

MEDICINE

Volunteers Test Weapons

Human volunteers at the Army's super-secret chemical center test the effects of nerve gas and other deadly weapons that might be used in modern warfare.

By JOHN W. ROBINSON

► EVERY MONTH a new busload of American soldiers arrives at the Army Chemical Center at Edgewood, Md., for some of the military's most secret research.

They are human volunteers who will spend 30 days at the Center, exposing themselves to hazards it is hoped few other Americans will ever have to face.

Until now, what goes on inside the Center has been a jealously guarded secret. There are still many off limits areas, especially those concerned with nerve gas and other as yet unnamed weapons. But security is being relaxed enough to give the public a glimpse of the inner workings at the Center's 10,000-acre site just north of Baltimore, Md.

The project most commonly associated with the Center is the work on nerve gas. The gas is not made at the Center in quantities but shipped there from a manufacturing plant in Colorado.

Civilian and Army scientists test it at the Center to determine the best ways to use it and the most effective means of protecting against it, explained Col. Lloyd E. Fellenz, commanding officer of the Chemical Warfare Laboratories at the Center.

On the battlefield, GB, as the most potent type of gas is called, can turn a man into a convulsing and dying casualty within seconds. To the scientists at the Center, however, it holds little of the irrational terror which has been built up in the public mind.

The Center first began working with the gas when several German manufacturing plants for it were captured during World War II. Since then, slow and methodical research has been done to find out exactly how and why the gas works and what can prevent its lethal effect.

It was for this type of medical research that human volunteers soon become necessary.

Disrupted Communications

Once understood, nerve gas is not quite so terrifying. It kills by disrupting the communication lines between the brain and the muscles of the body. When the diaphragm muscles are hit and paralyzed, the victim is unable to breathe and death follows quickly.

In the body it works this way: When a nerve impulse leaves the brain headed for a muscle, it must jump several gaps in the transmission line before it reaches its destination.

At these gaps, nature has put two delicately balanced chemicals which handle

the cross-over. One is the hormone acetylcholine, formed when the impulse first hits the gap. The acetylcholine then floods across the gap and reestablishes the impulse on the other side.

But this hormone cannot be allowed to stay flooded across the gap since a continuous impulse would then be set up and the muscle would begin twitching and convulsing.

To prevent this, the body has available the enzyme cholinesterase in the gap. This enzyme inactivates the excess hormone and it is at this stage that nerve gas attacks.

Once inhaled, nerve gas compounds seek out the body's thousands of nerve gaps. There, they lock up the cholinesterase molecules by forming a chemical bond with them and keeping them from inactivating the acetylcholine. The result is first convulsions in the body, as the muscles get

nothing but stimulation, and then paralysis, as the gaps become completely inoperable.

The Center has not disclosed exactly how far human research has gone on the effects of GB, although admittedly volunteers are now being exposed to dilute concentrations of the gas.

Wanted: Immunity Pill

So far there is only one drug useful for defense against the gas and that is atropine. This drug acts by limiting the body's sensitivity to excess acetylcholine, but it is only effective against relatively low concentrations of the gas. It must also be injected immediately upon exposure and is worthless as a preventive measure administered before exposure.

"We're hoping to find something like a pill or capsule that a man could swallow to keep himself immune to the gas," Col. Fellenz said.

And much of the human volunteer work going on is aimed at the development of just such a pill.

The most promising compound to date



TESTING WAR GASES—SP3 Jean Grimes, one of the human volunteers, breathes a controlled mixture of vapors during an inhalation study at the Army Chemical Center, Edgewood, Md. In this U. S. Army photograph, a technician keeps a vigilant eye on the necessary equipment to be sure the volunteer does not get a dangerous overdose.

is the complex chemical 2,3-butanedione 2-oxime, or DAM for short.

The drug exhibits a protective effect in animals and is now being tested for safety in humans. But it is too early to say when a volunteer will be asked to expose himself to a killing dose of the gas to test the drug's value.

The volunteers used at the Center come from Army units all over the country. The men, and women, so far two WACs have been through the tests, are volunteers in the full sense of the word. They are not to be confused with the type of "volunteer" who has become the butt of many an Army joke.

They are not intimidated or coerced in any way; in fact, if anything, they have found it difficult to be released by their units and be accepted for the secret work.

Before arriving, the volunteers have learned only that the Center is developing and perfecting methods of defense against chemical warfare agents and that it has now become necessary to use human test subjects.

They sign a legal document which guarantees that they may, at any time and for their own reasons, decline to participate in, or withdraw from a test. All of the testing is actually under their control since they can stop any phase whenever they wish.

Once inside the Center, the volunteers are given exhaustive physical and psychological tests to determine their fitness. When they leave they are put through the same tests to insure they have suffered no injury, mental or physical, from their experience. A psychiatrist also interviews the group to weed out any who are not emotionally stable enough to undergo the tests.

So far only two percent of a total of 471 volunteers has been rejected, Capt. Bernard Elfert, administrative officer for the clinical research division, said.

Volunteers Test Equipment

Not all of the volunteers are used for nerve gas research. Some may walk through tear-gas filled rooms to test new models of gas masks, others may be put in cold chambers at 40 degrees below zero Fahrenheit to test the value of protective clothing.

The most closely watched experiments, however, are those involving the use of deadly agents. Here the test subjects are given a thorough briefing by the doctors and scientists who supervise all the research. They are told exactly what is going to happen and how they will probably react to it.

There is never any attempt to fool or mislead them and the briefing is usually enough to allay any of their fears. But once in a while, a volunteer may decide that no matter how small the risk, it is still too great.

In one case, a volunteer who had already entered the gassing unit decided not to go through with the experiment. The scientists were instantly aware of his reaction and the test was stopped. The volunteer wanted nothing more to do with the gassing experiments but he did elect to join other phases of research at the Center.

What makes a man volunteer for this type of duty? Patriotism is high on the list, Capt. Elfert believes. One-fourth of the men volunteer because they feel the work is of great importance to national defense, he said.

The rest have reasons of their own. Some are scientifically curious, others think that 30 days spent at the Center would be more pleasant than the same time spent back in their unit.

The idea of giving extra pay to the volunteers was considered but even that was turned down because the few additional dollars might be considered a form of persuasion.

While at the Center the volunteers are free from all fatigue details, such as kitchen police and guard duty, and receive abundant passes off the base whenever they are not "on test." When they return to their parent units, they are awarded a certificate and a letter of commendation in recognition of outstanding services.

So far, the safety record of the Center has been excellent. There have been no harmful accidents and none of the volunteers are purposely subjected to a test that will harm them.

"The senior physician-scientist who is

mainly responsible for the success of the volunteer program is Dr. Van M. Sim, chief of the clinical research division," Dr. Kazuo K. Kimura, chief of the neurology branch of the clinical research division, said.

Volunteers, Not "Guinea Pigs"

"Human volunteers are not new and our work with them is quite similar to that which is carried on in many research institutions throughout the country," he added.

"The only difference here is that we are studying chemical warfare agents while someone else may be studying vitamin pills, nose drops and many other medicinal compounds."

One term which is never heard at the Center is "guinea pig" to refer to the volunteers. These men are not guinea pigs in any sense of the words, Dr. Kimura and other officials at the Center repeatedly emphasized.

Scientists at the center, as well as other employees and medical students have volunteered for tests.

They have come of their own choice and can leave whenever they wish. So far none of them have left voluntarily before their 30 days were completed.

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