**Walter, R.J.,** D. Valentino, K. Nagy, A. Dennis, J. Winners, F. Bokhari, and D. Wiley. "Pulsed electrical devices as non-lethal control weapons". AAAS Annual Meeting, Electric Forces in Biology and Medicine, St. Louis, MO. February 18, 2006.

Electrical discharge can produce a complex set of injuries including thermal burns, cell membrane pore formation and damage, as well as macromolecule (protein and glycosaminoglycans) denaturation or alteration. The nature and extent of the injuries depends on the strength and duration of the discharge, on its anatomic location and path through the tissues of the body, and on the characteristics of the current applied (AC, DC, mixed). The pathological effects may include skin burns, skeletal muscle necrosis, cardiac dysrhythmia and injury, osteocyte and osteoblast death, and blood vessel endothelial dysfunction. Some types of current (direct current, DC) can cause little or no injury at low levels and increasing amounts of physiological disruption and tissue damage at higher levels.

Electromuscular incapacitation devices (EIDs) or stun guns produce high voltage, low-amperage DC pulses to disable subjects. However, very little objective laboratory data are available in the refereed medical literature regarding animal or human studies describing the physiological effects of the present generation of EIDs. Because of their utility and despite this fundamental lack of knowledge about their underlying mechanisms and effects, these devices are finding increasing use by private citizens and deployment by law enforcement and military units. As a result of the expanding and sometimes unsupervised use of EIDs, growing numbers of individuals are being seen in health care facilities with electrical or other injuries related to their use. There is cause for increasing concern regarding the associated morbidity and mortality. Understanding the physiologic effects of high voltage, pulsed, DC current is essential so that these effects and their underlying mechanisms can be elucidated and possible injuries anticipated.

The current state of knowledge regarding the physiological effects of a range of EIDs will be discussed. Extensive new data regarding the effects of electric fields produced by EIDs on living tissue will be presented. The short-term (within 72 hours after administration) electrophysiological responses and structural effects on nerve, skeletal muscle, and skin will be described and the implications of these findings for the use of EIDs will be discussed.