Nano silver fights infections

August 1 2005

Silver nanoparticles could help fight hospital-related infections that afflict 2 million patients and lead to 90,000 deaths in the United States each year, experts told UPI's Nano World.

These anti-microbial nanoparticle coatings could have a dramatic impact on the roughly $160 billion global medical-device market, said Bruce Gibbins, founder of, and lead researcher and chief technology officer for AcryMed, a device maker in Portland, Ore.

"There are so many medical devices that are potential candidates for the use of our antimicrobial treatment," Gibbins said.

AcryMed presented its technology publicly at the Micro Nano Breakthrough Conference in Portland on July 27.

Roughly half of all hospital related infections are linked with catheters and other medical devices that pass through the skin. These devices provide surfaces where microbes can grow slimy fortresses called biofilms that serve as stepping stones for invasions deeper into the body.

"A typical infection can cost as much as $47,000 per patient to treat," said Jack McMaken, AcryMed's president.

Such infections cost $2 billion in added hospital charges in the state of Pennsylvania alone, Gibbins added.

Silver has been employed to fight infections and control spoilage since at

least the times of ancient Greece and Rome. AcryMed currently draws $5 million in revenue from products such as silver-based wound dressings. The company developed its nanoparticle system after medical-device manufacturers asked if AcryMed researchers could adapt silver for catheters and bone pins, Gibbins said.

In minute concentrations, silver is highly toxic to germs while relatively non-toxic to human cells. Microbes are unlikely to develop a resistance against silver, as they do against conventional and highly targeted antibiotics, because the metal attacks a broad range of targets in the organisms, which means they would have to develop a host of mutations simultaneously to protect themselves, he explained.

AcryMed has devised a technique to coat medical-device surfaces with anti-microbial silver particles 2 nanoparticles to 20 nanoparticles in size that prevent biofilms from forming. The coating "sticks to basically all kinds of surfaces, from glass to stainless steel -- even materials like Teflon," Gibbins said, and it lasts for roughly 150 to 200 days.

Other processes that apply silver nanoparticle coatings onto surfaces require high vacuum and often high temperatures.

"All this high-vacuum equipment is expensive and cumbersome and also incompatible with materials like plastics," said materials scientist Jack McCarthy of Oregon Health & Science University in Portland.

AcryMed's process works in the open air with fluids at either at or slightly above freezing.

"Their process is a low-temperature one amenable to large batches of materials with lower melting points. From a practical standpoint, it's a good process," said McCarthy, who has inspected AcryMed's results.

Because the technology uses an easily applied coating means medical device companies "don't have to go back to the design board to make their devices anti-microbial," McMaken said.

Along with catheters, Gibbins said, "we're seeing more and more artificial body parts used to repair worn-out joints, and all of these parts are potentially risk factors for infections. The ability to contribute to preserving those parts and making them function better is really exciting."