

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA
WEST PALM BEACH DIVISION

CASE NO.: 07-80789 CIV-HURLEY/HOPKINS

LIDIA BOLANDER, Individually as the
surviving spouse of Timothy Bolander, and
as Personal Representative of THE
ESTATE OF TIMOTHY BOLANDER, et
al.

Plaintiffs,

vs.

TASER INTERNATIONAL, INC. et al.
Defendants.

_____ /

**PLAINTIFFS' NOTICE OF FILING
CORRECTED 1/30/2009 SWORN
STATEMENT OF PLAINTIFF'S
EXPERT MENASHE B. WAXMAN, M.D.**

Plaintiffs' file the attached corrected January 30, 2009, Sworn Statement of Plaintiff's
Expert electrophysiologist, Menashe B. Waxman, M.D.¹

Respectfully Submitted,

s/ William D. Tucker, Esq. (Fla. Bar #865753)

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I hereby certify that: I electronically filed the foregoing document with the Clerk of the
Court using CM/ECF; and that the foregoing document is being served this day on all counsel of
record or pro se parties identified on the attached Service List in the manner specified, either via

¹ Correcting erroneous internal references, citations, and typographical errors contained
in Dr. Waxman's 1/30/2009 sworn statement filed at [101].

transmission of Notices of Electronic Filing generated by CM/ECF or in some other authorized manner for those counsel or parties who are not authorized to receive electronically Notices of Electronic Filing, this January 31, 2009.

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SERVICE LIST

Bolander v. Taser International, Inc., et al.,
United States District Court for the Southern District of Florida
Case No. 07-80789 CIV-HURLEY/HOPKINS

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SWORN STATEMENT OF MENASHE B. WAXMAN, M.D.

I am a resident of the province of Ontario, Canada, over the age of eighteen, and based upon careful review of the data presented, have personal knowledge concerning the matters attested to herein.

I am licensed to practice medicine in the province of Ontario. I have previously been engaged in the practice of cardiac electrophysiology for over 38 years.

This sworn statement contains my additional opinions in this matter, which supplement, and in some instances change, the opinions contained in my report and sworn statement previously filed with this court.

This sworn statement contains an abbreviated version of my additional opinions and is made in order to comply with a deadline imposed on plaintiffs' attorney William D. Tucker to file a response to Taser's motion for sanctions by 5:00 pm Friday, January 30, 2009. I am in the process of preparing a lengthier sworn statement for use in opposition to the defendants' motion for summary judgment, which I anticipate will be completed by Thursday, February 5, 2009.

I. Reason for Submitting this supplemental sworn statement.

I have become aware of some Taser information which indicates that the Taser gun can operate in 4 different modes as opposed to the 2 modes (probe mode and drive stun mode) referred to in Taser's submission to the court of a motion for summary judgment ([Case 9:07-cv-80789-DTKH Document 39 Entered on FLSD Docket 08/22/2008](#)). This new information is highly relevant since Mr. Bolander was Tasered by one of these new modes and I believe that this mode of Taser operation is far more likely to affect the heart and breathing. Thus I am obliged to bring these new Taser modes to the court's attention

II. New Modes of TASER SHOCK

II.1 Taser International, Inc., and its affiliate scientists and physicians represent that Taser weapons deliver electrical charges in only two ways as follows: the **probe mode** and the **drive stun mode**. The following quote from a November 8, 2004, letter To Whom It May Concern from Jeffrey D. Ho, M.D., who identifies himself as a “practicing emergency physician and a Taser Instructor”, provides a fairly representative description of the probe and the drive stun modes (1):

(a) Probe mode “it can be “discharged” at a subject where 2 metallic darts are discharged from the weapon. The darts have a predetermined degree of separation and small barbs to aid in adherence to the subject or their clothing. The darts remain connected to the hand held TASER device by way of insulated wires of varying lengths (currently 15, 21 or 25 feet). Once discharged, the TASER system generates an electrical current that is carried through the wires to the darts. The darts and wires complete an electrical circuit (one positive, one negative) if they are embedded in the same subject. The electrical current from the TASER device causes skeletal muscle tetany with subject incapacitation for 5 seconds per trigger pull. The operator has the option of generating additional 5-second bursts of current as needed for subject control and compliance.”

(b) Drive Stun mode: “The tip of the TASER device has 2 contact points very close together that can be touched to a subject and the operator can then deliver an electrical current via this method, called a “Drive Stun.” This method does not deploy darts, but causes less skeletal muscle tetany because the points of contact are quite close together. This method generally induces subject control through pain compliance, not incapacitation.” (ref #1)

The skeletal muscle tetany described by Dr. Ho is referred to by Taser as “NMI” (neuromuscular incapacitation).

II.2. The representation that the Taser can only be used in these two modes is incomplete. This is very significant because it imposes a limitation on the placement of the two Taser electrodes (the probes in probe mode, or the “contact points” on the tip of the Taser barrel in drive stun mode) - such that a Taser’s electric current cannot travel between locations on opposite sides of the body. **As you will note in paragraphs II.4 a. –II.4 b. below, the Taser actually has 4 modes of operation**

II.3. Taser Inc. experts have offered up scientific journal articles and reports in support of their claim that the use of Tasers on humans has little harmful effect. All the materials that I have reviewed, without exception, has as its foundation that a Taser can only be used in the probe mode or the drive stun mode. The associated limitation of this is that a Taser’s electric current cannot travel between locations on opposite sides of the body i.e. between the front to back of the torso or the reverse. Thus every human or animal study which Taser uses as support for its claims that Taser shocks do not cause harmful heart rhythms (such as ventricular fibrillation, or asystole), interfere with respiration (breathing), or result in the accumulation of harmful levels of acid in the blood (metabolic acidosis, respiratory acidosis) involve the use of Taser in only the probe mode or drive stun mode.

II.4. It has recently come to my attention that Taser Inc., in its product and training materials acknowledges two additional modes (# 3 & #4) of Taser use, both of which involve an individual being hit by a single Taser probe, and both of which allow for Taser electrodes to be placed in virtually any location including opposite sides of the body. I have reviewed these materials **and I note that these are not disclosed in Taser’s Court Filings or in the expert medical reports submitted in the Bolander case.** The additional modes are described in paragraph **II.4. (a)** and **II.4. (b)**.

II.4. (a). Mode # 3: The third mode of Taser use occurs when an individual hit by a single Taser barb is on grass or dirt while the Taser is “cycling”. As clearly shown in Taser’s product/training materials including video, when this occurs, the subject undergoes severe NMI/skeletal tetany. This Taser explains, is because the electrical current travels from the Taser probe, through the subject, to the ground, “completing the circuit.” The earth, then, acts as the second

Taser electrode. The number of Taser probe locations and point of body-ground contact pairs are virtually limitless. (Taser Inc 76 exhibit 3 – 70344V7SJ)

II.4. (b). Mode #4: The fourth mode of Taser use involves an individual hit by a single Taser probe and who is then “drive stunned” (consisting of applying the barrel of the gun to the skin and delivering current between two fixed contact points at the end of the gun barrel). Taser’s product/training materials and video clearly show that this mode of Taser use causes the subject to undergo severe NMI/skeletal tetany. Taser explains that this is due to electrical current traveling from the Taser probe, through the subject, to the electrode(s) on the end of the Taser barrel (drive stun mode), thus “completing the circuit.” In this configuration, the number of Taser probe location and Taser barrel electrode-body point of contact pairs are virtually limitless.

III The evidence for the use of the Additional Taser Modes in Mr. Bolander and the significance of this finding

III.1. Medical examiner Stuart Graham, M.D., testified that two wounds on Mr. Bolander’s upper right chest three fourths of an inch apart were caused by two Taser probes.

III.2. According to Dr. Kirkham, under the circumstances of the incident, these wounds could not have been caused by Taser probes from the same Taser weapon (because Casarez and Hynes were 8 – 10 feet away from Bolander and the separation of the skin lesions is far too close to be consistent with penetration from one gun). Therefore, one wound was caused by a Taser barb from officer Casarez’s Taser gun and the other wound was caused by a Taser barb from Officer Hynes’s Taser gun.

III.3. Based on my review of Casarez’s and Hynes’s video sworn statements and Taser’s product/training materials, I agree with Dr. Kirkham that Casarez fired his Taser at Bolander who was on the street moving backwards towards his lawn which was only a few feet away. As he did not see any change in Bolander’s behavior to indicate a Taser “hit”, Casarez, believing he missed or that his Taser misfired, testified that he called out to Hynes who then fired his Taser

at Mr. Bolander. Casarez and Hynes were each eight to ten feet from Bolander when they fired their Tasers. Hynes testified that when Bolander stepped from the street onto his lawn he began "high stepping". This is explained by current flow between the Taser barbs in Bolander's right upper chest and the earth (Mode #3). Hynes testified that he discharged his Taser in this mode for ten seconds.

III.4. Bolander then went face down on the ground, and during the next fifty one seconds Hynes discharged his Taser into various locations on Bolander's back for thirty eight seconds, a fact corroborated by testimony by the medical examiner, Stuart Graham, M.D., and Hynes' testimony concerning the print out of his Taser weapon discharges.

III.5. Based on this new information as to the two additional modes of Taser use, it is my opinion that during this 38 second seconds of Taser application, the combination of Stun Gun and Probe mode caused Taser current to travel from Hynes's Taser probe lodged in Mr. Bolander's right upper chest, through Mr. Bolander's chest and the organs in the current path toward the barrel of Mr. Hynes's gun pressing against the skin over Mr. Bolander's back.

III.6 According to Dr. Kirkham based on Hynes's testimony and Bolander's reaction to being Tasered, the wire that connected officer Hynes's Taser to Mr. Bolander did not break. As a consequence, during thirty eight of the next fifty three seconds, the current from Hynes' s Taser traveled between the probe in Mr. Bolander's right upper chest and points on his back corresponding to the thermal injuries identified by Dr. Graham as caused by current from the Taser. During this portion of the struggle, the current from officer Hynes' s Taser traveled through Mr. Bolander's heart, diaphragm, phrenic nerve, and vagus nerves. It is my opinions within a reasonable degree of medical certainty that this significantly interfered with Mr. Bolander's respiration and interfered with the normal function of his heart, so as to directly contribute to his untimely death. **Unfortunately for Mr. Bolander, the Taser probe placement and resulting current paths were the "worst case" for Mr. Bolander's respiratory and cardiac functions.**

IV Significance of Additional Taser Use Modes to “Worst Case” Taser Electrode Placement

IV.1. Research has show that optimal location for pacing the heart in emergency situations using cutaneous electrodes involves placing one electrode over the upper right posterior chest and another electrode over the skin overlying the heart (ref # 2). Likewise the optimal placement of electrode to convert rapid heart beating is very similar to the above (ref #2a).

IV.2. Thus it is clear that there is an optimal vector of current spread to stimulate the heart and that current proceeds from superior to inferior and from posterior to anterior. The electrodes are wide apart and are positioned so that current must pass through the heart

IV.3. In the case of Mr. Bolander, he received 38 seconds of Taser shocks delivered in mode # 4. Remembering that one of the electrodes (the barb) was in the upper right chest anteriorly and the second electrode (the end of the barrel of the gun) was in contact with the posterior inferior part of the thorax, we can easily visualize that the ensuing vector of current would pass through most of the structures in the chest including heart, diaphragms, phrenic nerves and vagus nerves.

IV.4. Thus the position of the electrodes in Mr. Bolander’s case would have created a “worst case scenario”

IV.5. In this regard it is worth noting that Lakkireddy and colleagues performed an experiment in which they administered Taser shocks of varying intensity and at levels of energy above the standard Taser output they could induce ventricular fibrillation (ref # 3). The electrodes they used were both on the front of the chest. The standard Taser current output in this case could spread from one electrode to the next without affecting the heart. By contrast an anterior and posterior and superior to inferior electrode placement would ensure current spread to the heart (in the case of their organ of interest) and undoubtedly the current intensities needed to stimulate the heart and cause ventricular fibrillation would have been lower. Thus strategic placement of the Taser electrodes as in Bolander’s

case would have the same effect as increasing the current output in the Lakkireddy experiments

IV.6. Sun and Webster carried out experiments in which they showed that when one of the Taser electrodes was in close proximity to the heart VF occurred (ref #4). The electrode placement in Bolander's case would have a similar effect to moving one of the electrodes very close to the heart.

IV.7. Depending on the organ and physiologic function of concern, there are a number of "worst case" Taser electrode placements, all of which involve Taser electrode placement on front and back of the body. If at the same time the electrodes are also positioned inferiorly and superiorly, you now have the widest fields possible to reach the contents of the thorax. This type of electrode placement is totally different than the studies relied on by Taser where the which involve electrodes placed on the same side of the body.

V. Taser electrodes, Pacing electrodes and Defibrillation electrodes placement in a selection of experiments carried out by Taser Inc experts

V.1. Dr. Ho's research studies pertaining to the effects of Taser use on respiration and heart function concludes that there is no effect on respiratory or cardiac function (ref #5, #6) In these experiments the Taser electrodes were placed only along the frontal plane of the chest as thus they do not approximate the electrode positioning in Mr. Bolander where the electrodes were in the upper anterior chest (bard) and in the inferior posterior thorax (barrel of gun electrodes). In Mr. Bolander's case the path of the current would be optimal to reach the heart, the vagus nerves, the phrenic nerves and the diaphragms. This current path would be even more significant for someone such as Mr. Bolander with clinically significant levels of cocaine in his blood. For those at risk individuals, interference with respiration, can, as it did in this instance lead to his death.

V.2. Panescu et al showed that the optimum placement of electrode on the skin of the thorax to achieve cardiac pacing in an anterior – posterior axis (7). This is analogous to the situation in Mr. Bolander.

V.3. Likewise Panescu et al showed that defibrillation of the heart is most efficient when the current is delivered in an anterior - posterior axis in a manner analogous to Mr. Bolander (ref #8).

VI. Summary of the essential facts, conclusions and consequences that resulted from use of the Taser in the single probe mode (mode # 3) and the stun drive mode combined with the single probe (mode # 4).

The salient facts that I have drawn on to reach my conclusions are summarized in paragraphs **VI.1 – VI.6**. These facts are taken from the analysis and statements of Dr Stuart Graham, the medical examiner who performed the autopsy examination of Mr. Bolander, George Kirkham, a law enforcement expert and professor of criminology acting as an expert for the Bolander family and Lidia Bolander, the wife of Timothy Bolander

VI.1. The two injuries on Bolander's right upper chest are three fourths of an inch apart and they were caused by Taser barbs (skin # 9 and #14). *Deposition Stuart Graham, M.D.*

VI.2. Bolander has at least seven thermal injuries on his back. (*Deposition Stuart Graham, M.D.*) (That there are an odd number at first seem significant. Taser's photos of Taser thermal injury wounds don't always depict two separate "circles" when the stun drive mode is applied to skin).

VI.3. The two wounds on Bolander's chest were caused by one probe from Hynes's Taser and one probe from Casarez's Taser. (*Sworn statement, George Kirkham*).

VI.4. Current from Casarez's Taser entered Bolander in mode #3 for approximately five seconds. (*Sworn statement, George Kirkham*).

VI.5. Current from Hynes's Taser entered Bolander in mode #3 for approximately ten seconds. (*Sworn statement, George Kirkham*).

VI.6 Current from Hynes' Taser entered Bolander in mode #4 for thirty-eight of the next 51 seconds (between upper right chest and various locations lower back), while Hynes and Casarez were sitting on him. (*Sworn statements, George Kirkham; Sworn statement Lidia Bolander;*

Deposition Stuart Graham, M.D).

VII. Based on these facts In Section VI.1. – VI.6., I have reached the following conclusions

VII.1. Based on the facts in paragraphs 1-5 above, approximately ten seconds of current from Taser entered Bolander's body, with a current vector between the upper right chest and one or both feet and out to the grassy earth beneath his feet. The current passed through the chest and its organs including the diaphragm. (*Sworn statement, Menashe B. Waxman, M.D - this report*).

VII.2. Based on the facts in paragraph **VI.6. 6.** above, for 38 of the next 51 seconds, current from Hynes's Taser travelled through Bolander's body, with a current vector of upper right chest, superior to diaphragm and various locations on Bolander's lower left back, inferior to diaphragm. (*Sworn statement, Menashe B. Waxman, M.D – this report*).

VII.3. Based on **VI.6. 6.** above, for 38 of the next 51 seconds current from Hynes' Taser passed through Bolander's diaphragm and phrenic nerve (s), which controls respiration, thus severely impairing Bolander's ability to breathe. (*Sworn statement, Menashe B. Waxman, M.D. – this report*)

VII.4. Based on **VI.6. 6.** above, for 38 of the next 51 seconds current from Hynes' Taser also passed through Bolander's heart, the vagus nerves which directly contributed to the cessation of Bolander's heart - asystole. (*Sworn statement, Menashe B. Waxman, M.D. – this report*)

Final Conclusions

1. We know that Mr. Bolander received 38 seconds of Taser shocks delivered to his thorax in an anterior – posterior and inferior – superior axis.
2. A similar configuration is acknowledged to be the most effective way of electrically stimulating the heart or to defibrillate the heart by electrodes applied to the chest.
3. The multiple human and animal experiments that Taser Inc. relies on to promote the idea that Taser shocks are not harmful have all used electrodes in a single body plane and thus do not come close to replicating the Taser applications in Mr. Bolander.
4. Thus we can conclude that Mr. Bolander was subjected to far more effective stimulation than those studies relied on by Taser Inc. The net result of the more effective thoracic stimulation in Mr. Bolander's case was to arrest his breathing and his heart.

References

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8. Panescu D, Webster JG, Tompkins WJ, Stratbucker RA. Optimization of Cardiac Defibrillation by Three-Dimensional Finite Element Modeling of the Human Thorax. IEEE Trans Biomed Eng, 1995; 42:185 - 191

Verification pursuant to 28 U.S.C. § 1746:

Under penalties of perjury, I declare that I have read the foregoing Sworn Statement and that the facts stated in it are true, this January 30, 2009.

Respectfully submitted,

S/Menashe B. Waxman, M.D.