

Health

Holy Water

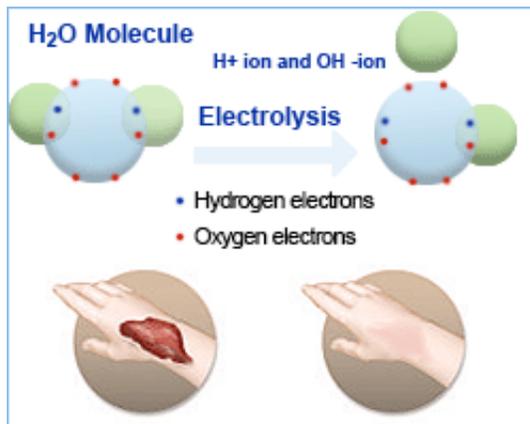
Mary Ellen Egan, 02.28.05

Can a dash of electrically charged liquid heal life-threatening burns and wounds?

File this under hard to believe: researchers at Oculus Innovative Sciences, a small biotech based in Petaluma, Calif., have developed a kind of superwater that kills bacteria, viruses, mold and spores at rates comparable to any antiseptic agent on the market but without the toxic side effects of bleach, alcohol and iodine.

Even more remarkable, but yet to be proven to U.S. drug regulators, is the effect that the clear liquid, called Microcyn, has on burns and chronic wounds. With the application of Microcyn, Oculus says, diabetic foot ulcers are healing for the first time ever, and kids with burns are leaving the hospital faster.

While the research data are preliminary, doctors are enthusiastic about the solution's potential. Microcyn has been approved as a disinfectant in the U.S., Mexico and Europe, and for wound care in Canada, Mexico and Europe. If the solution wins Food & Drug Administration approval for wound care--a decision is due by late March--the privately held Oculus could clean up: Chronic wound care is a \$4.3 billion global market, and consumer wipes another \$4.5 billion. The best part, the company says, is that the solution has a shelf life of two years. Some antiseptics break down after hours or days.



Add electricity to water and you create ions that can disinfect wounds and may speed healing. The trick was making it shelf-stable.

ionization process. Since 2003 he has raised \$21 million from an investor group led by Brookstreet Securities. In Oculus' method, water saturated with salt is electrolyzed, and the positive and negative ions are separated into multiple chambers. The solution undergoes further processing to stabilize the ions and to adjust the pH level. Trace chlorine left over from the process gives Microcyn its antimicrobial quality.

In early 2003 Oculus filed for approval with Mexico's Ministry of Health for Microcyn to be used as a disinfectant and an antiseptic for wounds. Dr. Andrés Gutiérrez, head of the cell therapy unit at the National Institute of Rehabilitation in Mexico City, was asked to test its safety and efficacy. "I was skeptical at first," he says. "Others have tried to do this before and have failed miserably."

But he quickly discovered that the solution killed spores, fungi and viruses. It eradicated *bacillus* bacteria in less than a minute compared with 15 minutes for alcohol, which doesn't even kill spores. Satisfied that Microcyn was effective and nontoxic, the institute tested the solution on patients with diabetic foot ulcers. "The first thing we noticed was that the odor from the wound faded away in 24 hours. This had never happened before," says Gutiérrez.

Microcyn has roots in the basic chemistry of oxidation. If you zap purified water with electric current, you can split apart a water molecule into a positively charged hydrogen ion and a negatively charged hydroxide ion (oxygen attached to hydrogen). The ions, having lost their stabilizing electron, go off looking for electrons to steal from other molecules. This is why highly oxidized water has a lethal effect on bacteria. Highly concentrated ions in a solution outside a bacterial cell want to rush inside where there's a lower concentration, thus damaging the bacterial cell membrane and killing the cell.

Microcyn arose from research done in the 1990s by Japanese physicists looking for a way to disinfect cooling water in nuclear reactors. Other research at the time pointed to the possibility that so-called active oxygen stimulates tissue growth at wound sites. But after 12 years of work, the Japanese physicists, using sodium chloride and water, couldn't figure out how to balance the acidity or how to keep their product viable for more than a couple of days.

In 2000 Hoji Alimi, an Iranian-born biologist, bought the license for the technology for his company, Oculus, originally started to develop a cancer treatment. Alimi spent the next three years and \$5 million fine-tuning the

Doctors in Mexico are now using Microcyn on patients with varicose vein ulcers and on children with second- and third-degree burns. With other treatments the average stay for pediatric burn patients was 20 days. With Microcyn the length was cut in half, saving Mexican hospitals \$18,000 per patient.

It is too early to be sanguine about Microcyn's claimed healing powers. Its backers don't even know exactly how the solution promotes healing. But if Microcyn receives its next FDA approval, the company will begin clinical trials for wound healing at the Veterans Administration hospital in Denver.