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Five-Star Studies

San Antonio-based naval researchers are developing innovative treatments to improve battlefield care

BY CHRIS WARREN



Dr. John Simecek doesn't have to look far for reminders that his work matters. As director of the Craniofacial Health and Restorative Medicine Directorate of the Naval Medical Research Unit in San Antonio, Simecek, a civilian dentist with training in epidemiology, spends his days working with Navy researchers to develop and patent new devices that help ensure servicemen and women get the best medical care possible.

Simecek's station at Joint Base Fort Sam Houston, where many of those injured in battle receive care at the San Antonio Military Medical Center, means there are plenty of visual cues that work in the laboratory really is consequential. "We see people with prosthesis who have lost arms and legs walk around campus," says Simecek. "It helps you remember that the work you do does have a good end."

An area of focus for Simecek and his 19 colleagues is preventative dental care—to the extreme. While it may sound bafflingly routine, making sure Sailors and Marines who are about to head overseas don't have a potential dental problem is vital to mission readiness. "What happens is if you have a toothache or an oral condition, even though it's not mortal, it means you will not be where you're supposed to be because you're at the dentist," Simecek says. To help avoid those kinds of unexpected problems, Simecek and his team have helped adapt what's known as an optical coherence tomography device to identify brewing oral problems. "It's a laser that allows you to see subtle discrepancies and cracks in a tooth that you can't see by doing a regular dental exam," he says.

Other innovations coming from the Naval Medical Research Unit, which has been based in San Antonio since 2010, include a device they are evaluating called a surface enhanced Raman spectroscopy, which can provide medics with a tool to quickly attack dangerous bacteria. Identifying bacteria currently requires a blood culture, which can take a day. By contrast, researchers are hoping this tool, which can identify the specific bacteria in as little as 15 seconds, could help complete the prep and identification process in as little as 15 minutes.

The technology being developed at Fort Sam Houston is able to work fast and can also determine whether bacteria being examined are antibiotic resistant. On a practical level, this means that wounds and infections in combat could be addressed more quickly and effectively. "The attending physician would be able to prescribe the right antibiotic earlier," says Simecek. "If you just give the one that most often works and (the bacteria) happens to be resistant to the antibiotic, you lose seven to 10 days of treatment."

Another project underway is the use of the lab's so-called electrospinner device to make what can best be described as super bandages. In short, the electrospinner is able to weave chemicals and proteins into the bandage that can aid the quicker healing of a wound. This project can both help wounded troops in the short-term and also improve their quality of life after they leave the military.

"Part of what we do with the bandage is add drugs and proteins that reduce scarring," Simecek says, noting that a noticeable injury to the face can have a lasting impact on a person's self-esteem and quality of life in a way that an arm or leg scar does not. "You want to get them healthy, but you want to help them look OK, too."