

# Evidence that stun guns may stimulate the heart

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On the eve of the British Columbia inquiry into the death of Robert Dziekanski, a review of scientific data in CMAJ (Canadian Medical Association Journal) finds that in some cases, stun guns may stimulate the heart in experimental models. This evidence is contrary to current views that stun guns only affect skeletal muscles.

“The frequency and the shape of the pulses generated by stun guns are designed to incapacitate the target by electrically overwhelming his or her control of these muscles,” state Dr. K. Nanthakumar and colleagues. “In principle, these pulses are designed to act only on skeletal muscles and to not affect internal organs such as the heart.” The evidence that stun guns do not stimulate the heart is based on “...theoretical studies [that] suggest that stun guns cannot deliver the amount of energy required to stimulate the heart or cause ventricular fibrillation.”

Dr. Nanthakumar and colleagues point out that most theoretical and some experimental studies reveal that cardiac stimulation does not occur with stun gun discharges. However, experimental studies on pigs by 3 independent groups of investigators found that “a stun gun discharge can stimulate the heart” depending on the location of the stun gun barbs. Barbs that are located such that they form a vector across the heart have greater effect than those focused on the abdomen. In one study, swine blood pressure was abruptly lost after discharge of a stun gun, and another study “reported the deaths of 2 animals caused by ventricular fibrillation immediately after the stun gun discharge....This suggests that sufficient current density was produced by the stun gun to stimulate the

heart, which according to theory should not and could not occur.”

The researchers caution against applying data from pigs to humans, although “most of the basic mechanistic concepts in cardiac fibrillation and defibrillation are derived from animal studies, not humans.”

Recently, there have been several deaths after the use of stun guns, including Robert Dziekanski in Richmond, British Columbia, a Montréal, Quebec man and 24 year-old Chicago, Illinois resident, Kevin Piskura. More than 300 deaths following stun gun use have been documented, 20 of them in Canada.

Regarding arrhythmias long after the discharge of the stun gun, Dr. Nanthakumar, Dr. Paul Dorian and colleagues conclude “...there is no conclusive evidence to show whether stun gun stimulation (under certain electrophysical conditions) can result in cardiac arrhythmias late after stun gun discharge. With regards to deleterious effects on the heart during the discharge they state “In our view, it is inappropriate to conclude that stun gun discharges cannot lead to adverse cardiac consequences in all real world settings.”

Source: Canadian Medical Association Journal

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