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Lansing biotech company sterilizes tissue with supercritical CO₂

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LANSING -- Two scientists in white lab coats lower human tissue into a stainless steel chamber under 1,400 pounds per square inch of pressure, where they'll flood it with a chemical that is simultaneously a liquid and a gas.

No, it's not a science fiction movie; it's simply a Lansing biotechnology company's process for sterilizing human transplant tissue.

The company, NovaSterilis, has found a way to overcome the problems of current forms of sterilization -- that use radiation or heat -- by using supercritical carbon dioxide (SCCO₂), which is both a liquid and a gas, and thus a good solvent, to allow their proprietary sterilant to kill bacterial spores, such as tetanus

Supercritical carbon dioxide has several uses including decaffeinating coffee, but the NovaSterilis sterilization process utilizing it is the first of its kind on the market.

"There are a million reasons for infection, but there are hundreds of infections each year from improperly sterilized tissue," said Thomas Steffie, the company's vice president for business development.

NovaSterilis' process resolves two critical problems: first, its sterilization of transplant tissue is 99.9999 percent reliable leaving only a one in a million chance that any bacteria remain. The other reason is that it has little or no effect on the usefulness of the tissue being sterilized, unlike gamma radiation or steam sterilization. That's a huge plus for tissue banks that can't afford to damage precious human bones and tendons.

Their machine, the Nova 2200, costs \$152,000, and NovaSterilis has sold about six of them so far, mostly to tissue banks who distribute transplants to donors. The company's 10 employees construct the tall, metallic devices in their 5,000-square foot Lansing headquarters, and also program the device's software and design the packaging for the sterilized tissue grafts.

Several scientists also do ongoing work with tissue banks to show the effects of their sterilization on the donor tissue.

"When tissue banks want to take over our technique, they'll send us human donor tissue samples, and tell us to run it through various sterilization cycles, said Renee Christopher, the company's director of research. "We'll spike it with a high number of colonies of bacteria, the one that most challenges our system. We put it on all our samples, put it through our machine, and then incubate it for seven days to see what develops."

NovaSterilis was founded in 2000 by president David Burns and Tony Eisenhut. They developed their own patented technique for sterilization that built on earlier Massachusetts Institute of Technology research. Eisenhut, who is the chairman of NovaSterilis' board, graduated from Cornell, which led to the company becoming incorporated nearby.

In 2007, NovaSterilis was the sole small business recipient for the President's Green Chemistry Challenge Award, given by the United States Environmental Protection Agency for developing a low impact business model.

The company also tries to purchase locally, buying their machined metal frames from Incodema, an Ithaca metal fabricating company.

Steffie said the company likes being in the Ithaca area for the relaxed attitude, and the proximity to innovation.

"From the technology point of view, this is the perfect area to be -- there's a whole number of small start ups, and you do have Cornell," he said. "There's a lot of stuff coming out of Cornell."

Additional Facts

Tompkins County workers make a stunning array of things from tiny nanotech gizmos that run satellites and diagnose disease to organic cosmetics and gourmet cheese.

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