

Pepper Spray: What Do We Have to Expect?

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Presentation Plan

- History
- Pepper Spray
- Tear Gas
- Symptoms
- Medical Treatment
- If you are the victim ???



History



- **PEPPER SPRAY →→**
 - **OC (oleoresin of capsicum)** (Most Commonly Used Compound)
- **TEAR GAS →→→**
 - **CN (chloroacetophenone)** (German scientists 1870 →→→ World War I and II)
 - **CS (orthochlorobenzalmalononitrile)** (US Army adopted in 1959)
 - **CR (dibenzoxazepine)** (British Ministry of Defence 1950-1960)

History of Pepper Spray



- Red Chili Pepper was being used for self defense in ancient India - China - Japan (Ninjas).
 - Throw it at the faces of their enemies, opponents, or intruders.
- Japan Tukagawa Empire police used a weapon called the "metsubishi."
- Accepted as a weapon
 - incapacitate a person temporarily.
- Pepper as a weapon **14th and 15th century** for slavery rampant and became a popular method for **torturing** people (criminals, slaves).

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History of Pepper Spray



- **1980's The USA Postal Workers** started using pepper sprays **against dogs, bears** and other pets and became a legalized non-lethal weapon
 - Pepper spray is also known as *oleoresin of capsicum* (OC) spray
- The **FBI in 1987** endorse it as an official chemical agent and it took 4 years it could be **legally accepted** by law enforcement agency.

Pepper Spray



- The active ingredient in pepper spray is **capsaicin**, which is a chemical derived from the fruit of plants of chilis.
- Extraction of **O**leoresin **C**apsicum from peppers
 - capsicum to be finely ground,
 - capsaicin is then extracted using an organic solvent (ethanol).
 - The solvent is then evaporated,
 - remaining **waxlike resin** is the **O**leoresin **C**apsicum
- Propylene Glycol is used to suspend the OC in water,
 - pressurized to make it aerosol in Pepper Spray.

Product Strength ???



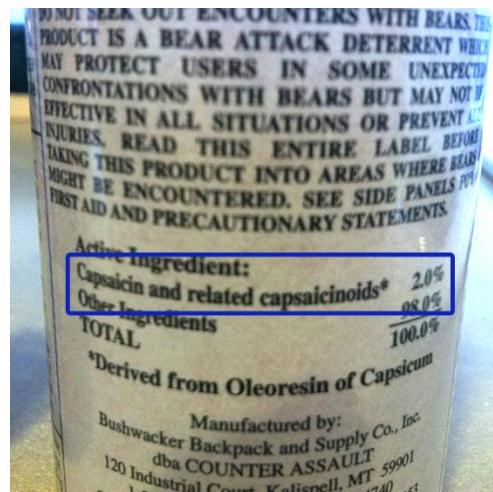
- Capsaicin and Related Capsaicinoids (CRC) content of the product
- CRC not measure the amount of Oleoresin Capsicum (OC) within the formulation
- CRC is the **heat bearing and pain producing** components of the OC



Product Strength ???



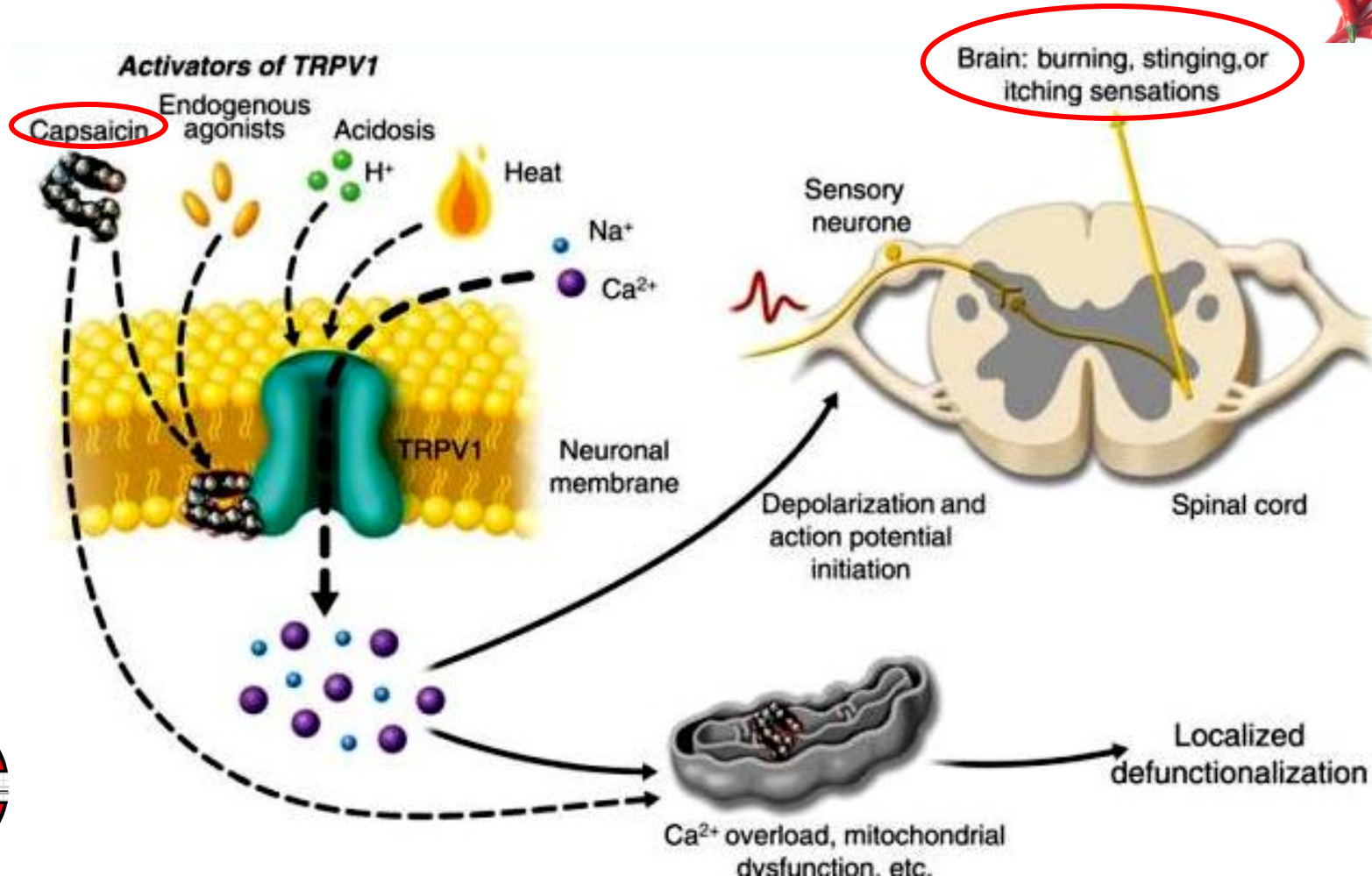
- Personal pepper sprays can range
0.18% - 3% CRC.
- Law Enforcement pepper sprays use between
1% - 2% CRC.



Pepper Spray

- Inflammatory Agent.
- It causes
 - immediate closing of the eyes,
 - difficulty breathing,
 - runny nose,
 - coughing
- The duration of its effects
 - depends on the strength of the spray
 - average full effect lasts around 30-45 minutes, with diminished effects lasting for hours.





Tear Gas (CN, CS, CR)



- Lachrymatory Agent or Lachrymator
- These types of compounds were assigned these 2-letter codes by The North Atlantic Treaty Organization (NATO).
- Chemical Weapon
 - stimulates the corneal nerves in the eyes
 - tears, pain, vomiting, and even blindness
- Victim incapable of fighting or resisting
- Irritation typically appear after 20–60 seconds of exposure and commonly resolve within 30 minutes of leaving

CN and CS Gas



- Tear gas (CS) and chloroacetophenone (CN) are important **pulmonary irritants**.
- CN was the primary pulmonary irritant after World War I
- **C**orson and **S**toughton developed CS in 1928.
 - CS was found to be **more potent** (10 times more potent as a lachrymator than CN) but **less toxic**.

CR Gas



- CR is a **more recent** tear gas, first synthesized in 1962.
- 6 to 10 times **more powerful** and less toxic (?) than those of CS gas
- Part of its high safety profile is due to its **low volatility**
 - minimizes its effects deep in the pulmonary system.

CR Gas



- Intense **skin irritation**, (moist areas);
- **Blephorospasm**,
- **Temporary blindness**;
- **Coughing**, gasping for breath,
- **Panic**
- It is a suspected **carcinogen**
- It **can be lethal**
 - large quantities and poorly ventilated space, an individual may inhale a lethal dose within minutes.
 - Death is caused by **asphyxiation and pulmonary edema**.

CR Gas



- Effect of CR is **long-term and persistent**.
- CR can persist on surfaces, especially porous ones, for up to 60 days
- **Water** may exacerbate the effects of CR.

- Skin contact with CR can become extremely severe and persist for up to 48 hours and longer.



CR Gas



- **Carcinogenic Properties**
- United States does not utilize CR for riot control.
- The U.S. military classification for this chemical agent is **combat class chemical weapon**
- Causing serious side-effects for humans.
- Vietnam (1968 – 72)
- South Africa (1980)
- Northern Ireland
- Sri Lanka (2008)
- Egypt (2011)
- **Turkey (2011-13)**
- Ukraine (2011-12)

Symptoms



- Onset of symptoms occurs in seconds
- Duration is **15-30 minutes** → longer than 30 minutes → respiratory and oral symptoms may persist more than **1 hour** ????
- Typically, the eyes, nose, mouth, and **even airway** feel a **burning sensation**
- Severity of manifestations is dependent upon **age of the victim, comorbid factors, and duration of exposure**

Symptoms



- **The eye** is the most sensitive organ involved
 - **Ocular pain, tearing, and severe blepharospasm**
 - Corneal epithelial damage and chemosis.
 - Conjunctival injection and periorbital edema
 - More serious and even permanent eye injuries (eg, corneal abrasions, foreign bodies)
 - Blindness

Symptoms



- Once the skin comes in contact
 - Erythema, tingling, and burning
 - Patients can develop first- or even second-degree burns (Blistering),
 - Delayed allergic contact dermatitis
- Cough, chest tightness, dyspnea, and wheezing
- Increased blood pressure and heart rate
- Psychological effects (eg, anxiety and panic)

Symptoms



- Serious effects including death have been reported
 - Pulmonary injury and/or asphyxia
 - Pulmonary edema,
 - Chemical pneumonitis
 - Upper airway mucosal necrosis
 - CS may be converted into cyanide in the peripheral tissues

Treatment



- First **withdraw** them from exposure.
- Then, **decontaminate** patients
 - soap and water
 - warn patients that **the pain worsens** during decontamination
- No antidote exists.
- **Corneal abrasions** (local antibiotics, oral analgesics) (Gentamicin 0.3 % solution (Genoptic, Ocu-Mycin) Erythromycin ophthalmic (E-Mycin))
- Significant **respiratory damage** → **rare** and require **oxygen and bronchodilator** therapy → admission to the hospital, possibly critical care unit.

Diphotereene Solutions

- Aqueous,
- Polyvalent,
- Amphoteric,
- Chelating Molecule,
- Rapidly and effectively absorb and neutralize the aggressive chemical molecule
- Washing solution highly effective against all kinds of corrosive and irritant chemicals.



SoloStocks



Don't Forget



- U.S. Army has reported in internal documents that pepper gases and sprays are **carcinogenic and mutagenic**.
- Fairly ineffective on combative people, instead making them more angry
- **Warning label on them** ironically reads
 - "Warning irritant, avoid contact with eyes."
- When restrained, people have suffocated or their hearts have stopped beating.



For Yourself

- The best protection against chemical weapons is a **gas mask**.
- A **bandanna** soaked in water or lemon juice or vinegar and tied tightly around the nose and mouth is a last resort.
- For protecting **your eyes**, **swim goggles** work well. If you are wearing **contact lenses**, immediately remove them.
- These can also **make you targets of police violence**.
- The best treatments are **air, cold water and time combination**.



Thanks for your attention



	Naga Viper	800,000 ~ 1,382,118
	Trinidad Scorpion	1,029,000 ~ 1,390,000
	Naga Jolokia "Ghost Pepper"	1,020,000 ~ 1,578,000
	Chocolate 7 Pot	1,169,000 ~ 1,850,000
	Moruga Scorpion	1,200,000 ~ 2,009,231
	Carolina Reaper	1,200,000 ~ 2,100,000
	Common Pepper Spray	2-3,000,000
	Police Grade Spray	5,300,000
	Homodihydrocapsaicin	8,600,000
	Nordihydrocapsaicin	9,100,000
	Pure Capsaicin	15-16,000,000

The World's Hottest Chile Peppers



Red Savina Habanero



Ghost Pepper



Naga Viper



Trinidad Scorpion



Moruga Scorpion



Naga Jolokias growing at Frontal Agritech



Naga Viper



Trinidad Scorpion

Questions ??????

Suggestions ?????



Moruga Scorpion



Carolina Reaper