



# FORCE SCIENCE<sup>®</sup> NEWS

Chuck Remsberg  
Editor-in-Chief

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## New study of unanswered question: Do CEW darts cause infections?

### I. New study of unanswered question: Do CEW darts cause infections?

More than 3.3 million darts from conducted energy weapons, including thousands that likely were contaminated with Staphylococcus aureus bacteria, have penetrated human skin. How many would you guess have caused infections?

The best guess would be "zero," according to what is believed to be the first scholarly paper to review this issue.

The research group, headed by Dr. Mark Kroll, a biomedical engineer with the University of Minnesota and California Polytechnic University, reports its findings in the peer-reviewed Journal of Forensic Sciences.

Because of skin penetration by non-sterile CEW probes, "there has been concern raised about the risk of infection," Kroll writes. Allegations of non-fatal infection have been made in at least two lawsuits.



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But after a thorough review of CEW-related literature, including "a vast number of conference abstracts," and a survey of individuals who experienced probe penetration, Kroll told Force Science News that those allegations are "poorly supported."

In reality, he states, "The results of this paper suggest that probe infections have yet to occur and are extremely unlikely."

(Kroll is a scientific advisor and board member of TASER International, the principal CEW manufacturer, and two other members of his team also have TASER connections. He has authored numerous reports of objective data related to CEW performance and outcomes.)

**ASSEMBLY CONTAMINATION.** During the normal process of CEW manufacture, Kroll explains, the stainless steel dart portion "is grasped by an ungloved assembler for insertion into the cartridge," thereby potentially adding human-borne "pathogens to the airborne pathogens that the probe is already exposed to."

Other researchers have found that in the process some 5% of probes are contaminated with infectious *Staphylococcus aureus* bacteria, which can cause a multitude of diseases. This is not surprising, Kroll maintains, considering that some 80% of healthy people unwittingly are "persistent" or "intermittent" carriers of Staph germs.

In the field, Kroll calculates, an estimated 165,000 probes have penetrated human skin while laden with Staph bacteria.

"Inoculation by puncture with a bacteria-coated probe should be more likely to cause

infection than a superficial scratch or a more open wound experienced in daily life," Kroll notes. Yet his team's investigation failed to establish any connection between CEW "landings" and infectious disease.

**HUNTING INFECTION.** Through law enforcement agencies that "typically used a probe exposure as part of training," the researchers surveyed the recipients of 238 probe punctures. The subjects were a mixture of races, and their probe penetrations had occurred from less than a month to more than a year before the survey.

The day after the exposure, "a slight majority of respondents noticed nothing at the landings, while about half noticed either redness or a burn mark." Within a week, this "damage" for most had vanished. After a year, a few reported "a small scar" as evidence of penetration. Only one had sought medical aid, but none experienced any infection.

Kroll's team also tracked down details of 11 dramatic published cases in which "significant probe penetrations into [especially] sensitive tissue" have been cited. These included probes that lodged in the brain, the eye, the chest (probe embedded so deep it had to be surgically removed), and the trachea. Again, "There were no case reports of infections"--a finding that is "indeed impressive," Kroll writes.

Kroll believes that in "most, if not all" of the extreme cases, the subjects were given "prophylactic antibiotic treatment." But the survey group received only "self-treatments," which ranged from a mere "alcohol wipe" to "nothing."

WHY? The researchers speculate on why probe penetration seems not to lead to infection.

- The most important factor, Kroll suggests, is a sterilizing effect on the darts from the CEW's electrical currents. "However, 10% of the time, only a single probe makes a connection and thus there is no current," he says.
- Bacteria colonies that are on the probe "spear" are "possibly very small and hence present a minimum challenge to the subject's immune system." Indeed, many superficial Staph infections "in otherwise healthy individuals will resolve without complication or need for medical attention."
- The "vast majority" of CEW penetrations do not enter bone or major blood vessels where the risk might be greater. "The most common bone penetration," Kroll notes, "is that of the sternum," and that occurs in fewer than 1% of probe contacts.

These speculations are "seeds for further research," Kroll states.

Meanwhile, whatever the explanation, the lack of infections is "fortuitous," he declares, because "there is no practical way to keep the probes sterile [during manufacture or use] with present technology."

Click [here](#) for a free abstract of the paper, "Infection Risk from Conducted Electrical Weapon Probes: What Do We Know?" A link to the full article can be activated there for a fee.

Dr. Kroll can be reached at: [mark@kroll.name](mailto:mark@kroll.name)

## II. Free offer for testing new anti-unintentional discharge device

Lt. Col. Dave Grossman, long a prominent figure on the law enforcement training circuit, is seeking departments willing to help in field-testing a new, custom-made device, designed to cut the risk of unintentional firearms discharges.

He and his son Jon have devised and patented what they call a "trigger finger shelf," a flanged strip of metal less than two inches long that can be installed above the trigger guard of any semi-automatic pistol, rifle, or revolver. The trigger finger indexes on a nipple at one end, then rests along the slightly protruding "shelf" until a decision to shoot is made, Grossman explains.

The configuration is intended to discourage unconscious "trigger checks" and "convulsive clutching" under stress, which appear to be associated with some types of unwanted shootings.

The Grossmans told Force Science News they are willing to install the device free of charge on up to two guns from any agency that will give feedback on field performance. "We want to know if it is comfortable and reassuring to officers and if it does in fact reduce inappropriate movement to the trigger," Grossman explains.

Initial informal tests at one training academy showed that the device made officers more conscious of risky finger movement and gave them "a strong sense of safety," Grossman says. But no scientifically designed study of effectiveness has yet been conducted.

For full details of the offer, contact Grossman through his website: [www.SheepDogKnifeAndGun.com](http://www.SheepDogKnifeAndGun.com). Photographs there show how the device appears when installed.

### **III. Our readers write: TASER falls & unintentional discharges**

Force Science News #317 [8/10/16] featured reports on two new studies: one on fatal falls associated with the deployment of conducted energy weapons and another, from the Force Science Institute, on unintentional firearms discharges. Among reader responses that landed in our in-box:

#### **Weighing risk against offense**

As an expert witness, I've worked for the defense of law enforcement agencies on two major, nonfatal head-injury civil suits involving a running suspect who received TASER probes and went down.

One was a foot pursuit about an open container of beer. In the other, a fleeing felon (football tackle-size guy) was charging at a responding officer. The beer guy got a big settlement, the tackle guy lost his case; both as it should be.

Basic risk management dictates that it is important that officers learn through policy and training to distinguish between a serious crime versus a minor crime when deciding whether to use a TASER on a running suspect.

Capt. Greg Meyer (ret.)  
Los Angeles PD  
Certified Force Science Analyst

Negligent or non-negligent, but not accidental

Unintentional discharges continue to occur in the LE community despite best efforts for the exact reasons you mention and more. I want to commend you for using the proper terminology. Too often police refer to these as accidental discharges (ADs), but I believe there is no such thing as an "accidental discharge."

An unintended discharge can be "negligent" or "non-negligent." A negligent discharge is one where the operator is responsible and the firearm is in proper working order. For example, an operator on the range in the process of putting a firearm in the holster discharges a round. Clearly, the operator had no "intention" for a round to discharge, but in the process of holstering may have placed a finger on the trigger causing it to discharge, or perhaps clothing got caught up in the trigger guard and on the trigger.

Regardless, the operator most likely loaded the firearm, was in care and control of it when it discharged, and was ultimately responsible for the direction of the muzzle at the time of the discharge. In other words, it was not an accident. The operator was responsible and therefore negligent.

A "non-negligent" discharge is where the firearm is not in proper working order (has a mechanical defect, is not to specifications, etc.) and the operator is not involved in the causation of it discharging.

Sgt. Rom Ranallo,  
Vancouver (BC, Canada) PD  
Force Options Training Unit-Firearms  
Training Team  
Certified Force Science Analyst

Agency's incidents mirror FS research  
As the Supervisor for all Range and Armory operations for the Pentagon Force Protection Agency (PFPA), I found your research into unintentional discharges to be very enlightening and would like to disseminate this valuable information to our agency's police force to help to avoid these incidents in the future. We have experienced a few incidents that have mirrored what your research has shown.

I have sent many of my staff through the Force Science Institute training. We are big believers in your exhaustive research on many important topics.

Thomas Donati  
Branch Chief, Range/Armory Operations  
Pentagon Force Protection Agency Training  
Division  
Washington, DC

Permission granted....

I would like permission to forward your report on UDs to the rest of the Criminal Investigators in our office.

Lt. James Hammond  
Investigations Division  
Dallas County (TX) District Atty.

#### **IV. Worthy of quoting: A leader on leadership**

What we lack too often in law enforcement is effective leadership. We have management, but we manage numbers and budgets.

True leadership is focused on people skills; drawing out the best efforts of our officers and leading by example.

Leadership does not apply only to ranking officers. Each officer is a leader who chooses to be so. Every day we demonstrate leadership qualities, starting with ourselves. A fit and squared-away officer of any rank leads by example. Same for each officer who regularly trains, correctly practices the skills of our profession, and demonstrates the same on the street.

We do not become leaders in one day, any more than we go to the gym and become fit in one day. It is a lifetime pursuit, accomplished day to day.

The true qualities of leadership cannot be bought, only earned through self-initiative, self-reflection, perseverance, and determination.

"The greatest leader is not necessarily the one who does the greatest things. He is the one who gets the people to do the greatest things."- President Ronald Reagan

Now more than ever is the time for all of us to do great things and lead the way forward.

Chief Jeff Chudwin (ret.)  
President, Illinois Tactical Officers Assn.

#### **V. New law requires teens be taught proper traffic-stop behavior**

In hopes of keeping traffic stops of young motorists from escalating into deadly encounters, drivers ed instructors in Illinois will soon be required to teach students how to behave safely when pulled over by police.

The mandate is part of a new law signed by Gov. Bruce Rauner, aimed at "preventing teenagers from panicking" or doing anything an officer might interpret as a red flag.

"I think it's really timely, so that young drivers don't look at a police officer as a threat or a problem," State Sen. Julie Morrison, who sponsored the legislation, told the Chicago Tribune. Being pulled over is "just a part of driving, and if they respond in a responsible, correct way, it should never escalate."

Demonstrations of proper tactics will begin in public and private schools next year, with specific guidelines to be developed by the IL Secretary of State's office.

Written by Force Science Institute  
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