
Preface

We conceptualized this book after receiving numerous requests over the years to consult with bodies of government, industry, public safety agencies, and the judicial system in cases involving wounds and forensic analysis related to conducted electrical weapons (CEWs). These cases are often emotionally contentious and typically involve allegations of civil rights violations surrounding perceptions of excessive force. To our surprise, we found that time and time again we encountered people that were very eager for some basic knowledge in this area. In several cases, there was confusion over what turned out to be an exaggerated claim. In some, there would be concern over an inability to make sense of the available forensic data. Still in others, it was clear that the only reason that a claim had been made was because of a well-meaning but uneducated statement made by a clinician or investigator early in the post-event analysis process that led to an expensive and unnecessary prolonged investigation and legal challenge. In all of them, there was a clear lack of uniform knowledge that was readily available on the subject.

Collectively as editors of this work, we have decades of experience in this field. Over the years, we have been unwittingly amassing a repository of scientific facts, real-time observations, prospective analyses, and retrospective anecdotes related to this subject. It was not until we realized this during informal discussions that we felt that we could help close this knowledge gap. In the areas where we did not have express expertise, we enlisted a strong cadre of fellow authors to assist in creating this book that is intended to be part text, part atlas, and all educational. Our intent is to make this knowledge available to those that need it most. We hope it does just that.

Within the last decade, the handheld conducted electrical weapon (CEW) has created a unique convergence of interest and knowledge within the fields of medicine, law enforcement, and biomedical engineering. These have combined to develop the modern CEW as an advanced technology. Several CEW ideas have progressed into mass production for use by the military, law enforcement officers (LEOs), and civilians. Over time, society has become more willing to accept the CEW as a tool that is common for use in repelling, controlling, and restraining violent or potentially dangerous persons.

This acceptance has not been without debate. Prior to 2003, there was little interest in knowing more about CEWs. This is likely due to the fact that although CEW technology had been around and available for decades, the CEWs available before that year were largely deemed to be of questionable utility and effectiveness (see Chap. 2 for more detailed historical CEW information).

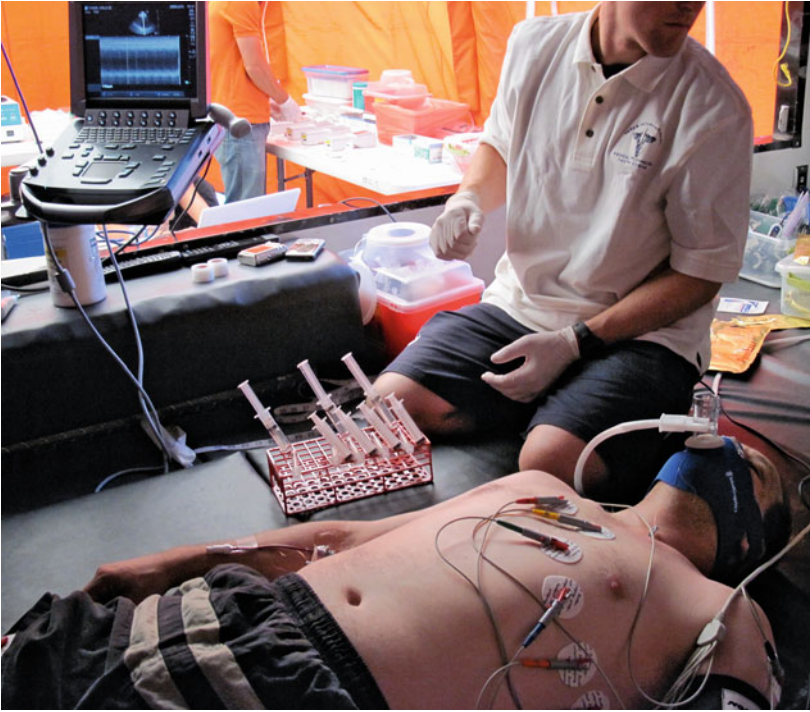


Fig. 1 A standard CEW human effect research study test involving several modern diagnostic tools to capture data on human effects

Because of this, there was no widespread acceptance or use of this technology by any single group or profession.

However, in 1999, this changed with the introduction of the Advanced TASER M26 CEW (TASER International, Inc., Scottsdale, AZ). Although the TASER CEW was originally meant for civilian self-defense purposes, this particular CEW was a near-instantaneous hit with LEOs because of its combination of skeletal muscle incapacitation and ability to be applied from a reasonable distance. It brought utility and effectiveness to the CEW marketplace and allowed an entire professional group to accomplish parts of their job in a manner that was deemed safer to both suspects and operators.

As CEW technology has matured, the knowledge about these devices has grown in depth and sophistication. Multiple studies, both animal- and human-based, have been performed to ascertain effect and safety. Over the past decade, many of these studies have focused on determining basic physiology associated with these devices. There have been a few groups of scientists that have been consistently successful at gathering useful data in these areas, several of whom are chapter authors in this text. Research groups such as mine (Ho and Dawes, et al., Minneapolis, MN) have been using modern medical diagnostic tools to answer CEW questions related to human physiologic effects (Figs. 1, 2, and 3). This has led to our involvement in helping to balance the ratio between desired effect and overall safety of the modern CEW.

Because much of our scientific work in the past 6 years has focused on basic science physiologic research, we felt that there was a lack of accessible



Fig. 2 Research use of echocardiography to determine real-time cardiac function during a CEW exposure to establish human effects



Fig. 3 Research involving a test of motivation during a CEW exposure to establish human effects (test subject attempting to inflict injury upon the yellow “dummy” with a rubber knife)

forensic information available on this subject matter. The overriding reason for this book was to fill the knowledge gap that currently exists. Therefore, we assembled a very specialized group of editors and authors who are subject matter experts.

The field of CEW technology involves extensive knowledge and understanding of many scientific as well as field-use principles and concepts. Because of this, we asked two of my good friends to join me in editing this text as well as authoring some of the chapters where we have expert command of the subject matter. The three of us combined bring a wealth of slightly different experience and knowledge to this project. Each of us has been extensively involved in the scientific proliferation of CEW knowledge for the past several years in many different ways. What was clear to us when we started this textbook idea was the fact that there are good sources of CEW information available in the form of manufacturer specifications, scientific research articles, and a comprehensive didactic textbook [1]. However, lacking was a good source of information for interpretation of CEW wounds, device analysis, and relevant case law. Despite this knowledge gap, there remained plenty of people willing to provide uninformed opinions about these topics. Unfortunately, these opinions have led to needless investigations and frivolous litigation.

Perhaps one of the best ways to make this point is to provide a synopsis of a real case that demonstrates this as an example: In mid-2004, we were asked to evaluate a case that was winding its way through the legal system. The case ended in a confidential settlement that included a requirement to not identify it in future proceedings; therefore, all identifying information in this case has been omitted. It was a fairly simple case of a shirtless person that physically resisted attempts at control while being arrested by several police officers. The subject was not intoxicated but had a warrant for their arrest and did not want to go to jail. A short scuffle ensued, and the subject was placed prone on the ground where they continued to vigorously resist the police. The subject received a single drive-stun to the left calf as a measure of pain compliance, and this caused them to end their resistance. The subject was taken to jail without further incident. This incident was witnessed by bystanders and documented well by all the officers at the scene. The subject was evaluated at the scene by paramedic personnel for abrasions. The paramedic documentation—and the recollections of all witnesses and officers—was consistent with the single drive-stun to the left calf. At the scene, all witnesses and officers indicated that there was only a single drive-stun to the calf during the sequence of events. The CEW download showed a single trigger activation. Upon being released from jail 72 h later, the subject read a mass-media article about CEW technology and filed an excessive-force lawsuit. The subject stated in his complaint that the reason that he deemed it to be excessive was because when he was young, he was told that electricity was dangerous. Hence, he did not believe that it was safe to use electrical current to restrain someone. Furthermore, the suspect took photographs of multiple abrasions on his chest and the single drive-stun marks on his calf as “evidence” of damage caused by the CEW application. Despite the fact that the abrasions were consistent with the reports that the subject was

shirtless and resisting wildly—while prone on the asphalt—and that the calf marks exactly matched the pattern and measurements of a single drive-stun, an attorney was found that also promoted the notion that the chest abrasions were caused by the CEW (from an unexplained mechanism). The attorney instructed the subject to obtain medical care to document the injury, and a physician (with no prior CEW knowledge) provided a diagnosis in the subject's medical record of "complex electrical burns to the chest." After 18 months of discovery and countless hours of work, the case was dismissed. Although the injury pattern and abrasions in this case did not support the allegations, this frivolous complaint was allowed to fester based upon a very uninformed physician. The knowledge of the complainant and the attorney is more difficult to ascertain.

It is exactly this type of case that we hope this text will address. We recognize that this text cannot provide images or discussion that covers every possible CEW usage scenario or allegation of misuse and that there can be variations on the topics that are discussed. However, we have chosen to put this information and these images out for easy accessibility in the hope that it will stimulate thoughtful discussion and analysis related to CEW application. The scope of work in this text is broad. It includes wound analysis, human forensic considerations of CEWs, and a historical as well as legal perspective for context, and much of this work is amenable to an atlas format style. We hope that this work provides a balance of clinical reality and academic theory. Along with the other two editors, we have had the good fortune of working with some prominent experts in this field, and the three of us have learned a lot more about these topics in working through the editorial process. We hope you enjoy reading it as much as we enjoyed putting it together.

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Reference

1. Kroll MW, Ho JD, editors. *TASER conducted electrical weapons: physiology, pathology, and law*. New York: Springer Science + Business Media; 2009.