 7

It takes a tremendous amount of strength to force a person's hands into handcuffing position if the subject doesn't want to go there. A suspect can easily lock his or her arms together against or under his body. I've witnessed instances where it took four to six officers to force a suspect's hands into cuffing position. Most officers understand—sometimes only instinctively—that they have a limited time frame to control a suspect, particularly if they are working alone, without backup. *And the truth is 66% of all force encounters involve a single officer confronted by one or more suspects.* 8 In these cases, even a suspect who is passively resisting, i.e., not fighting, but refusing to allow himself to be handcuffed and controlled, can easily bring an officer to his or her fatigue threshold.

❖ Reasonable or Excessive?

In the final analysis, the most important reason we need to have a clear understanding of the fatigue threshold is because it changes the dynamics of a force encounter. If an officer knows he or she is about to reach their own fatigue threshold—and most often they will know it's coming—they must act quickly and decisively to control the suspect. *At that point it may even appear to the casual observer that the officer is winning the battle, but the reality is he's about to hit the wall. When that happens, all gains are lost; all advantages evaporate.* So what will the reasonable officer do?

The reasonable officer understands that any suspect who is willing to fight the police with such intensity that he can bring the officer to the limits of his strength is dangerous and cannot be allowed to overcome the officer, gain the upper hand or control the outcome. Particularly if the suspect 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, up to and including deadly force.*

This will never look good on video, but appearances to the untrained eye should never dictate our standard of objective reasonableness. The law requires we place ourselves in the officer's shoes, taking into account his physical condition at the time of the encounter. 9 The fatigue threshold may play a prominent role in such an analysis.

❖ Conclusion: More Research Needed

The fatigue threshold is a relatively new concept. As such, there is a void of empirical data documenting specifics on the extent and character of the problem for law enforcement. However, experience tells us that just because a problem is not comprehensively documented does not mean it does not exist. *We can clearly document the physiological process of the fatigue threshold. Without question, it exists. What we still need to more clearly establish is the scope of its impact.* Hopefully, this article will stimulate deeper professional and academic inquiry into the issue.

The fatigue threshold is an important concept to understand for the sake of our officers, but no less so for the subjects they encounter. An exhausted officer who has reached the limits of his or her physical endurance, yet still has not taken a resisting suspect into custody may often have no other option than that of deadly force. Sometimes the four-pound pull of a trigger is the only force option a threatened, exhausted officer can physically perform.

That's rarely good for the officer and never good for the suspect.

❖ Biographical Information

Jeffrey L. Johnson has 28 years experience as a police officer. He is presently a Commander with the Long Beach Police Department, California, assigned as the Commanding Officer of the Training Division. He has been a use of force instructor of both police recruits and advanced officers for 18 years. He has served as a legal expert for the California Commission on Peace Officer Standards and Training (POST), and has participated as a writer for the POST Use of Force and other curriculum.

He is qualified and has testified as a force expert. He is an FBI National Academy graduate, holds a Masters Degree in Public Administration, a Juris Doctor Degree, and has been a member of the California Bar for 20 years. He also serves as a private consultant and trainer on use of force issues. Email: insighttraining@att.net

❖ Notes:

1. [*Police Force and the Hollywood Factor*](#), AELE Monthly Law Journal, 2007 (4) AELE Mo. L. J. 501, Special Articles Section (April 2007); Journal of California Law

Enforcement, Vol. 41, No. 1 (Jan. 2007); PORAC Law Enforcement News, Volume 40, Number 1 (Jan. 2008).

2. This condition is loosely related, but not the same as what has been termed the “Parasympathetic Backlash.” See Lt. Col. David Grossman, *On Combat*, p. 15. (2004).
3. Donatelle, Rebecca J., *Health: The Basics*, 6th Ed., San Francisco: Pearson Education, Inc. (2005).
4. “Aerobic Exercise” defined. Wikipedia.org.
5. Rust, Elizabeth, Ph.D., Rahnema, Sahand, “Timing is Everything: Why the Duration and Order of Your Exercise Matters,” *MedFitness*, Univ. of Michigan, School of Medicine. www.umich.edu (2005). (emphasis added)
6. Hunter, Sandra, Duchateau, Jacques and Enoka, Roger, *Muscle Fatigue and the Mechanisms of Task Failure*, Exercise Sport Science Review, 32(2), (2004).
7. It would be instructive at this point to engage in a discussion of distraction techniques and their importance as a tool for helping an officer gain control of a suspect, particularly when time is of the essence. However, due to the amount of print it would take to do the subject justice, it will have to wait for another day.
8. [*Police Use of Force in America*](#), International Association of Chiefs of Police, p.47 (2001).
9. “The calculus of reasonableness must embody allowance for the fact that police officers are often forced to make split-second judgments—in circumstances that are tense, uncertain, and rapidly evolving—about the amount of force that is necessary in a particular situation.” [*Graham v. Connor*](#), 490 U.S. 386, at 397 (1989).

© Copyright 2010, Jeffry L. Johnson. Permission to republish is granted to AELE and to IACP Net members.

AELE Monthly Law Journal

Wayne W. Schmidt
Employment Law Editor
P.O. Box 75401
Chicago, IL 60675-5401 USA
E-mail: wws@aele.org
Tel. 1-800-763-2802

Contents may be downloaded, stored, printed or copied,
but may not be republished for commercial purposes.

- The purpose of this publication is to provide short articles to acquaint the reader with selected case law on a topic. Articles are typically six to ten pages long. Because of the brevity, the discussion cannot cover every aspect of a subject.
 - The law sometimes differs between federal circuits, between states, and sometimes between appellate districts in the same state. AELE Law Journal articles should not be considered as “legal advice.” Lawyers often disagree as to the meaning of a case or its application to a set of facts.
-

[AELE Home Page](#) — [Publications Menu](#) — [Seminar Information](#)