

Pathogen Challenge

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Anthrax

Experimentation with chemical weapons to defeat the enemy began during WW1. German forces released chlorine gas in 1915 and then later in 1917 they deployed mustard gas on allied forces.¹ Protective equipment such as gas masks were crucial to a soldier's survival. Unfortunately, in 1918, frontline soldiers began to present with a strange new blistering rash with blackened ulcers to the face and neck.¹ Military commanders presumed the enemy was using a new biological agent but how was it getting inside the mask? It was soon discovered that the infected soldiers were new recruits that had just arrived overseas. Investigators examined the trenches and a keen observer noted the difference in the color of the shave brushes for the new recruits.¹ To ensure a tight-fitting seal on their gas masks, soldiers would shave daily with issued shave kits including a shave brush. The recruits' brushes had bristles made of contaminated animal hair. Due to an interruption in the supply chain caused by the war, replacement horsehair was unknowingly obtained from animals infected with anthrax. Over 200 cases of anthrax have been linked to these low-cost shaving brushes¹.

Anthrax is an infectious disease caused by the *Bacillus anthracis* bacterium.² It is speculated to date back to Moses times during the ten plagues of Egypt, portrayed as an illness of the animals. However ancient writings by Homer suggest it dates back to 700 BC. Anthrax is also known as the "wool sorters disease" because of the relationship with the animal hair industry.³ It is caused by contact with infected animals or products made from infected animals such as cattle, sheep, horse, pigs or goats. Anthrax is highly contagious, and their spores can lie dormant for many years in the soil.² It was not until 1877 that Robert Koch discovered that the bacterium forms very durable and indestructible spores.² There are three main types of infection. First, cutaneous anthrax is the most common form and the least deadly, accounting for 90% of cases worldwide.³ Cutaneous disease usually enters through a cut or scrape in the skin causing a progressive rash with pruritic red-brown papules. These develop into vesicles that ulcerate with depressed black eschar and lymphadenitis. The second, gastrointestinal anthrax is usually caused by ingestion of raw infected meat.³ Symptoms can progress from oral lesions to abdominal pain with nausea, vomiting, and bloody diarrhea. Septicemia and death are linked to widespread necrosis and eschar of intestines. Finally, inhalation anthrax has the highest mortality of all three.³ It can cause severe respiratory distress, hemoptysis, shock and death. The bacteria cause massive lymphadenopathy and widening of the mediastinum. More than half of the patients with inhalation anthrax develop hemorrhagic meningitis.³ Although penicillin was discovered in 1928, it was not until 1944, when it became the treatment of choice for anthrax.² Since its discovery, anthrax has been investigated, studied and analyzed by many nations. Its durability and ease of deployment have made it the perfect weapon in biological warfare. These new technologies caused incredible carnage on the battlefield with soldiers dying or suffering from

horrific long-lasting injuries. To stop these atrocities, in 1925, many countries joined forces to develop the Geneva protocol to prevent further use of such agents during war.² However, nations were still permitted to experiment and stockpile such mediums. This experimentation led to a few small contained outbreaks throughout the world and prompted the isolation of an entire island. In 1942, British forces deployed a bomb filled with anthrax on a tiny island off the coast of Scotland.² It killed 80 test sheep and the island remained uninhabitable for over 40 years until finally disinfected with a mixture of formaldehyde and seawater. To this day, Gruinard Island remains closed to the public. This incident compelled many countries to sign other treaties including the Warsaw Pact prohibiting biological and toxic weapons.² These agreements included the destruction of individual country stockpiles allowing only small amounts of certain pathogens to test new treatment regimens and vaccines. Unfortunately, it is alleged that at least 17 nations continue offensive biological weapons programs which have led to new and more virulent strains of anthrax resistant to antibiotics.³ Anthrax remains a deadly infection that requires early recognition for survival.

References

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