BREAKING NEWS

Vein Viewing Technology Provides Life Saving Imagery For Battlefield Wounded

By Pete Meltzer, Jr.
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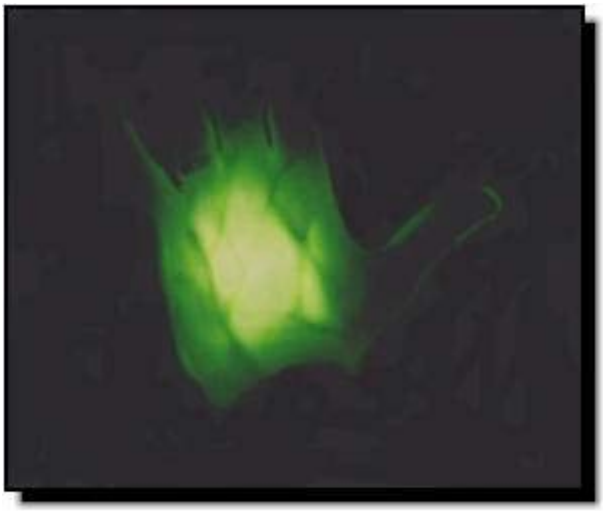
Aerospace research at the Air Force Research Laboratory's Materials and Manufacturing Directorate has led to a medical breakthrough in the technology used to locate veins and arteries in wounded soldiers on the battlefield, says Robert L. Crane, a senior materials scientist who helped lead the directorate's research effort along with Byron P. Edmonds, Walter E. Johnson and Charles B. Lovett.

The "Vein Viewer," said Crane, dramatically shortens the time it takes to help soldiers wounded in combat - a factor that could save many lives during that "golden five minutes" when a soldier's life may hang in the balance.



The goggles enable the wearer to see infrared light passing through the patient's body, except where it's partially blocked by blood moving through the veins and arteries.

"According to military medical personnel, the most pressing need on the battlefield is the ability to insert an intravenous (IV) needle into a wounded soldier to administer life-sustaining fluids after a serious wound occurs," Crane said. "Statistics from the Vietnam conflict indicate that several thousand soldiers died from wounds to their extremities. Many of them might have been saved if an effective method of inserting an IV had been available.

"A critical problem is that prompt insertion of an IV can be difficult to impossible under low ambient lighting or nighttime conditions," Crane explained. "Conventional methods for finding a patient's veins have had to rely on feeling and visual cues - a guess and stab process. This is also true at the scene of many auto accidents and for other trauma victims in the civilian world."

Crane, Edmonds, Johnson and Lovett, and other scientists and engineers in the directorate, successfully addressed this problem using night vision goggles (NVGs) equipped with specially designed light filters developed by the Air Force for quite different purposes.

"The goggles enable the wearer to see infrared light passing through the patient's body, except where it's partially blocked by blood moving through the veins and arteries. This happens because the infrared light is absorbed by the blood. The result is attendant medical personnel can see the arteries and veins, and gain rapid access to them if needed, and with much less physical discomfort to the patient," Crane explained.

The new technology solves some urgent challenges for the medical community. The Vein Viewer, for example, works with patients with darker complexions who tend to be less translucent. Additionally, it works with heavier patients, whose veins and arteries are deeper under the skin and more difficult to access.

"After the initial discovery of this new infrared technology, we quickly realized that we could also see arteries, bones, tendons and other tissues, so the term 'Vein Viewer,' the name chosen early on for the technology, doesn't really tell you what it is capable of," Crane explained.

Vein Viewer technology, in fact, provides major opportunities in terms of possible applications, and many who have seen the prototype have had ideas on how it might be used in areas not yet considered.

Night Vision Goggles in place and ready for viewing.

A patent has been granted and a license has been issued in hopes that someday soon, the technology will be commercialized. "Right now, there are so many possible applications, the medical research community will be working on them for some time," Crane pointed out.

At the moment, the primary medical application for the directorate's hot, new technology is locating veins and arteries. "During initial experiments, we used the only tools that we had available, a TV remote control infrared light source and standard military NVGs, to be able to clearly see the network of veins in fingers, hands, lower arms and feet. We performed additional experiments using various light sources and filters to determine the optimum imaging characteristics of the device and verify that a needle inserted beneath the skin is clearly visible, since metal also blocks infrared light. This capability will help doctors locate foreign objects under the skin such as bullets or shrapnel," Crane added.

"In addition to its military battlefield uses, the breadth of the Vein Viewer's technological achievement encompasses a broad range of civilian applications including emergency medical services, trauma centers, blood banks, pediatric and geriatric care facilities, and a variety of surgical procedures," he explained.

A prototype of the Vein Viewer has been successfully demonstrated at Wright-Patterson Medical Center, Cincinnati Children's Hospital Medical Center, and Columbus Children's Hospital. "Many physicians have commented that this technology would alleviate a great deal of suffering by patients, especially small infants, who must sometimes undergo painful medical procedures requiring access to

veins, such as drawing blood and IV insertions," Crane stated.

Vein Viewer technology should greatly improve medical treatment for premature babies, whose veins are often too small to access immediately using conventional procedures, and the new technology also allows quick access to arteries for blood gas analysis, used to measure oxygen flow from the lungs.

"The technology embodied in the Vein Viewer device is a breakthrough for applications in which a patient's blood vessels must be viewed rapidly and accurately to facilitate critical medication, particularly on the military battlefield where conditions range from less than optimal to abysmal," Crane pointed out. "Prompt IV administration on the battlefield can save the lives of thousands of soldiers."

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