

How Chemistry Changed World War I

Mustard Gas Saves Lives?

Autopsies of people who died of mustard gas poisoning during WWI showed low white blood cell counts. Researchers then thought, “Hmm, if mustard gas kills white blood cells, could it can treat cancers that affect immune cells, such as leukemia?” At a cellular level, mustard gas and nitrogen mustard form intermediates that bind to DNA’s two helical strands, locking them together. Because the strands can’t pull apart during cell division, the cells die. After the war, researchers developed nitrogen mustard into one of the first cancer chemotherapy drugs called mustine. It wasn’t the best drug ever, but mustine paved the way for treating cancer with chemicals, or cancer chemotherapy.

Death By Bullets (Not Disease)

Trenches were slimy, muddy pits where soldiers could easily contract infections. Prior to WWI, most deaths during wars were caused by diseases from living in unsanitary conditions. With advances in medicine, WWI was the first war where a majority of fatalities were caused by bullets or shells, rather than diseases. Doctors used chloride of lime to disinfect and sterilize water. Tinctures of iodine, carbolic acid, and Dakin’s solution, which is sodium hypochlorite and boric acid, were used to clean wounds.

Shell-Shocked

Much of WWI was fought using artillery shells filled with explosives, such as TNT. Roughly 100 shells were shot per minute during one 10-month battle during the war. It’s no wonder that soldiers had “shell-shock.” All these shells required a lot of explosives. Germany might have run out of ammo in 1916 because the Allies blocked its access to nitrates, which are essential for making explosives. But Fritz Haber—a chemist who also proposed poison gas as a weapon—had a solution to the shortage. He and Carl Bosch had figured out a way to harness nitrogen in the air for making ammonia, a precursor to nitrates. The same reaction was also used to make fertilizers that could feed billions, but in WWI it was used to make ammo that killed millions.

Source:

“The Chemists’ War: 1914—1918” by Michael Freemantle