The Skin Decon Kit

—what should we demand in the future?

By CPT Juan A. Cuadrado

You are a soldier of the American Expeditionary Force (AEF) in World War I (WWI). Suddenly the enemy saturates your position with artillery chemical shells. Your training paid off; you mask in time but soon find out that a sticky and dense liquid is all over your left arm, penetrating your uniform and reaching your skin. All you know is that a chemical agent is on your skin, and it can kill or incapacitate you in minutes. You have an emergency and you don't have a skin decon kit.

Now, wake up out of that nightmare. Let's go together and check on the importance of skin decon kits in our chemical defense.

Why is skin decon difficult?

All chemical warfare agents are acids (less than pH 7). We decontaminate personnel or equipment by removal and neutralization of hazardous levels of chemical contaminants. Neutralization means destruction of chemical agents (acids) with a base (greater then pH 7) or an alkali (greater than or equal to pH 10).

Acid + Base = Salt + Heat = Neutralization

The heat of neutralization doesn't affect equipment, but it affects personnel. Skin decon demands a harder selection of decontaminants than equipment decon. You must consider corrosive effects and toxicity of decontaminants on personnel.

Evolution of Skin Decon Kits

The use of mustard blister agent in WWI created a new problem: chemical agents that penetrate the skin. Chemical protective suits were not practical or available to the troops. Soldiers removed contaminated uniforms to minimize the exposure of the skin to chemical agents, but this was not enough. The American 77th Infantry Division on the Aisne-Marne Campaign, 15 through 18 August 1918, proved this fact. This division reported 1,209 gas casualties; 60 to 70 percent were casualties because they could not remove their contaminated uniforms in time.

The AEF used hot, soapy water to remove, rather than neutralize, mustard agent shortly after exposure. Later in the war, the AEF used bicarbonate of soda to decon skin and to flush eyes, ears, mouth, and nasal passages. These methods required large amounts of water and supplies that prevented their use by the individual soldier. The AEF created several personnel decon units called "degassing units," but only a few saw service.

The Germans issued their troops small boxes of chloride of lime, with instructions to decon mustard agent on their skin. The Allies copied this practice, but didn't use it regularly for this purpose. This was the only attempt in WWI to give the soldier some individual decon capability.

The US developed a series of protective ointments for individual skin decon after WWI until the late 1960s. These protective ointments were M1, M2, M3, M4, and M5. They contained a chlorinated compound to neutralize blister agents, but didn't decon nerve agents. Soldiers used these ointments after they removed most of the contaminant from the skin with absorbent tissue and before the skin redness developed. During this period the Army developed an ointment to decon blister agents around the eyes. The Army fielded some combinations of these ointments and atropine injectors in one kit, M5A1 and M5A3, and issued them to the soldier.

Late in the 1960s, the US fielded the ABC-M13 individual decontaminating and reimpregnating kit (M13). The M13 kit provided a good skin, individual clothing, and equipment decon by removal and

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neutralization of blister and nerve agents.

The kit consisted of a compact plastic container, two decon bags (neutralizing compound), one decon pad filled with "Fuller's earth" powder to absorb liquid contaminants, and a cutter to remove heavy contaminated areas of clothing. Some problems with this kit were the irritant effect on the skin, multiple steps procedure, and its toxicity.

Early in the 1970s, the US fielded the M258 SDK to replace the less effective M13 kit. The M258 SDK was too irritating for use on the face, and the M13 kit retained the roles for face and individual equipment decon. The M258 continued to be used to decon all other skin except the face areas. The M258 SDK consisted of a plastic carrying container, four gauze pads, two scraping sticks, and two plastic capsules with caustic decon solutions. Now the soldier had to use two different types of kits to decon his skin.

In 1981 the US fielded the M258A1 SDK to replace the M258 SDK and the M13 kit for skin decon, including the face. The M258A1 SDK consisted of three number 1 and three number 2 decon packets. The packets contained wipes impregnated with decon solutions and required little preparation for use. The major disadvantage of the M258A1 SDK is its interference with the readings of the Chemical Agent Monitor (CAM).

The US Army Chemical Corps is fielding the M291 skin decon kit this year. The M291 SDK consists of a wallet-like carrying pouch with six decon packages. The decon packets contain an applicator with decon powder that physically removes and absorbs the liquid contaminant on the skin, with no long-term effects. The M291 SDK doesn't interfere with the CAM.

What's Next?

The next generation of skin decon kits must decontaminate all chemical warfare agents without long-term effects. This task demands fast absorption and removal, or a fast and gentle neutralization of the chemical contaminant on the skin. Both approaches are challenges to our technology. A gentle neutralization that doesn't irritate the skin and remain effective is extremely difficult to achieve. A better approach is to develop an absorbing agent that traps and isolates the contaminant inside its chemical structure. This absorbing agent stops and removes the contaminant without irritating the skin.

Some desirable characteristics for skin decon kits of the future are to make them lightweight, simple to use, dual purpose (skin and individual equipment decon), and non-interference with current detection systems. The best decontaminant is useless to the soldier if it's not available to him. Thousands of soldiers died in WWI because they didn't have individual decon kits available to decon their skin.

Soldiers also need skin decon kits which are easy to use; multiple step procedures reduce effective use. A simple or "user friendly" skin decon kit helps prevent mistakes at the critical time. A dual purpose decon kit, skin and individual decon, gives the soldier a better chance to avoid spreading contamination with his equipment. The skin decon kit is the only immediate decon asset available for the soldier and his individual equipment. Finally, the skin decon kit must not interfere with the chemical detection systems used to check personnel. This characteristic saves valuable time and effort during chemical casualty treatment and evacuation procedures. If the skin decon kit causes false positive readings in your detection systems, then its use for decon is limited.

In summary, the skin decon kit is the conerstone of personal wipedown and individual equipment decon. History proved the need for the soldier to carry skin decon kits instead of centralized personnel decon assets at unit level. The most responsive decon available to the soldier is that skin decon kit he carries and uses. Remember, once you have a chemical contaminant on your skin, you have an emergeney. Your skin decon kit is your best chance to survive.

At the time this article was written, CPT Juan A. Cuadrado was attending the chemical officer advance course. CPT Cuadrado has served as a field artillery officer in the 2-162d Field Artillery Battalion of the National Guard in Puerto Rico. After attending the chemical officer basic course, he served as battalion chemical officer for the 1-39th FAR (Airborne) at Fort Bragg, North Carolina. While brigade chemical officer of the 18th FA Brigade (Airborne) at Fort Bragg, his unit deployed to Saudi Arabia and participated in Operations Desert Shield and Desert Storm. CPT Cuadrado has a BS in industrial chemistry from Humacao University College. He has done undergraduate research in biomedicine and graduate research in organic chemistry at the University of Puerto Rico.