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# Agitated Delirium and TASER: The EMS Perspective

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# Disclosures

- Bill has no actual or potential conflict of interest in relation to this presentation.
- Scott has no actual or potential conflict of interest in relation to this presentation.

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# Social Media Usage

- *We encourage you to use your phones!*
  - Take notes
  - Take pics of various slides
  - Tweet/FB/SC
    - #PulseCheck2016
    - #FOAM

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No EMS Staff will be harmed  
during this presentation....





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# Objectives

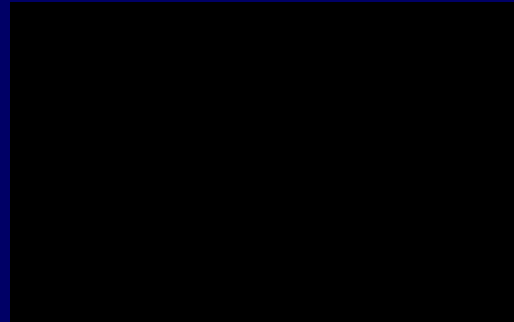
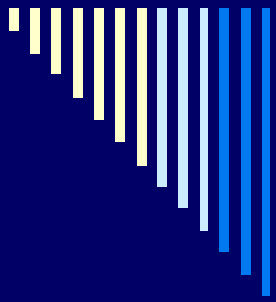
- Agitated Delirium
- Chemical & Physical Restraints
- Medical Management
- TASERs



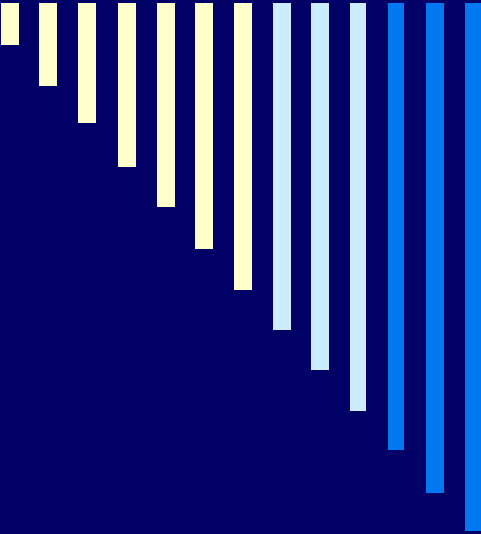
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# What is Agitated Delirium?

- A controversial theory
- An imminently life threatening medical emergency...
- Not a crime in progress!



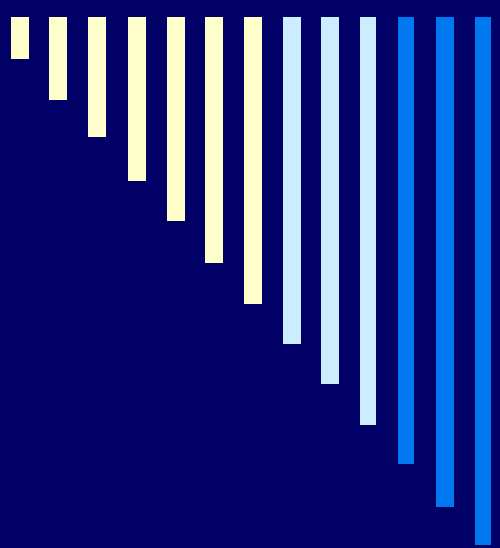
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Agitated delirium is an  
imminently life-  
threatening medical  
emergency.

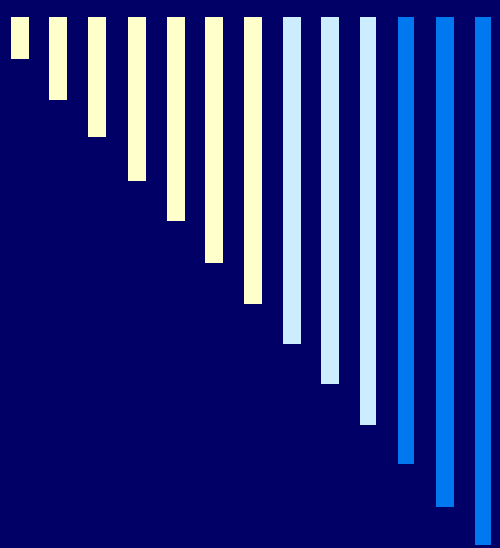


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The behavioral features of agitated delirium include criminal acts, but...

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Agitated delirium is  
not a crime in  
progress, and  
responders must  
recognize the  
difference, before it's  
too late.



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# The “Freight Train to Death”

- How we restrain, position, or treat the subject may not stop “the freight train to death”
- Conditions likely in place before EMS/LE arrival.



# Freight Train Scenario

- Los Angeles County EMS Study
  - 18 AD deaths witnessed by paramedics (all were restrained)
  - In 13 – rhythm documented
  - VT and asystole were most common
    - No ventricular fibrillation
  - All failed resuscitation



# What is Agitated Delirium?

- Diagnostic criteria
  - Characteristic behavioral components
  - Metabolic Acidosis
  - Hyperthermia
  - Identifiable cause
    - Stimulant drugs
    - Psychiatric disease
- It does not explain all behavior that leads to confrontation with police/EMS



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# Recognizing Agitated Delirium

- Agitation or Excitement = Increased activity and intensity
  - Aggressive, threatening or combative – gets worse when challenged or injured
  - Amazing feats of strength
  - Pressured loud incoherent speech/Keening
  - Sweating (or loss of sweating late)
  - Dilated pupils/less reactive to light
  - Rapid breathing



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# Recognizing Agitated Delirium

- Delirium = Confusion
  - Disoriented
    - Person, place, time, purpose
  - Rapid onset over a short period of recent time
    - “He just started acting strange”
  - Easily distracted/lack of focus
  - Decreased awareness and perception
  - Rapid changes in emotions (laughter, anger, sadness)



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# Recognizing Agitated Delirium

- Psychotic = bizarre behavior
  - Thought content inappropriate for circumstances
  - Hallucinations (visual or auditory)
  - Delusions (grandeur, paranoia or reference)
  - Flight of ideas/tangential thinking
  - Makes you feel uncomfortable





# Behavioral Components: Excited (Agitated)

- Extreme agitation, increased activity
  - Aggravated by efforts to subdue and restrain
    - No compliance to verbal command
    - Poor/no compliance to baton/chemical spray
    - Perhaps unlikely to comply after one or two tasers



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# Behavioral Components: Excited (Agitated)

- Violent or aggressive behavior
  - Towards inanimate objects, especially smashing glass
  - Towards self, others or police
- Noncompliant with requests to desist
- Superhuman strength
- Insensitive to pain



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# Pathophysiology

- Central nervous system effects:
  - Changes in dopamine transporter and receptors
  - Accounts for behavioral changes
  - Accounts for hyperthermia



# Mnemonic: NOT A CRIME

- Naked – and sweating from hyperthermia
- Objects – violence against, especially glass
- Tough – unstoppable, insensitive to pain
  
- Acute onset – “He just snapped!”
  
- Confused – person, place, purpose, perception
- Resistant – will not follow commands to desist
- Incoherent speech – shouting, bizarre content
- Mental Health or Makes you uncomfortable
- Early LE/ALS Back-up



# Strategies

- ❑ Attempt verbal de-escalation
- ❑ Summon back-up quickly
- ❑ Summon ALS as early as possible
- ❑ Use TASER before a struggle ensues
- ❑ Restrain the subject and administer tranquilizer
- ❑ Back off and contain the subject without restraint
- ❑ Once calm transport (no restraints?)
- ❑ Minimize struggle and restraints
- ❑ Unrealistically simplified?? – Maybe!



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# Fall Back Position

- Proceed to customary practices at any point when
  - Strategy appears to fail
  - Safety appears to be endangered
  - It is necessary to escalate the level of force based on the threat level
- Don't allow transport in a squad car
- Use the least amount of force needed



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# Agitated Delirium: The Usual Suspects

- #1 Cause: Stimulant Drug Abuse
  - Acute intoxication
  - Superimposed on chronic abuse
  - Acute intoxication may trigger the event



# Agitated Delirium: The Usual Suspects

- Underlying psychiatric disease
  - AD first described in 1849
  - Mania (Bipolar Disorder)
  - Psychosis (Schizophrenia)
- Noncompliance with medications to control psychosis or bipolar disorder
- Rare: New onset schizophrenia





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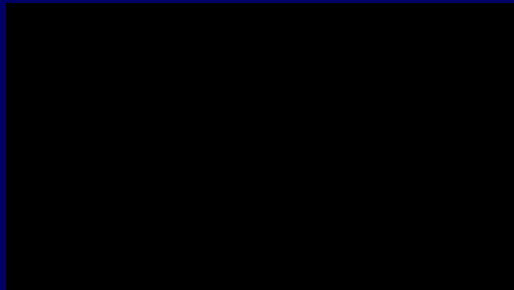
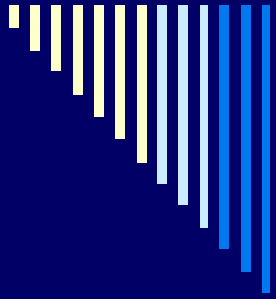
# Stimulant Drugs

- Cocaine
- Toxicology studies show...
  - Low to moderate levels of cocaine
  - High levels of benzoylecognine (the major breakdown product of cocaine)
  - Suggests recent use superimposed on chronic abuse



# Stimulant Drugs

- Other known culprits include:
  - Methamphetamine
  - Phencyclidine (PCP)
  - LSD
  - “Bath Salts”
- Cocaethylene = Cocaine + Alcohol
  - Toxic to the heart
  - Unknown role in agitated delirium deaths

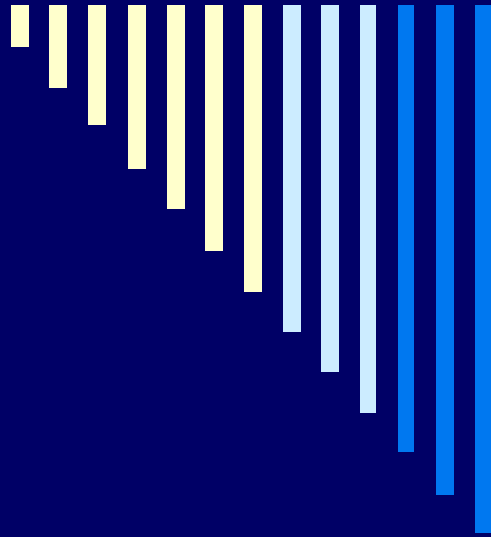




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# Bad Behavior: Other Reasons

- ❑ Alcohol intoxication or withdrawal
- ❑ Other drug use problems
  - Example: Cocaine psychosis
- ❑ Pure psychiatric disease
- ❑ Head injury
- ❑ Dementia (Alzheimer's Disease)
- ❑ Hypoglycemia
- ❑ Hyperthyroidism



Patients with agitated delirium need rapid aggressive medical intervention.



# Agitated Delirium

## □ Hyperthermia

- High body temperature
- 105 – 113 °F
- Drug's effect on temperature control center in brain (hypothalamus)
- Tell-tale signs:
  - Profuse sweating
  - Undressing – partial or complete



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# Agitated Delirium

## □ Hyperthermia

- Aggravated by
  - increased activity
  - the ensuing struggle
  - warm humid weather (summertime)
  - dehydration
  - certain therapeutic medications



# Agitated Delirium

## □ Metabolic Acidosis

- Potentially life threatening
  - Elevated blood potassium level
- Factors: dehydration, increased activity

## □ Survivors:

- Kidney damage due to muscle breakdown
  - Rhabdomyolysis
- May require dialysis



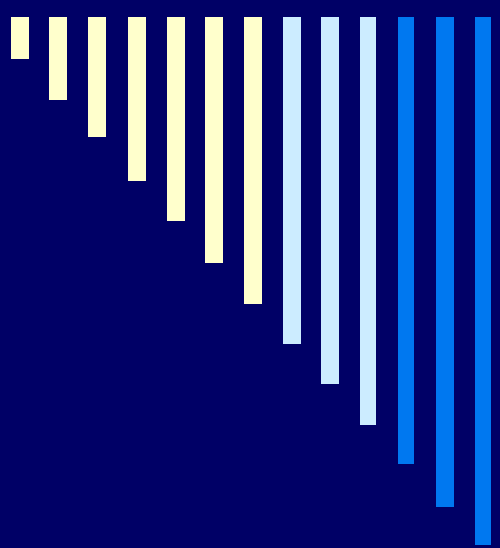


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# Concurrent Health Conditions

- Obesity
- Heart Disease
  - Coronary artery disease
  - Cardiomegaly
  - Hypertrophic cardiomyopathy
  - Myocarditis
  - Fibrotic heart

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The first goal of  
therapy is to gain  
control of the violent  
behavior.



# The “Ideal” Drug

- Rapid effective tranquilization
  - No repeat dosing
- No significant adverse effects
  - respiratory depression
  - cardiovascular depression
  - neurological adverse effects
- Easy to administer (IM)
- Allows easy assessment of neurological status on ED arrival



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# In Search of The “Ideal” Drug

- Benzodiazepines
- Neuroleptics
- Atypical antipsychotics
- Ketamine



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# Benzodiazepines

- Effective
- But usually require repeat doses
- Adverse reactions:
  - Hypotension
  - Respiratory Depression
  - Over sedation



# Ketamine

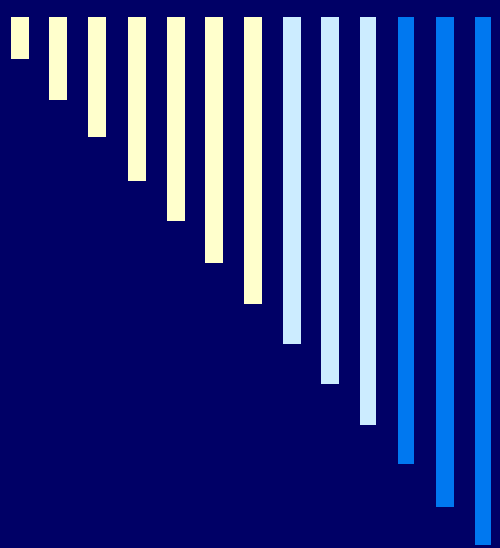
- Very rapid onset of action (<5 minutes)
- Highly effective in a single dose
- Favorable safety profile in healthy patients
- Potential adverse effects:
  - Adrenergic over stimulation
  - “Emergence reactions” in adults
    - <Less than 10-12% of doses



# Ketamine Will Save Us!

- The standard dose and route for an adult is 4 mg/kg (**maximum dose 500 mg**)
- **Intramuscular (IM) injection only.**  
(Lateral thigh preferred)
- May administer through clothing.
- May repeat 100 mg IM dose in 5-10 minutes for continued agitation. The typical concentration of ketamine to be used is 100 mg/mL.

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The second goal of therapy is to stabilize the underlying pathophysiologic processes.





# Other ALS Interventions

- Dehydration/Metabolic Acidosis:
  - IV NS X 2 W/O
- Hyperthermia:
  - Cool environment, disrobe, tepid mist and fanning, cooling blankets
- Hyperkalemia?:
  - Fluids, Calcium Chloride, Sodium Bicarbonate, Albuterol
- Rapid transport



# Caveats

- ❑ Never place an agitated and combative patient in an ambulance without physical restraints
- ❑ Never transport a restrained patient without an officer present who can unlock the restraints
- ❑ Should the transporting officer disable his/her weapons?

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# Potential Pitfalls

- ❑ Can't wait for back-up
- ❑ ALS not available
- ❑ Struggle and restraints cannot be avoided

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# Restraints and In-Custody Deaths

- What roles do physical restraint, restraining technique and restraint position play in agitated delirium deaths?

# Physical Restraints



FIGURE 1. Example of a hobble ("hog-tie") restraint. Reproduced with permission from: Reay DT, Fligner CL, Stilwell AD, et al. Positional asphyxia during law enforcement transport. *Am J Forens Med Pathol.* 1992;13:90-7.



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# Physical Restraint Issues

## □ Positional Asphyxia

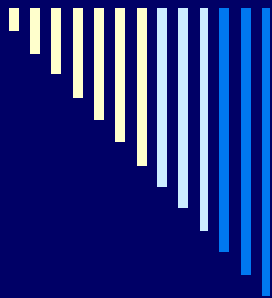
- Deaths have occurred with subjects restrained in a prone position
- Theory: restricts breathing
- The role of the position is unclear
- Other factors may be present



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# Physical Restraint Issues

- Compression asphyxia
  - What are the adverse effects on breathing and circulation when one or more officers kneel on the subjects back as they handcuff him?







# TASERS and Agitated Delirium Deaths

- It's not the TASER
- Many in-custody deaths long before tasers were ever used
  - Documented in 1980s medical literature
- Deaths of persons not in custody
  - Found naked in bathrooms
  - Wet towels
  - Empty ice cube trays scattered about
  - A futile effort to cool themselves

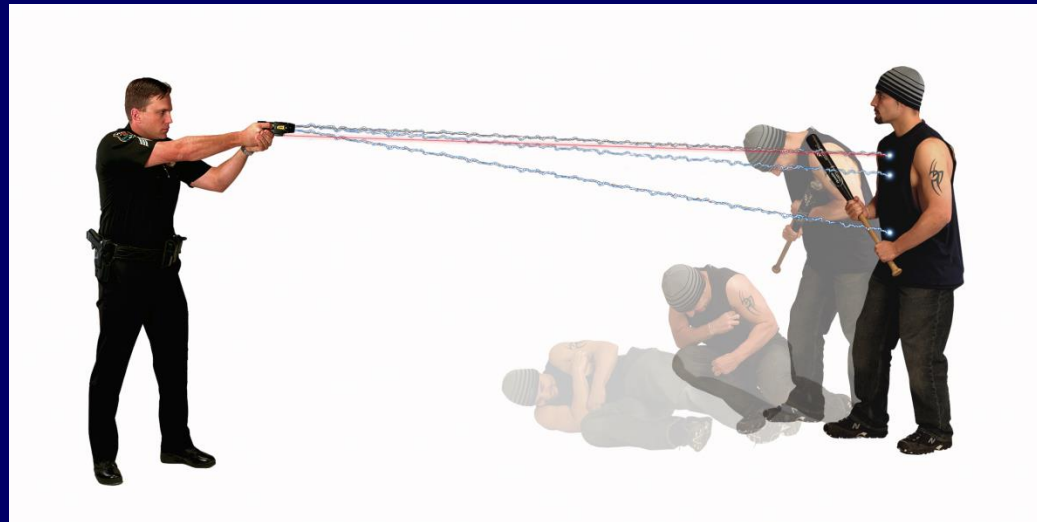


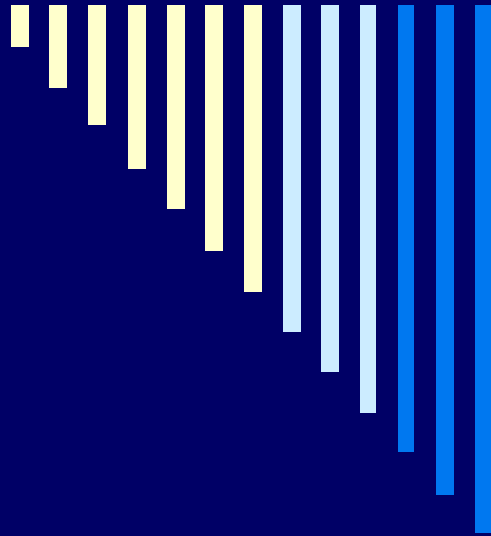
# TASERS and Agitated Delirium Deaths

- It is unknown whether TASERS have different adverse effects on people with agitated delirium than on healthy volunteers
- TASER
  - No proximate temporal relationship between TASER use and death
- Multiple or continuous TASER shocks
  - Taser International's recent warning against repeated shocks

# Advantages of the TASER

- Less risk of injury to law enforcement officers when subjects actively resist
- Less risk of injury or death to subjects from law enforcement use of force



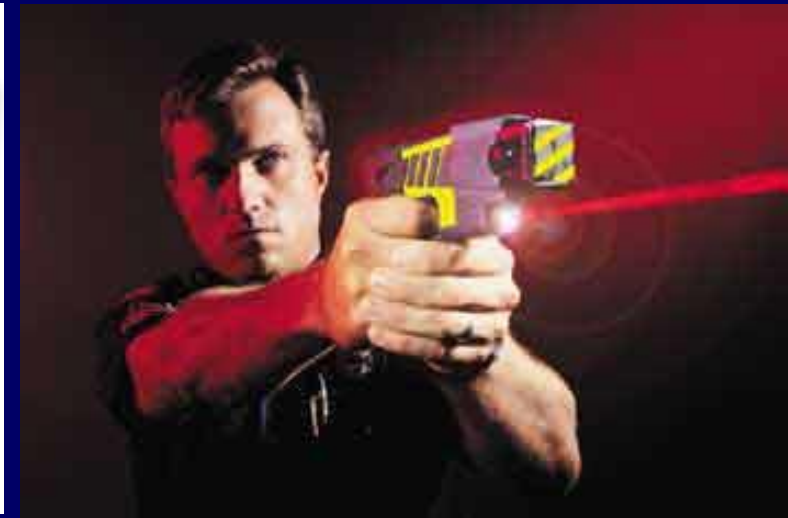


Whether repeated or  
continuous TASER  
shocks is safe  
remains unknown.  
They should probably  
be avoided, if  
possible.

# Thomas A. Swift's Electric Rifle (TASER)



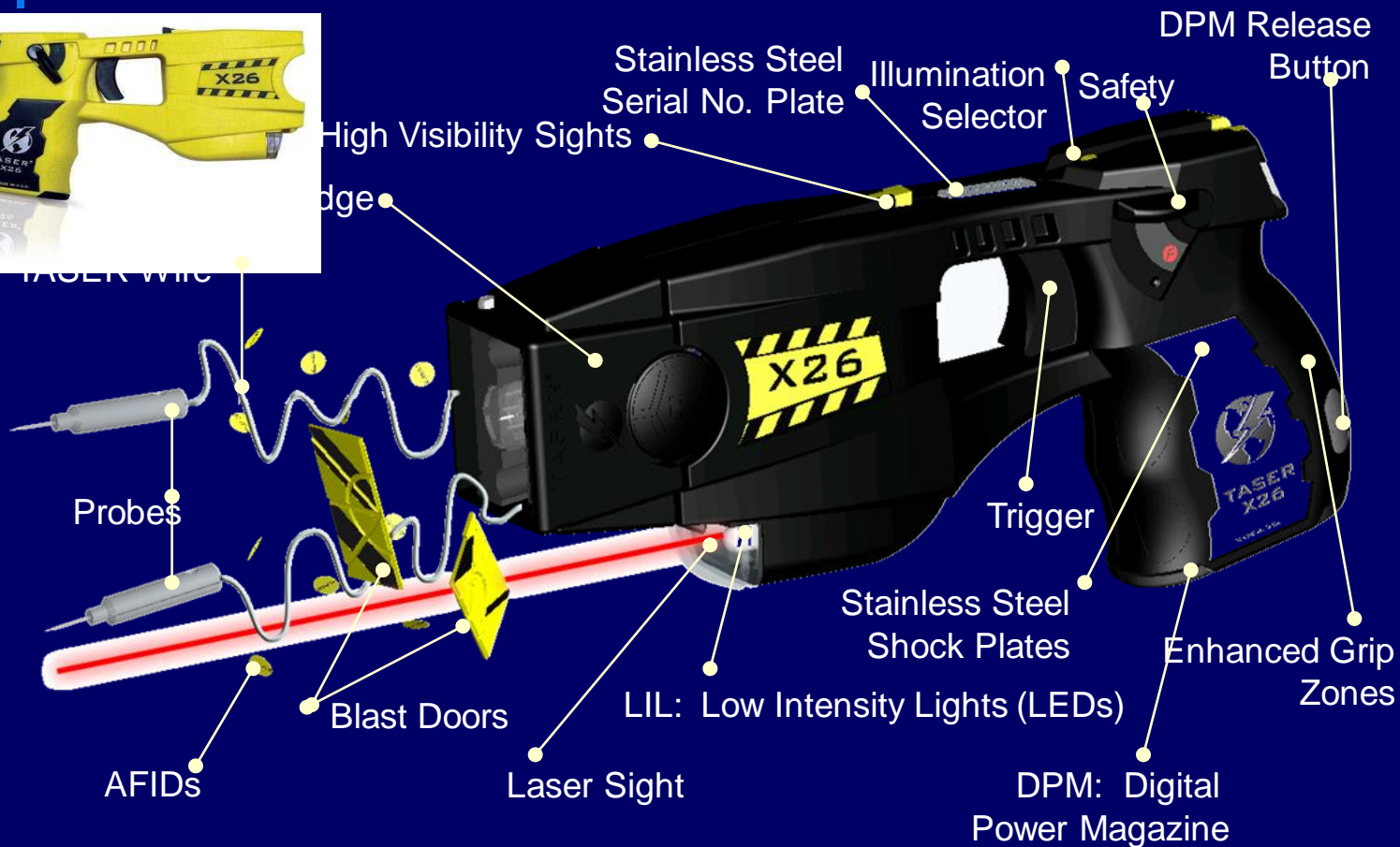
Source:  
<http://www.pointshooting.com/m26black.jpg>



Source: <http://www.keme.co.uk/~mack/M26.jpg>

M26 Taser. Manufactured by Taser International

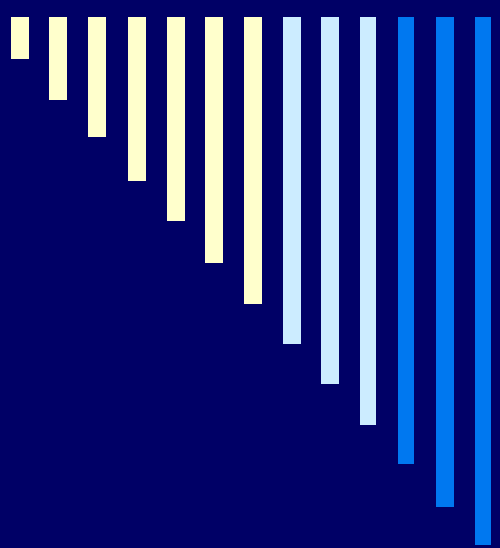
# X26 Taser



# M26 Taser



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Tasers,  
in and of themselves,  
are not lethal  
weapons.



# Tasers Use Electricity

- Taser:
  - 50,000 Volts
- Static Electricity
  - door knob
  - 35,000 – 100,000 Volts
- Van De Graaff Generator:
  - 1 – 20 Million Volts





# Tasers Use Electricity

- It's not the voltage it's the amperage that is dangerous
- Tasers use high voltage, but very low amperage
  - M26: 3.6 milliamps (average current)
  - M26: 1.76 joules per pulse
  - X26: 2.1 milliamps (average current)
  - X26: 0.36 joules per pulse
- X26 Taser delivers 19 pulses per second



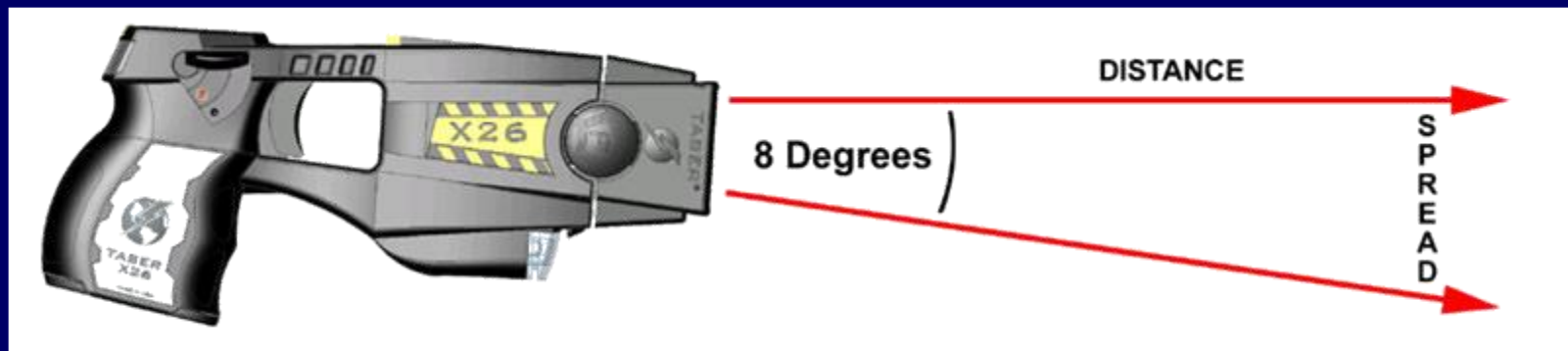
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# Tasers Use Electricity

- Cardiac Defibrillators use 150 – 400 joules per pulse
- The safety index for the fibrillation threshold ranges from 15 – 42 depending on the weight of the subject
  - Source: *PACE* 2005; 28:S284-S287.
  - Pig study
  - Variable current/constant pulse frequency

# Probe Trajectory

- Aim like a standard firearm at center of mass
- Use sights and/or laser
- Rule of Thumb: 1 foot (.3m) spread for every 7 feet (2.1m) of travel



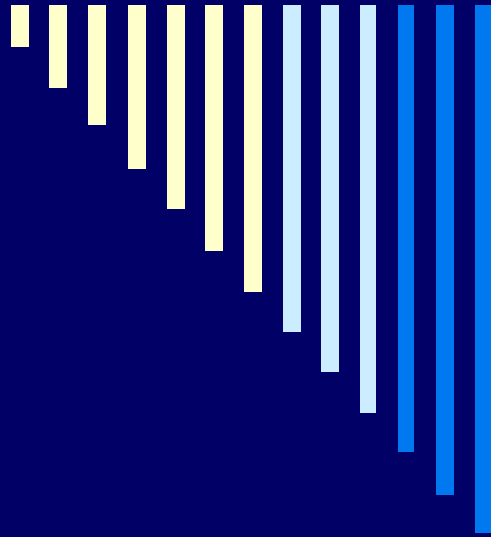
	(m)	.6	1.5m	2.1m	3m	4.5m	6.4m	7.6m
<b>Target Distance (ft)</b>		2'	5'	7'	10'	15'	21'	25'
<b>Spread (in)</b>		4"	9"	13"	18"	26"	36"	38"
<b>(cm)</b>		10cm	23cm	33cm	46cm	66cm	91cm	109cm



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# Taser Effects

- High voltage affects nerves
- Leads to intense muscle contraction
- Does not affect muscles directly



Tasers have caused injuries, but most Taser-related injuries are minor.



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# Taser Injuries

## □ Muscle Contraction Injuries

- Stress fractures
- Muscle or tendon strain or tears
- Back injuries
- Joint injuries

## □ Injuries from Falls

- May be serious depending on the height



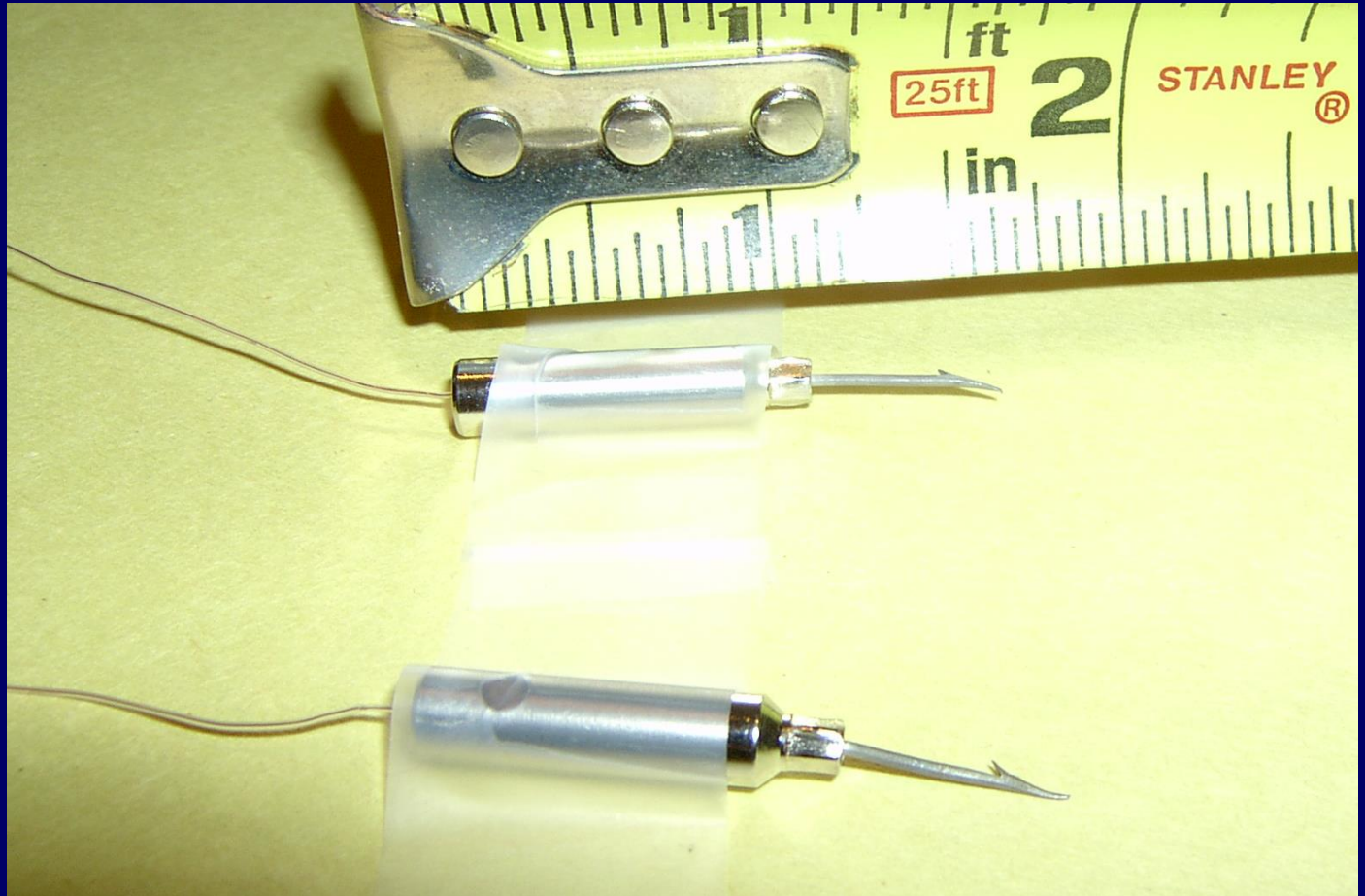
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# Taser Injuries

- Minor Surface Burns
  - Due to arcing
- Tasers will ignite flammable liquids and gasses
  - Potential for serious burns
- Penetrating Eye Injuries



# Taser Darts



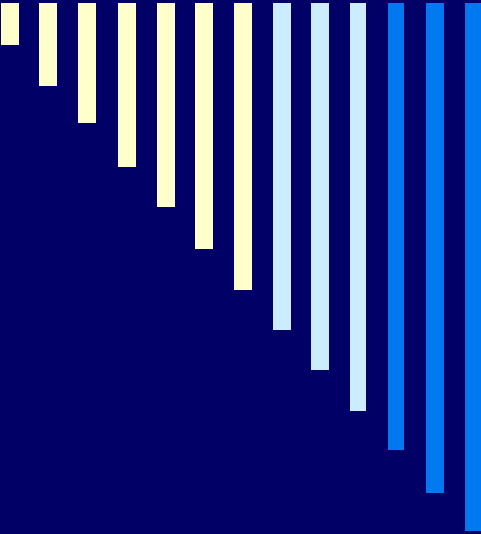


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# Taser Dart Injuries

- The skin at the puncture site is cauterized
- A swift tug will remove the barb easily
  - Taser users receive this training
- Wipe site with alcohol prep
- Consider a band-aid

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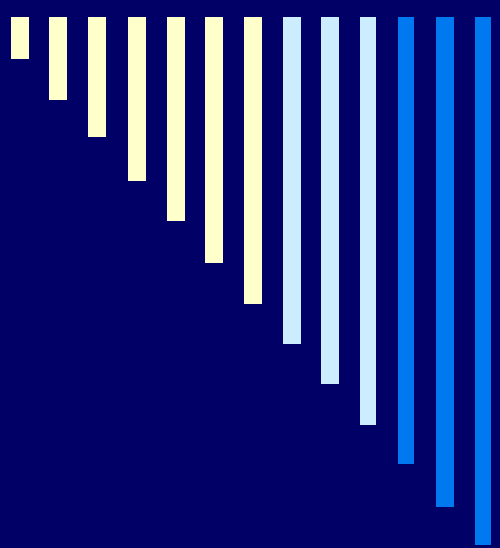
News media sources  
have implied a cause  
and effect relationship  
between Tasers and  
in-custody deaths...



# Concern About Tasers

- 147 in-custody taser-related deaths since 1999
  - Source: Robert Anglen, Arizona Republic August 8, 2005
  - The number is growing
  - Draws significant negative media attention
  - Outcry from human rights activists
    - Amnesty International
    - <http://web.amnesty.org/library/index/ENGAMR511392004>

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There is no scientific evidence to date of a cause and effect relationship between Tasers and in-custody deaths.

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# Taser Use in Police Training

- Over 300,000 police officer volunteers
  - No deaths



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# In-Custody Deaths...

- Why do some people die following a violent confrontation with police?
- What role does the taser play, if any?
- What can police officers do to prevent in-custody deaths?



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# Typical Scenario

- Male subject creating a disturbance
- Triggers 911 call
- Obvious to police that subject will resist
- Struggle ensues with multiple officers
  - May involve OC, Taser, choke holds, batons, etc.





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# Typical Scenario

- Physical restraints applied
  - Subject subdued in a prone position
  - Officers kneeling on subjects back
  - Handcuffs, ankle cuffs
  - Hogtying or hobble restraint
- Prone vs. lateral positioning
- Transported in a squad car to jail



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# Typical Scenario

- Continued struggle against restraints
  - Sometimes damages squad car
- Apparent resolution period
  - Subject becomes calm or slips into unconsciousness
  - Labored or shallow breathing
  - Followed unexpectedly by...



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# Typical Scenario

- The press:
  - Subject “died after being shocked with taser”
  - Implies cause and effect
- The Fallacy: “*Post hoc ergo proptor hoc*”
  - “*Because of this....this*”

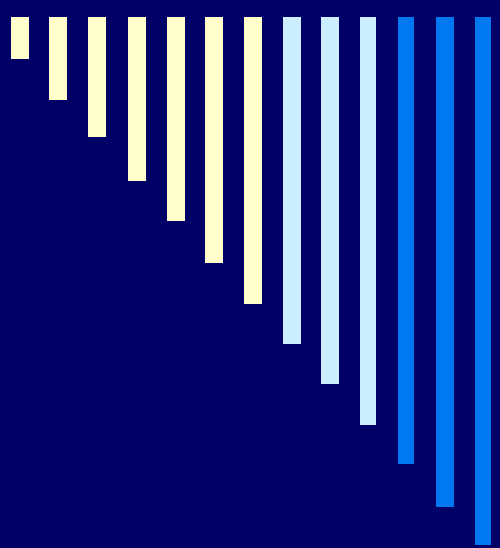


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# Typical Aftermath

- Several weeks later – autopsy results...
  - Cause of Death
    - Excited delirium
    - Illicit stimulant drug abuse
    - Concurrent medical problems
    - Minimal injury from police confrontation
  - It wasn't the TASER after all
  - Officers exonerated

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Several forensic pathology studies have cited agitated delirium, not Tasers, as the cause of death.



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# Summary

- Agitated Delirium is an imminently life threatening medical emergency, not a crime in progress
- In-custody deaths likely related to agitated delirium
- TASERS – if used early – may help
- ALS medics can give potent tranquilizers
- Rapid aggressive medical stabilization needed

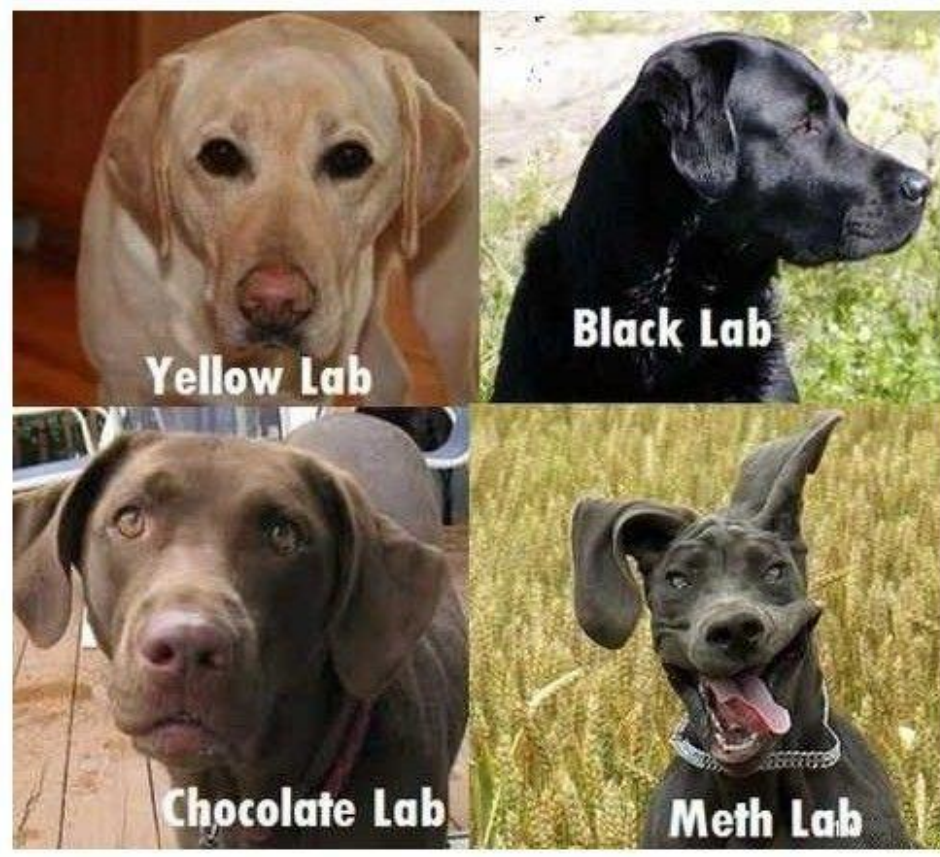


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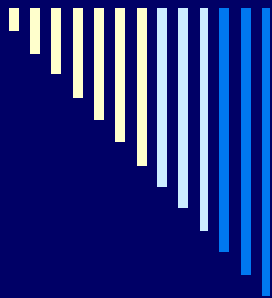
# Summary

- Beware of potential side effects of therapeutic drugs
- Treat for hyperthermia, dehydration, metabolic acidosis and potential hyperkalemia

# Questions?







The key to  
*immortality*  
is *first living*  
a *life worth*  
*remembering*

The Fresh Quotes