

Research roundup: Latest on Tasers, arrest-related deaths, excited delirium

The specific dynamics of many arrest-related deaths remain a mystery, but recent research findings have fitted a few more pieces into place for understanding these puzzling and often controversial events. Our reports:

1. Is it the fight-stopper...or the fight itself? In news stories and in activist campaigns by groups like Amnesty International, the Taser is often fingered as the culprit when a subject dies during or shortly after police contact. One theory is that the use of an electronic control device [ECD] to subdue an unruly suspect may release such a high level of stress-related chemicals into the bloodstream that the heart is fatally damaged.

A new study, headed by Dr. Jeffrey Ho, a deputy sheriff and an emergency medicine specialist with the Hennepin County (MN) Medical Center in Minneapolis, in effect turns that premise upside-down.

A Taser application, Ho reported at an international professional conference in Australia last month [6/09], is one of the weakest stimulants of stress chemicals among sources that are commonly present during a police confrontation.

Ho and a team of researchers from 4 states randomly assigned 60 law enforcement and civilian volunteers to 1 of 5 groups, in which they:

- sprinted 164 yards, simulating flight from LEOs
- hit and kicked a heavy bag for 45-seconds, simulating physical combat with officers
- took a 10-sec. hit with a Taser X26
- endured a K-9 training exercise attack for 30 seconds, or
- were sprayed in the face with OC.

The test subjects predominately were males (85%), with a median age of 35 (range of 19-67) and a median body mass index of 27.8 (more than 25 is considered overweight). There was no significant difference between the 5 groups in terms of stress-chemical levels prior to their assigned tasks.

A physician or paramedic placed an IV catheter in each subject so that the cocktail of stress hormones known as adrenalin, which includes epinephrine, norepinephrine, and dopamine, could be drawn and checked within 30 seconds of task completion and every 2 minutes for 10 minutes thereafter.

The researchers discovered that the highest level of stress chemicals was generated by the heavy bag exercise; i.e., the simulated struggle with police. After that, in decreasing order, came the sprint group, the K-9 group, the Taser

group, and the OC group. In other words, only the administration of OC was slightly less stress-inducing to the subject than an ECD zap.

Indeed, Tasering generated nearly 3.5 times *less* adrenalin than the simulated fighting.

"The comparison of use-of-force encounters demonstrated that the ECD was one of the least activating" of stress chemicals, Ho writes in a study report. "These results...suggest that fighting with LEOs may be the most detrimental [to subjects] from a physiologic standpoint."

In other words, says Dr. Bill Lewinski, executive director of the Force Science Research Center, which was not involved in the study, "It is worse for a subject to fight with police than to be shot by a Taser in terms of total stress impact. This certainly suggests that resistant fighting in itself may be why some subjects die, because of the stress that violent struggling places on their system."

Ho's team recommends further study of force encounters "to assist LEOs in determining the best tactics and devices to utilize" in encounters that may culminate in an arrest-related death.

2. Excited delirium and telltale "biological markers." One condition that has been circumstantially linked to arrest-related deaths is the psychic and physical meltdown known as excited delirium. In a highly technical report available for a fee online from the journal *Forensic Science International*, a research team independent of Dr. Ho's group reports on certain biological factors that seem to be associated with ED fatalities.

This information is most useful to coroners and medical examiners in analyzing autopsy findings. But as Dr. Bill Lewinski of the Force Science Research Center points out, the new study "does support the assertion that there is such a phenomenon as excited delirium. Officers who have witnessed it know it exists, but some people in the medical profession and in activist groups suspicious of the police have questioned whether it is valid as a recognized medical diagnosis."

The study, reported under the heading "Brain Biomarkers for Identifying Excited Delirium as a Cause of Sudden Death," was led by Dr. Deborah Mash of the neurology department at the University of Miami's Miller School of Medicine.

She and her team reviewed 90 deaths that seemed to fit the "acute onset of agitated violent behavior" commonly associated with ED. For each, they explored the circumstances surrounding the death, the use of force that may have been involved, and the results of autopsy and toxicology screening.

The researchers acknowledge the controversy regarding the possible contribution of "restraint, struggle, and the use of conductive energy devices" to such deaths. But they say their findings suggest that what underlies the delirium and the subsequent fatal outcome may, in fact, be a dysfunction of the central nervous system.

First, they found that "a majority of victims...tested positive for cocaine in blood and brain." Only 4 "had no licit or illicit drugs or alcohol measured at autopsy."

Also there was evidence that the victims' bodies had been significantly overheated, rising to a mean core body temperature of more than 105 degrees Fahrenheit. A particular protein related to heat shock was found in the brains at autopsy to be elevated 1.8 to 4 times beyond normal. This "confirms that hyperthermia [abnormally high body temperature] is an associated symptom and often a harbinger of death in these cases," the researchers report.

On the other hand, the investigators found that "dopamine transporter levels" were below normal in the ED subjects. The function of this "membrane-spanning protein" is to help properly relay cognitive impulses through the brain. When the level is not right, Lewinski explains, signals between nerves cannot get turned on and off appropriately and a "continuous chaotic electrical pattern of over-stimulation in the brain" can result, "leading to chaos and confusion" in behavior. Cocaine, Lewinski says, can be a factor in dopamine transporter dysfunction.

For coroners and medical examiners seeking cause of death, the "2-protein biomarker signature"--the elevated heat shock protein combined with lowered dopamine transporter level, both detectable in expedient postmortem blood draws--can be revealing. "When combined with descriptions of the decedent's behavior prior to death, [this] signature can serve as a reliable forensic tool for identifying the excited delirium syndrome," the new study concludes.

3. ER docs seek consensus on ED. In October, it's expected that a special task force of emergency room physicians will submit a report on excited delirium that will conclude for the first time whether the violent syndrome confronted by officers is, in fact, "a disease entity" and, if so, how to it can best be controlled.

The task force was created by the American College of Emergency Physicians, a medical society that represents more than 25,000 ER doctors, residents, and medical students. The task force is chaired by Dr. Mark DeBard, professor of emergency medicine at Ohio State Medical School. Among its 19 members are Dr. Matthew Sztajnkrycer of the Mayo Clinic, a member of the Technical Advisory Board for the Force Science Research Center, and "others with particular interest and expertise" in areas associated with ED, DeBard says.

The group has been charged with these responsibilities:

- determine whether excited delirium exists as a disease entity * report the characteristics that help identify ED and the associated risk for death
- explain "current and emerging methods of control and treatment."

Based on task force findings, the ACEP will then develop and disseminate a white paper to the law enforcement and EMS communities and other "appropriate entities." This paper is expected to be released at an ACEP Council meeting in Boston in October. *Force Science News* will report on results as they become known.

4. AMA group offers Taser recommendations. Another physicians' group, the American Medical Assn.'s Council on Science and Public Health, last month [6/09] issued a 14-page review of relevant research and concluded that Taser use by law enforcement appears to be safe and effective--"if deployed according to an appropriate use-of-force policy and used in conjunction with a medically driven quality assurance process."

Specifically, the group recommended that the AMA:

- establish a policy that law enforcement agencies institute "specific guidelines, rigorous training, and an accountability system for the use of conducted electrical devices that is modeled after available national guidelines" from the DOJ and the Police Executive Research Forum;
- "encourage additional independent research involving actual field deployment of [electrical devices] to better understand the risks and benefits under conditions of actual use";
- establish a policy that law enforcement agencies "have a standardized approach to the medical evaluation, management, and post-exposure monitoring of subjects exposed to [electrical devices]."

Although the report generally supported Taser use against unruly subjects, it has drawn criticism from some law enforcement sources for some evident weaknesses. For example, it speaks of a "model" force continuum developed by the Federal Law Enforcement Training Center--without explaining that FLETC abandoned that continuum more than 2 years ago as not so "model" after all.

Also the PERF guidelines it recommends are considered by a number of less-lethal force experts to be significantly out-dated, with "some not restrictive enough, others too restrictive or refuted by current medical research," as one critic puts it.

One benefit of the AMA report, however: it does acknowledge the existence of excited delirium, stating,

"Although not a validated diagnostic entity in either the International Classification of Diseases or the *Diagnostic and Statistical Manual of Mental Disorders*, 'excited delirium' is a widely accepted entity in forensic pathology and is cited by medical examiners to explain the sudden in-custody deaths of individuals who are combative and in a highly agitated state. Excited delirium is broadly defined as a state of agitation, excitability, paranoia, aggression, and apparent immunity to pain, often associated with stimulant use and certain psychiatric disorders."

5. Meanwhile.... Controversy in the field about Tasers and excited delirium continues. Last month [6/09], a 32-year-old man said to be bipolar was hit with a Taser, lost consciousness, and died almost immediately during an altercation with police on a busy highway near Hurricane, UT. The man was naked, "repeatedly running in and out of traffic," "screaming unintelligibly," "uncontrollable and displaying highly irrational behavior" when officers arrived. He refused more than 20 times to "get down on the ground," then reportedly lunged at an officer, who zapped him.

Afterwards, the man's father, a TV editorial director, insisted publicly that a Taser "absolutely, unequivocally should have never been used in this instance" and made allusions to the crucifixion of Christ, another naked man "being treated ill by officers of the law." Civilians in the blogosphere questioned the existence of excited delirium. And a newspaper columnist angrily opined that 10 years ago, "police would have tackled [the subject] and wrestled him to the ground" but now Tasers, which have "been used on grandmothers and autistic teenagers alike," are "more convenient, less messy."

At this writing, autopsy results have not been disclosed. An attorney for the police department expresses confidence that the officer's actions were "reasonable and appropriate."

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