FORCE SCIENCE® NEWS

Chuck Remsberg
Editor-in-Chief

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CEW darts in the eye: First thorough study documents risk

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I. CEW darts in the eye: First thorough study documents risk

In the first study of its kind, a research team has comprehensively documented the risk of barbed darts from conducted electrical weapons penetrating the eyes of suspects.

While certainly cringe-inducing, the risk, in fact, is small: only 1 in every 123,000 CEW discharges in the field results in eye injury, the study reports. But the problem is still considered "significant" because of the severe damage typically inflicted.

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The majority of penetrating strikes result in the eyeball having to be surgically excised or remaining in place blinded. Indeed, probe impalement of an eye appears to be "the most common life-altering injury from electrical weapons," the study's lead author, Dr. Mark Kroll, told *Force Science News*.

Not included in the researchers' statistical calculations are *accidental* eye injuries to *officers* and their family members that the team uncovered during their investigation.

Two officers, for example, unintentionally fired a probe into one of their own eyes during CEW training. Another, off duty, shot a dart into the eye of his teenage stepdaughter while showing her how to spark-test his CEW; he ended up charged with "knowing and reckless child abuse." Another officer's two-year-old girl suffered a permanently "shrunken, nonfunctioning eye" after a probe was discharged by siblings playing with the weapon.

WIDE CANVASS. When the team assembled by Kroll, an adjunct professor of biomedical engineering at the U. of Minnesota and the California Polytechnical Institute, began its work, only eight cases of penetrating eye injury from on-duty CEW discharges had been reported in medical literature.

After surveying some 500 master TASER instructors across the US and abroad and thoroughly canvassing open-source news media and legal databases, the researchers discovered 20 more, including cases from Australia, Canada, and Scotland. Thus, a documented total of "28 such injuries out of [an estimated] 3.44 million [CEW] field uses," Kroll writes, "giving a demonstrated risk of approximately 1:123,000."

Eighteen of the injuries resulted in total blindness in the affected eye, "primarily from globe rupture"; in 12 of those cases, the eye had to be removed. In addition to these 18, seven suspects were left with only partial vision. In just two cases could the researchers confirm that normal sight had been restored by surgical repair.

CIRCUMSTANCES. The injured parties mostly ranged in age from late teens to early 30s and often were mentally ill or suicidal, Kroll notes. Their eyes were not deliberately targeted by officers but unintentionally became points of impact because of unexpected or erratic movement, a miscalculation of probe spread, or fluke circumstances.

Examples from 20 cases described in the study:

• A middle-aged male was stabbing himself in the neck with a box cutter when an officer sought to control him with a CEW discharge. The moving blade just happened to intersect the incoming probe and deflected it into the man's eye, blinding him.

• Another suspect ducked to tackle an officer just as the officer was deploying his CEW. When a probe hit the subject's eye, he yanked it out and ran away. Arrested weeks later by the same officer, he reported "only mildly blurred vision in the injured eye."

• A severely intoxicated (0.31 BAC) domestic-violence suspect was struck in the eye by a probe intended for his center mass. He "denied the presence of the probe in his eye even after being informed" it was there. "Non-consented surgery" removed it.

• A bar fighter was warned by a mounted officer of an imminent CEW discharge aimed at his lower shoulder blade. He turned and ducked, resulting in a probe ripping his right retina and leaving him partially blind.

LEGAL CONCERNS. A similar case of "sudden head-spinning movement" that caused a probe to strike an inmate in the eye during a jail-cell struggle ended up in a lawsuit cited in a legal section of the study added by Atty. Michael Brave. Here a federal appellate court concluded that "a police officer is not expected to always precisely hit his target when the target is moving," Brave writes. (This 7th Circuit case is *Forrest v. Prine*, 620 F.3d 739 [2010].)

[**Editor's Note:** Research by the Force Science Institute has established that a suspect can unexpectedly rotate his/her head in about 0.18 (18/100) of a second, with a fuller body rotation occurring in about one-third of a second. "This can easily create unpredictable strike points beyond an officer's control," says FSI's executive director Dr. Bill Lewinski. For another real-world example of head-turning resulting in unintentional consequences, see Article #II below. Falling subjects can also pose a challenge as the result of having a head move from an erect position to suddenly moving through the plane of a projectile, such as a CEW dart, as discussed in an article on Force Science research titled, "Falling Subjects and the Use of Force," published in the IACP's *The Police Chief* magazine.]

A critical factor in eye-related litigation, the researchers point out, will be the intent of the officer involved. Any intentional CEW discharge into the head, face, or eyes should be avoided except in the most dire circumstances, they warn. "Significant legal justification" will be required.

In *un*intentional cases, "the officer's objective in launching the projectile, the targeting point, and the totality of circumstances are important components in determining whether a projectile affecting the eye is legally justifiable," the study states.

Nearly nine years ago, TASER International (now known as Axon), the major manufacturer of CEWs, lowered the preferred point of aim from the torso center to lower-center, in part to lessen the risk of probe placement into undesirable areas, including the head and face.

Even so, Axon warns: "Probes may deviate. CEWs are not precision-aimed weapons."

The study, titled "Eye Injuries from Electrical Weapon Probes: Incidents, Prevalence, and Legal Implications," appears in the *Journal of Forensic and Legal Medicine*. A free abstract and a link for purchasing the full report can be accessed by clicking here https://www.jflmjournal.org/article/S1752-928X(18)30029-5/fulltext.

Dr. Kroll, a member of Axon's scientific advisory board, can be reached at: mark@kroll.name.

II. How 1 agency "educates" prosecutors about OIS realities

A recent officer-involved shooting in rural Iowa is typical of many that occur across North America. The sheriff's office involved hadn't experienced an OIS in at least three decades. The county prosecutor, responsible for evaluating legal justification, hadn't handled one in 17 years.

"In locales other than large metropolitan areas, an OIS tends to be a once-in-a-career event," says Mike Krapfl, special agent in charge in the Major Crimes Unit of the Iowa Division of Criminal Investigation.

"The prosecutor is likely to be cutting his teeth on his first case of that kind. It's very rare that he's had anything on officer-involved shootings in his legal training. His knowledge about police shootings may not extend much beyond the definition of reasonable force in the state code. It's not that he's bad at his job, it's just that he's not exposed to some important issues on a regular basis."

So with an officer's future at stake, how does a prosecutor in those circumstances get proficient at fairly analyzing the situation in a hurry?

In Iowa, investigators under Krapfl, a certified Force Science Analyst, assume responsibility for a helpful crash-course as part of their workload.

"At the request of involved agencies, we conduct the official investigation of more than 95 per cent of the state's officer-involved shootings, about a dozen a year on average," Krapfl says. "These always include cases in rural areas or small- to medium-size towns that have never had a police shooting in recent memory.

"In meeting with prosecutors, our job is not to sway the prosecutor toward one conclusion or another. Our job is to make them aware of the unique realities of OISs that can better inform their decision-making."

And as it turns out, he says, investigators sometimes find that their educational insights are welcomed in busy metropolitan jurisdictions as well as in their less populous counterparts.

"REASONABLENESS" REVIEW. "We encourage the prosecutor to come to the shooting scene if possible," Krapfl told *Force Science News* recently. "Then within a day or two, our investigators assigned to the case meet with him to review the State's legal standard for use of force and the 'objectively reasonable' standard established by the US Supreme Court in *Graham vs. Connor* and expanded on in subsequent decisions.

"The purpose of this is to reinforce the *objective* factors the courts have given us for guidance, instead of the natural tendency to rely on *subjective* opinions about whether the incident was a 'good shoot' or not."

To avoid the appearance that they're "lecturing" the prosecutor, the investigators frame the discussion in the context that *Graham* and related decisions will be guiding their eventual reports on the case. In describing what occurred, they explain, they'll be addressing such "reasonableness" factors as:

- the severity of the crime or action that brought the suspect to the officer's attention
- whether he/she was armed
- whether he/she posed a threat to officer(s) or others
- whether he/she was actively resisting or trying to avoid arrest by flight
- whether a warrant existed
- whether more than one suspect or officers were involved
- other dangerous/exigent circumstances
- whether alternative methods to subdue or

arrest the suspect were available or attempted.

"Because of the infrequency of OISs in most places, prosecutors don't review the critical factors in determining objective reasonableness very often," Krapfl says, "so this initial discussion is usually beneficial to all involved. The investigators can go over the factors one by one and point out any that they see as pertinent to the case so far."

FORCE SCIENCE FACTORS. During this initial meeting or in subsequent conferences, investigators also typically acquaint prosecutors with important use-of-force insights that Krapfl and others on his staff have learned from Force Science training.

"Everyone wants to see video from body cams or dash cams right away," Krapfl explains, "but it's important to view it in context with the involved officer's statement or report. Video has limitations that Force Science teaches and that a prosecutor needs to understand.

"For example, dash-cam footage is the *patrol car*'s perspective of what happened, not necessarily what the involved officer saw or felt. Similarly, a body camera is not a precise eye-tracker. It may miss critical things the officer saw or see things the officer missed. Even the lighting at a scene can cause differences between what's recorded by the camera and captured by the human eye."

Often, Krapfl says, results of Force Science studies on action/reaction time and decision-making under stress are explained. "People who aren't familiar with the realities of shootings often don't comprehend the split-second speed at which threats occur and how time pressure can affect an officer's decision-making," Krapfl says.

Depending on the circumstances of the case at issue, investigators may delve into the physiological and psychological subtleties that often are involved in mistake-of-fact shootings, shootings at moving vehicles, shootings of unarmed subjects, shootings of edge-weapon wielders, and other OISs that tend to ignite controversy.

CASE HISTORY. Krapfl cites an incident in which a white officer fatally shot an unarmed black subject in the back of the head at the end of a foot pursuit. Police critics were outraged. But as investigators dug into the facts, this scenario emerged:

The suspect initially was armed and was fleeing from police after pointing his weapon at a large group of people. The suspect ran into a darkened area and as he raced along a fence line he threw the gun over the fence "in his natural running motion." In the pitch darkness, a pursuing officer failed to see the toss.

A few strides later, the suspect tripped and fell face-first to the ground, landing with his right hand under him. About 15 feet away, "with no backup nearby and in very dark conditions," the officer drew his service pistol and began yelling commands.

"The suspect raised off the ground and turned toward the officer," Krapfl says. "The officer said he believed the subject still had the gun and was bringing it around with his right hand." The officer insisted that he fired to protect himself.

Yet his shot struck the suspect in the *back* of the head.

Investigators reached this conclusion, which they explained to the prosecutor: In the split second after the officer decided to shoot, the suspect saw the officer and turned his head away from facing him, causing the bullet to impact at the back of his skull. This happened so fast that the officer completed his commitment to shoot without realizing the change. [See **Editor's Note** in article above for findings from Force Science research regarding the speed of suspect turning times.]

"A discussion of action versus reaction was imperative in this circumstance," Krapfl says. "This case relied on Force Science research, showing that in the short length of time it took for the officer to perceive a potential threat, decide he needed to shoot, raise his gun from a ready position, and pull the trigger, the suspect could have turned to face the other way, accounting for the unexpected and unintended point of impact."

Accepting this interpretation, the prosecutor invited Dr. Bill Lewinski, executive director of the Force Science Institute, to explain to a grand jury the research he has conducted on the lightning speed at which offenders can turn during an armed confrontation and the inevitably slower time it takes officers to react.

Considering this testimony, along with various *Graham* factors in the case, the jury determined the shooting to be reasonable and exonerated the officer of any wrongdoing.

REACTION. Generally investigators spend an hour or two in prosecutor debriefings, "depending on the complexity of the case," Krapfl says. "We want to avoid just a quick video review and provide something more meaningful."

In some cases, prosecutors have been so impressed that they've initiated public forums so the knowledge shared with them can be shared with the general public.

"Typically the reaction from prosecutors is appreciation for the information," Krapfl says, "especially in high-profile OISs."

Mike Krapfl can be reached at: krapfl@dps.state.ia.us.

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