Findings Suggest New Method to Fight Staph Infections

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School districts in middle Tennessee recently have reported several cases of staph infection among students and school workers. A biology professor at Middle Tennessee State University (MTSU) is involved in research that holds the promise of helping to reduce the number of these infections. The research may also point to new ways to combat other pathogens such as anthrax, SARS and avian flu.

Dr. Anthony Newsome and some of his students are investigating the effectiveness of chlorine dioxide gas in killing the germs that live in sports equipment such as shoulder pads and helmets.

According to Newsome, use of the chemical to kill germs is not new. It has a long history of use as a disinfectant, and it is used worldwide to treat tap water and preserve food. Unfortunately, it is too unstable to ship as a gas and must be produced on site. Historically, this has required bulky equipment and training of personnel to operate the equipment.

What makes his research significant is the new method used to generate chlorine dioxide. Instead of bulky equipment, he is using a system involving a dry chemical powder stored in a container about the size of a salt shaker. When the powder is activated small amounts of chlorine dioxide gas is released.

The chemical system used in the tests was produced by ICA TriNova of Newnan, Ga. In 2001, Joel Tenney, the company's executive vice president, and several other individuals with backgrounds in public

health and chemical engineering developed technology for a new method of producing small amounts of chlorine dioxide to meet specific needs. Tenney says his company's system differs from older methods of chlorine dioxide generation in that it's portable and simple to apply.

Early in the company's development, ICA TriNova showed that its products could be used effectively to deodorize and decontaminate military clothing and equipment, and these products are currently being used by some U.S. troops overseas to deodorize protective body armor. From these uses, the idea emerged that it might also be used to kill bacteria associated with athletic equipment such as football pads.

Recently, Tenney attended a conference where Newsome and his graduate students presented their studies about the type of microorganisms present in cooling towers. Through that chance meeting a cooperative relationship developed between Newsome and the company. Newsome and Tenney soon designed laboratory experiments at MTSU to demonstrate the bactericidal properties of chlorine dioxide using this newer technology.

Tests conducted in fall 2005 by Newsome and students showed the new chlorine dioxide generation technology could be used to kill all or significantly reduce bacteria associated with shoulder pads and football helmets. For these studies they worked closely with MTSU football equipment manager Chris Matusek.

Following these encouraging results a similar procedure was done with the cooperation of Coach Eddie Bassam and the staff at Middle Tennessee Christian School.

"For all these tests it was shown in dramatic fashion that bacteria were markedly reduced or eliminated from the equipment," Newsome said.

This past spring, Newsome and two undergraduate students continued the research, applying Staphylococcus aureus, the staph bacterium, directly to football pads.

"One surprising observation made," he said, "was that if staph are applied to football pads with a paintbrush and allowed to sit for several days, the greatest number of staph are found not to be on the mesh surface of the pads but rather on the underside of the mesh covering and within the foam pad itself."

Using the chlorine dioxide gas treatment approach, his student researchers found that bacteria were killed not only on the surface, but in the mesh layer and even into the foam pad beneath.

"Traditionally the way to treat sports equipment was to wipe it down with a disinfectant," Newsome observed. "That treats the top surface, but doesn't get into the pores of the pads. The only way to completely eliminate the bacteria was to tear out the old pads and replace them, something that's very costly for the average high school. This new technology allows for a simple, safe onsite intervention for hard-to-clean shared gear."

Moreover, he added, "We're looking at a number of other uses for these products. Foodstuffs like spinach or tomatoes could be treated in the field to improve safety without affecting the quality. We're also evaluating medical device sterilization, portable water treatment, and other researchers are looking at biothreat response to anthrax, SARS and avian flu."

Source: Middle Tennessee State University