Tear Gas toxicity

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Tear gas, formally known as a lachrymator a gent. sometimes known as mace. is a chemical weapon that causes severe eye and respiratory pain, skin irritation, bleeding, and even blindness.

In the eye, it stimulates the nerves of the lacrimal gland to produce tears.

Common lachrymators include **pepper spray (OC gas), PAVA spray (nonivamide), CS gas, CR gas, CN gas (phenacyl chloride), bromoacetone, xylyl bromide, syn-propanethial-S-oxide (from onions), and household vinegar**.

Lachrymatory agents are commonly used for **riot control**. Their use in warfare is prohibited by various international treaties. During World War I, increasingly toxic and deadly lachrymatory agents were used

Tear "gas" consists of either aerosolized solid compounds or evaporated liquid compounds (bromoacetone or xylyl bromide), not gas.

Tear gas works by irritating mucous membranes in the eyes, nose, mouth and lungs, and causes crying, sneezing, coughing, difficulty breathing, pain in the eyes, and temporary blindness.

The compound **2-chlorobenzalmalononitrile** (also called **o-chlorobenzylidene malononitrile**; is the defining component of a tear gas commonly referred to as **CS gas**, which is used as a riot control agent.

Exposure causes a burning sensation and tearing of the eyes to the extent that the subject cannot keep his or her eyes open, and a burning irritation of the mucous membranes of the nose, mouth and throat, resulting in profuse coughing, nasal mucus discharge, disorientation, and difficulty breathing, partially incapacitating the subject.

CS gas is an aerosol of a volatile solvent (a substance that dissolves other active substances and that easily evaporates) and 2-chlorobenzalmalononitrile, which is a solid compound at room temperature. CS gas is generally accepted as being non-lethal

•This article is about the tear gas. For the compound with the molecular formula CS, Carbon monosulfide

What is OC?

- **Oleoresin Capsicum** comes from the latin term for “Oily resin” of a “pepper”.
- It is a NATURAL EXTRACT of Cayenne and other edible peppers.
- All ingredients are certified food grade by the FDA

Why Is This Important?

- OC is far less likely to cause an allergic reaction. Very few people are allergic to peppers.

- Higher probability of asthmatic reactions to teargas (CN) and mace (CS)

OC Is All Natural

- It is important to note that OC is a natural food derivative.
- CN (teargas) is a synthetic chemical lacrimator.
- CS (mace) is a synthetic chemical irritant.

Other Differences between OC, CN and CS

- OC is an "Oily Resin"-Can be washed off with soap and water.
- CN and CS are both microparticulate solids.-will "blow off" with fresh air.
- With CS gas, symptoms of irritation typically appear after 20–60 seconds of exposure and commonly resolve within 30 minutes of leaving (or being removed from) the area.

PAVA spray is an incapacitant spray similar to pepper spray. It is dispensed from a handheld canister in a liquid stream. It contains a 0.3% solution of pelargonic acid vanillylamide (PAVA), a synthetic capsaicinoid (analogue of capsaicin), in a solvent of aqueous ethanol

Effects of PAVA

PAVA primarily affects the eyes, causing closure and severe pain. The pain to the eyes is reported to be greater than that caused by CS.

CR gas or **dibenzoxazepine** (also referred to as **DBO**), is an incapacitating agent and a lachrymatory agent.

Lachrymators are thought to act by attacking sulfhydryl functional groups in enzymes. One of the most probable protein targets is the TRPA1 ion channel that is expressed in sensory nerves of the eyes, nose, mouth and lungs

Risks

As with all non-lethal, or less-lethal weapons, there is some risk of serious permanent injury or death when tear gas is used. This includes risks from being hit by tear gas cartridges, which include severe bruising, loss of eyesight, skull fracture, and even death.

While the medical consequences of the gases themselves are typically limited to minor skin inflammation, delayed complications are also possible: people with pre-existing respiratory conditions such as asthma, who are particularly at risk, are likely to need medical attention and may sometimes require hospitalization or even ventilation support.

Skin exposure to CS may cause chemical burns or induce allergic contact dermatitis. When people are hit at close range or are severely exposed, eye injuries involving scarring of the cornea can lead to a permanent loss in visual acuity. Frequent or high levels of exposure carry increased risks of respiratory illness

collected thousands of tear gas canisters fired by Venezuelan authorities in 2014, showed that 72% of the tear gas used was expired and noted that expired tear gas "breaks down into cyanide oxide, phosgenes and nitrogens that are extremely dangerous

Protection:

•Avoid use of oils, lotions and detergents because they can trap the chemicals and thereby prolong exposure.

•We recommend using a water or alcohol-based sunscreen (rather than oil-based).

For the eyes and mouth:

We recommend a solution of half liquid antacid (like Maalox) and half water. A spray bottle is ideal but a bottle that has a squirt cap works as well. Always irrigate from the inside corner of the eye towards the outside, with head tilted back and slightly towards the side being rinsed

For the skin:

We recommend canola oil followed by alcohol. Carefully avoiding the eyes, vigorously wipe the skin that was exposed to the chemical with a rag or gauze sponge saturated with canola oil. Follow this immediately with a rubbing of alcohol. Remember that alcohol in the eyes hurts A LOT

•We also recommend minimizing skin exposure by covering up as much as possible. This can also protect you from the sun, as can a big hat.

Gas masks provide the best facial protection, if properly fitted and sealed. Alternatively, goggles (with shatter-proof lenses), respirators, even a wet bandana over the nose and mouth will help.

Treatment

There is no specific antidote to common tear gases.

Getting clear of gas and into fresh air is the first line of action. Removing contaminated clothing and avoiding shared use of contaminated towels could help reduce skin reactions. Immediate removal of contact lenses has also been recommended, as they can retain particles.

Once a person has been exposed, there are a variety of methods to remove as much chemical possible and relieve symptoms. The standard first aid for burning solutions in the eye is irrigation (spraying or flushing out) with water.

There are reports that water may increase pain from CS gas, but the balance of limited evidence currently suggests water or saline are the best options.[Some evidence suggests that Diphoterine solution, a first aid product for chemical splashes, may help with ocular burns or chemicals in the eye.

Anticholinergics can work like some Antihistamines as they reduce lacrymation, decrease salivation, and for overall nose discomfort as they are used to treat allergic reactions in the nose (e.g., itching, runny nose, and sneezing)

Oral analgesics may help relieve eye pain