


**Chemical Warfare:
A Primer for First
Responders & Receivers**
Satellite Conference and Live Webcast
Friday, May 3, 2019
12:00-1:00 p.m. Central Time

UAB Research Center
of Excellence in Arsenicals




Produced by the Alabama Department of Public Health
Video Communications and Distance Learning Division

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Excellence in Arsenicals**




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Faculty



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Faculty

Active in lecturing, training, and providing
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Conflict of Interest Disclosure

- ▶ None to disclose

Twitter

- ▶ @ZiadKazzi
- ▶ #UABcounterACT

Why Are You Here?



Ghouta Incident 2013

Source: https://www.youtube.com/watch?v=yp_Ju6742Z0
Mohammed Al Said

China Construction Site 2003

- ▶ Underground parking construction site
- ▶ 5 drums left behind from WWII
- ▶ HD/Lewisite Mixture
- ▶ 44 victims
- ▶ 1 death 17 days after contact
- ▶ Chronic complications reported in this study



After this Presentation, You Will Be Able To:

- ▶ List major chemical agents used in warfare such as arsenicals, sulfur mustard, nerve agents and chlorine.
- ▶ Describe important historical and recent examples of chemical agents use in warfare.
- ▶ Enumerate clinical components of major chemical toxidromes.
- ▶ Discuss challenges in prevention of these incidents and medical care of victims.

Challenges in Prevention

- ▶ Chemical security enhancement
- ▶ Inventory, safe storage, safe transport
- ▶ Production chain

Challenges in Response

- ▶ Notification and activation
- ▶ Recognition
- ▶ Scene safety
- ▶ Responder safety and PPE
- ▶ Triage and rescue
- ▶ Decontamination of people



Challenges in Medical Care

- ▶ Recognition
- ▶ Diagnosis: Detection and confirmation
- ▶ Supportive care
- ▶ Specialized centers? RITN Centers for Mustard? Burn Centers?
- ▶ Treatment: Antidotes
- ▶ Long term monitoring: What to test for? What to look for? Why do it?

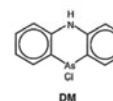
Clinical Versus Laboratory Diagnosis

- ▶ Non specific and overlapping clinical presentations
- ▶ Clinicians lack knowledge/experience about certain chemical
- ▶ Delayed presentations
- ▶ Resources may not be available for testing in a mass casualty incident
- ▶ Laboratory testing may not be available for specific agent

Vomiting Toxidrome: Adamsite (Germany 1917, USA 1918)

- ▶ 10-Chloro-5,10-dihydrophenarsazine
- ▶ Delay in effects (minutes)
- ▶ Respiratory tract and mucous membrane irritant
- ▶ Prolonged systemic effects (hours)

DM (Diphenylaminearsine)

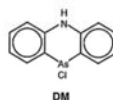


- Owens EJ, McNamara BP, Weimer JT, et al. The Toxicology of DM. Edgewood Arsenal, Md: Medical Research Laboratories; 1967. Technical Report 4108
- Medical Manual of Defence Against Chemical Agents. London, England: Ministry of Defence; 1987

Vomiting Toxidrome: Adamsite (Germany 1917, USA 1918)

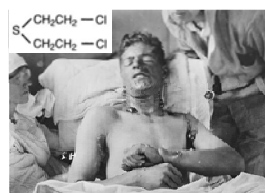
- ▶ Vomiting agent
- ▶ Incomplete information about toxicity
- ▶ 2 reported death
- ▶ Not used in WWI

DM (Diphenylaminearsine)



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- Medical Manual of Defence Against Chemical Agents. London, England: Ministry of Defence; 1987

Vesicant Toxidrome: Mustard (1917)



Public Domain: Library Archives of Canada

- ▶ H and HD
- ▶ High number of injuries; mortality low

Lewisite

- ▶ Sometimes mixed with Mustard to LOWER its freezing point (Cold weather like in Russia)
- ▶ Rapid onset of pain upon skin contact
- ▶ British Anti-Lewisite for skin and eye lesions within minutes



Agent Blue During the Vietnam War

- ▶ Dimethylarsinic acid
- ▶ Chronic health effects:
 - ▶ IARC 2b (possible carcinogen)



Khan Al-Assal – March 19, 2013

- ▶ 20 people were killed and an additional 124 were injured
- ▶ Lessons learned:
 - ▶ Lack of clinical competency
 - ▶ Lack of PPE
 - ▶ Lack of oximes. Atropine available but there was lack of familiarity with dosing guidelines including in children

Disaster Med Public Health Preparedness. 2018;12:663-665)

Khan Al-Assal – March 19, 2013

- ▶ Lessons learned:
 - ▶ Secondary exposure of health care providers: Dizziness, miosis, inability to stand up, possible case of cardiac arrest requiring defibrillation
 - ▶ Use of alternative medical units like the Oncology Ward proved useful

Disaster Med Public Health Preparedness. 2018;12:663-665)

August 21, 2013 Sarin Gas in Rural Damascus

- ▶ >1,300 deaths
- ▶ >10,000 were exposed and affected



Opioid Toxicidrome



- ▶ Miosis
- ▶ Coma or stupor
- ▶ Depressed breathing
- ▶ Low blood pressure and or heart rate
- ▶ Low body temperature

Source: [July 12, 2012](#)
 N Engl J Med 2012; 367:146-155
 DOI: 10.1056/NEJMra1202561

Summary Points

- ▶ Chemical warfare agents are numerous
- ▶ They can lead to severe morbidity and mortality
- ▶ There has been a resurgence of these chemicals in the areas of conflict
- ▶ There has been incidents involving these chemicals in public spaces and with criminal intent
- ▶ Using Toxidromic approach improves our chances of responding as safely and as effectively as we can

Common Goal

- ▶ Stay Safe
- ▶ Save lives

Suggested Readings and Resources

- ▶ M. Ihsan Kaadan, Hilarie Cranmer. The Management of the Khan Al-Assal Chemical Attack in Aleppo University Hospital (AUH) DMPHP Volume 12, Issue 5 October 2018 , pp. 663-665.
- ▶ Chemical Emergency Medical Management (CHEMM)
<https://chemm.nlm.nih.gov/>

Thank You

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German gas attack launched on French Territorial and soldiers of the Troupes coloniales, which was launched on 22 April.
<https://www.gallery.ca/collection/artwork/the-first-german-gas-attack-at-ypres>