



Pure Bioscience Looks For Silver Lining

The company has a silver-based molecule it thinks can be used in a range of products, including medicines.

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Alexander the Great is said to have used silver coins to purify water. The huge collection of impressionist art at the Barnes Foundation near Philadelphia was amassed with a fortune built on selling an antiseptic silver compound called Argyrol in the early 20th century.

But silver was largely sidelined with the discovery of penicillin and other new antibiotics in the 1950s. It was still used for some things, like treating burns and disinfecting the eyes of newborns. But it was hard to patent, and make money from, and scientists weren't so sure how it worked.

Concerns about microbes that develop resistance to antibiotics and health concerns about some antibiotics themselves have led to a renaissance for silver, and companies are searching for new ways to produce it to make it more effective and to apply it more broadly.

Of course, this has also led to a whole class of silver-tinged snake oil, too. Simon Silver, a professor in the department of microbiology and immunology in the University of Illinois at Chicago, College of Medicine, studies bacterial resistance to metals. (Despite his name, he studies mercury and arsenic, too.) He says of the new silver products: "There are those that are useful, those that are harmless and some that are pure garbage."

Pure Bioscience (PURE - news - people), a El Cajon, Calif., company has a silver-based molecule it thinks can be used in a whole range of products, from cleaning products to agriculture to lotions and cosmetics and, perhaps someday as a drug.

The company is expected to announce Thursday that one of its development partners, FTA Therapeutics, will team with the Cleveland Clinic to develop Pure's molecule for several applications, such as treating wounds and acne. Last month, the U.S. Environmental Protection Agency approved the use of Pure's molecule for sanitizing surfaces that come in contact with food.

Pure's molecule contains silver in the form that it is useful as an anti-microbial: as an ion, a silver atom that has been stripped of one electron.

Silver ions, explains UIC's Silver, bind to proteins on the cell membranes of bacteria, and disrupt their respiratory chains--the series of reactions that allow them to produce the energy molecule ATP that all life depends on. It then busts the cell open and kills it. The cells of most multi-cellular organisms, like humans, do their respiration in mitochondria that are tucked safely inside the cell and protected from silver ions.

But silver ions work against viruses, too, by binding to proteins on their so-called coats. And, curiously, for reasons that aren't fully understood, they also seem to work against fungi, and fungi cells are more like human cells than bacteria or viruses. "They work, they kill what you want them to kill," says Silver. "And the evidence that it harms us is almost zero."

Ingesting too much silver can lead to a rare condition called argyria, that, while it doesn't seem to affect health, is creepy. The afflicted person's skin turns strikingly blue.

Silver ions are produced in small amounts when silver comes in contact with water--this is how Alexander the Great may have seen some benefit from his silver coins. Lots more can be produced by passing an electrical current through silver that is in a liquid. (My home dehumidifier purifies water this way.)

But the ions don't last very long because they are so reactive, and without electrical current you need lots of silver to create enough ions to do much. Pure has developed a way to stabilize silver ions in citric acid, the common organic acid found in fruits. The company's molecule, silver dihydrogen citrate, keeps the silver ions ready for action indefinitely, and requires only tiny amounts of silver.

Even better, claims Pure's chief microbiologist Dolana Blount, bacteria see the citric acid as a food source, so they ingest the molecule that quickly kills it.

UIC's Silver says that while bacteria have the genetic ability to develop a resistance to silver, they almost never do. In 30 years of research, he has heard of it happening only twice. And as soon as the resistance develops, it quickly disappears because the kind of change required to protect against silver weakens the microbe dramatically.

Aside from obvious uses as a disinfecting cleaning product and as a topical antimicrobial, Pure says it can put its molecules in things like cosmetics, deodorants and lotions to keep them from becoming contaminated. The company says it can kill fungus on sugarcane and soybean crops. And the company is trying to develop it for water purification in the third world.

Pure spent six years trying to convince the EPA that its product was safe, an effort that was made more difficult, says Blount, by all of the silver snake oil on the market.

So-called colloidal silver is sold as an alternative medicine, and sellers' wild claims about its efficacy have drawn the wrath of the FDA and the U.S. Federal Trade Commission. The FDA's stance: "The FDA does not consider colloidal silver to be safe or effective for treating any disease or condition."

Claims abound, nevertheless. One seller of colloidal silver relies on ambiguity: "Silver colloids also revitalize the healthy cells by nourishing and supplying them with many particular needs," the seller's Web site says.

The human body has, in fact, no known use for silver whatsoever. But maybe the human race does, if it can use silver to knock off a few more microbes.