

Chemical - 20 Questions

1. You respond to a scene where someone has had an asthma attack after opening a letter filled with white powder. She still has powder on her. IF this is anthrax, how much of a threat is it to you?
2. Is the anthrax that causes inhaled and cutaneous forms different?
3. While vacationing in Kikwit, Zaire, you are enlisted to help care for victims of an Ebola epidemic. Based on their prior experience, how effective will the gloves, gown, and surgical mask they give you be?
4. You are asked to evaluate a patient who was sprayed with CS at close range several hours ago and complains of persistent severe eye pain. Is he faking it?
5. During another episode of unrest at home, you spray your children down with CS, then feel remorseful and hose them down, leaving them in their wet clothes. Why is this a bad idea?
6. A 'professional protestor' is exposed to CS on a nearly daily basis. Does the agent tend to affect him more or less as he is exposed repeatedly?
7. Another, less professional protestor was exposed to CS in Washington about 2 months ago and is re-exposed in Minneapolis. Within 24h, she is admitted to the burn unit with severe skin necrosis. In contrast to the case above, what did she probably develop?
8. A canister of Chlorine gas is ruptured in the lobby of an un-named downtown hotel to disrupt a conference. Many people leave the building with irritation of the nose, throat, and eyes. How dangerous is this irritation?
9. What complication can you expect at least some of the people in the afore mentioned question to develop within 24 hours that will make them call 911?
10. Following a demonstration, the street is being cleaned when a maintenance person triggers an explosive device. As several people go to help him what do they need to be careful to look for in the area?
11. As the first persons rush in to the area in the afore mentioned question, they rapidly collapse. You can see at least one of them having a seizure. What agent do you suspect may be present?
12. What is the therapy for nerve agent poisoning?
13. How important is decontamination for nerve agent victims?
14. During a demonstration on Nicollet Mall, a plume of smoke goes up. Demonstrators are shouting 'Cyanide gas!'. Is it likely to be cyanide, and if it is, do you need to worry?
15. What part of your protective equipment offers the most protection for you from a variety of chemical agents?
16. In another attempt to create the Ultimate Potato Cannon, you have obtained a small amount of C-4 from a next door neighbor who happens to be adept at developing high ordinance explosives'. Should you happen to use just a bit too much, injuries in what parts of your body should concern you most?
17. As you're hurtling through the air to what should surely be your demise, you note that you have been perforated by multiple pieces of shrapnel. Prior to landing in a crumpled heap, you have just enough time to ponder which of the 4 phases of explosion injury this is. Which is it?

18. World War II has just broken out and you have decided to take a cleansing hike in the German-occupied Alps. While you are taking in the vistas, you note that a couple of soldiers place a canister with a skull and crossbones just upwind from where you're standing. Faintly, in the gentle breeze, you detect the scent of fresh mown hay, which takes you back to your youth. What should you do?
19. A well meaning prankster, who was sitting next to you at lunch, surreptitiously sprinkled a white powder on your BLT. While eating it you note the exceptional zing this provides, but figure that it's merely from the spiced bacon. Later, you note some significant belly pain and while relieving yourself in the bathroom, you note that your stool seems to be smoking. What is the substance?
20. Aren't you glad that this is the last question?



Chemical - 20 Answers

1. Visible contaminant should be moistened, clothing affected removed, and the patient should soap and water wash areas in contact with the powder. You should wear a PAPR and barrier precautions, but your risk with these precautions is zero. Anthrax spores are tremendously difficult to re-aerosolize. A letter is a lousy delivery device UNLESS you reflexively smell your fingers to see just what the heck the powder is, in which case you're probably dead.
2. It's the same bug. Cutaneous anthrax occurs when spores get under the skin (usually due to a cut), and the dose to cause the local black scab is much lower than the inhaled dose to cause disease (about 8,000-40,000 spores). Cutaneous anthrax is no big deal, and responds to antibiotics.
3. Not that you still shouldn't be working with your travel agent to book that flight home, but during the biggest outbreak in recorded history, Ebola transmission to healthcare workers was completely prevented if universal precautions rules were followed.
4. Probably not. Riot agents are solids suspended in liquid, when sprayed at close range they can cause abrasions to the cornea, which can cause progressive pain for days.
5. CS and CN both cause skin irritation and can cause mild skin burns. With higher temperatures, and especially with humid conditions or wet clothes/skin, severe burns can occur. For this reason, skin washing is recommended when these conditions exist or erythema is noted.
6. Less. Frequent exposure often leads to tolerance, to the point that individuals can continue to function fairly well in environments that leave others in a weeping heap. So if you were a really serious demonstrator, you could train for this!
7. Unfortunately, some people develop a hypersensitivity syndrome and react very strongly to these agents when exposed again. Severe skin necrosis can occur.
8. The initial irritation may lead to bronchospasm, especially in asthmatics, and rarely to upper airway swelling, but is more often a nuisance.
9. Delayed pulmonary edema, which can be fatal, occurs in a minority of cases of chlorine exposure. If severe, this usually will make itself known by 4 hours, but can be delayed up to a day later. Usually if the delay is long, the edema won't be as severe.
10. SECONDARY DEVICES! The abortion clinic bombing outside Atlanta was the first case in which a bomber targeted a device at public safety responders. It probably won't be the last. Luckily, nobody was killed by the second device.
11. In an open air environment, about the only agent that would cause such rapid collapse and seizure activity would be the nerve (organophosphate) agents.
12. Seizures are treated with benzodiazepines (eg: midazolam, as usual). Ventilation may be difficult due to bronchospasm and profuse secretions. Atropine IM or IV will dry the secretions and allow ventilation (usually start with 2mg and go up – average to control secretions in Tokyo sarin incident was 2mg). Pralidoxime needs to be given as an antidote before the effects of the nerve agent become permanent. This window is about 4h for sarin (most common), 12h for VX, and down to minutes for soman (luckily harder to obtain or make!).
13. VERY. 110 EMTs were sickened in Tokyo because they cared for contaminated individuals without any protective equipment. Decon for vapor exposure basically means clothing removal and sealing clothes in plastic bags to prevent 'off-gassing', liquid exposure means clothing removal and soap/water wash. If unsure which, go for the undress and wash.

14. Unlikely. Cyanide is usually invisible, though if the gas is being explosively released, or was stored at below freezing, you may see a plume due to condensation. Cyanide is a very POOR open air toxin. It requires a closed space and high concentrations to induce symptoms. Cyanide usually results in death or complete recovery without much in between. Symptoms of low-grade exposure include headache and dizziness. High concentrations cause rapid cardiovascular collapse, often with hypoxia/acidosis related seizures, and death.
15. Gloves. The primary risk to responders is CONTACT with chemicals. Inhalational hazards from off-gassing have been documented with nerve agents, but with most chemicals this is not a problem. With an unknown agent, do not take chances! The sicker a patient is after exposure, the higher the toxicity, and the better the chance that it's a threat to you. Unless you know what you're dealing with and are assured of your safety, stay out of the hot zone and in your protective equipment!
16. Gas filled structures such as lungs, intestines, and middle ear. Also ocular injuries are not uncommon. These injuries are worsened when explosions occur in an enclosed space.
17. Primary injuries are from the initial pressure wave of high output explosives. Secondary injuries are from shrapnel and other debris penetrating the body. Tertiary injuries occur as bodies are thrown by the blast wind. Quaternary injuries include burns, and crush injuries, as well as exacerbations of previous conditions such as asthma from the sudden increase in dust.
18. Consider going to the local ED and letting them know that you, and a bunch of other non-suspecting folks have been exposed to Phosgene gas. You can expect that you might do well, but others who love the scent of fresh mown hay might develop delayed non-cardiogenic pulmonary edema. Treatment may consist of bronchodilators and other supportive respiratory cares. You might also consider treatment with Na Bicarb nebs.
19. White phosphorus. You will need to be monitored for bowel perforation, and significant burns in the gut, with the possibility of strictures as you heal.
20. Invariably the answer is yes...

