

# Just-In-Time Learning Series: MANAGEMENT OF CHEMICAL AGENT INJURIES - VESICANTS & RIOT AGENTS



Region 8  
**MOUNTAIN PLAINS**  
Regional Disaster  
Health Response System

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## Vesicants

All Vesicants cause surface injuries on the body where the agent lands (skin, mucous membranes) but are chemically very unique.

Agent	Key Takeaways
Phosgene Oxime	<ul style="list-style-type: none"> <li>• Reacts with skin and eyes almost instantly leading to immediate skin and mucosa membrane irritation, and severe pain.</li> <li>• Causes wheal-and-flare reactions within minutes</li> <li>• Necrosis and respiratory compromise in the mins/hrs after exposure.</li> <li>• No known specific treatment for phosgene oxime exposure.</li> </ul>
Lewisite	<ul style="list-style-type: none"> <li>• Causes immediate pain with lesions developing within minutes.</li> <li>• Skin blisters form within 3-4 hours of exposure. Blister fluids contain arsenic</li> <li>• Pseudomembrane formation in the conductive parts of the airways leading to obstruction.</li> <li>• Can be treated with British Anti-Lewisite (BAL) also known as dimercaprol.</li> </ul>
Mustards	<ul style="list-style-type: none"> <li>• Initially painless with skin, eye, and respiratory blisters developing <u>hours</u> after exposure. Blister fluid is nontoxic.</li> <li>• Rate of absorption increases with heat. Individuals in hot environments will be exposed to a higher dose. Areas of the body prone to sweating are likely to experience the worst lesions (armpit, groin).</li> <li>• Causes conductive airway problems.</li> <li>• &gt;40% total body surface area burn is commonly fatal. Risk of death rises around day 5 after exposure due to risk of secondary bacterial infections.</li> <li>• Because the reaction is immediate, patients will likely develop symptoms regardless of timing of decontamination. Decontamination is still crucial in mitigating exposure to healthcare providers.</li> </ul>

## Riot Control Agents (Irritants)

Cause surface injuries but are fast acting in onset of symptoms that resolve in less than 30 minutes without residual toxicity. Symptoms should resolve quickly but there is a risk of lung problems if there is a prior history of lung disease, especially asthma. Individuals exposed should aerate/ventilate clothing and irrigate mucous membranes.

Agent	Key Takeaways
CS	<ul style="list-style-type: none"> <li>• Causes blepharospasm, conjunctivitis, rhinorrhea, sialorrhea, cough, skin tingling/burning.</li> </ul>
Capsicum products	<ul style="list-style-type: none"> <li>• Interacts with a specific neuroreceptor in skin to convey sense of intense burning. Causes blepharospasm, conjunctivitis, and excessive tearing.</li> </ul>
Mace	<ul style="list-style-type: none"> <li>• Causes rhinorrhea, lacrimation, blurred vision, nausea, chest discomfort.</li> <li>• Some individuals are more sensitive to mace leading to more prolonged skin symptoms.</li> </ul>
PS	<ul style="list-style-type: none"> <li>• Humans are very sensitive to exposure resulting in mucous membrane irritation.</li> <li>• Not widely used as an RCA due to neurotoxicity.</li> </ul>

## PREHOSPITAL CONSIDERATIONS FOR VESICANTS & RIOT AGENTS

PPE is crucial for first responders in a potential chemical warfare environment. The purity of these agents will impact their chemistry and kinetics making it difficult to assess care needs of patients at the scene, particularly when the compound is unknown. Aggressive and thorough decontamination is crucial in mitigating exposure to the patient, responders, and others. For vesicants in particular, reactions from exposure occur quickly therefore decontamination is mainly important in reducing the risk of exposure to others. Any materials used in decontamination should be regarded as toxic and have dedicated hazardous waste management protocols.

### **Persistence:**

*Persistence refers to how long a chemical remains in the environment.*

*Vesicants in particular are very persistent and pose a contamination risk to EMS.*

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