A man with short brown hair and a serious expression is looking directly at the camera. He is wearing a dark, possibly black, button-down shirt over a white t-shirt. He is holding a pair of surgical forceps in his right hand, which is positioned over a synthetic, pinkish-red thigh. The thigh is mounted on a wooden block and is secured with black straps. The background is a dark, textured wall.

# Body Copy

By Bob Andelman  
Photography by John Revisky

**It's only salt and water:**  
Local scientist Chris Sakezles with his synthetic thigh,  
made primarily from salt, water and fibers.

*Medical researchers, Hollywood filmmakers  
and animal rights activists stand to benefit from  
Chris Sakezles' synthetic human body parts.*

When Robert Cresanti met Sarasota entrepreneur and inventor Dr. Christopher Sakezles in February, Sakezles shook his hand and showed him his thigh.

You can bet that's the first time that's happened to the U.S. Secretary of Commerce for Technology, who came to Tampa that day in February to present Dr. Sakezles with a Recognition of Excellence in Innovation award.

And it was appropriate that Sakezles bring out his remarkable thigh, because it's a big part of the attention his company, SynDaver Labs, has been attracting from medical device manufacturers, university medical schools, pharmaceutical companies, and the U.S. military.

Sakezles literally invented that thigh. It looks real, and more importantly, feels sickeningly real, right down to the synthetic blood coursing through it's veins.

"I had discussions with a number of scientists when his nomination first came up," Cresanti says, "The technology really stuck out. It was, considering the many innovation awards we've given out, among the most unique. The name of the company seemed kind of odd at first. But the more I looked at the thoughtfulness, the patents and his overall developmental approach – the more interested and impressed I became."

And, as Cresanti pointed out, it's one thing to read about SynDaver Labs' design and manufacturing of synthetic human body parts, but something else entirely to actually hold them in your hands." I said to him, "When you visit customers, you probably have a very interesting experience going through the airport," Cresanti says.

That's true. "When I go through the airport with a bag full of penis models," Sakezles says, "it gets really interesting. The security people pull them out and wave them around. I get a smirk and a lot of weird looks. Then I have to explain what I do, and I'm not sure they believe me."



Sakezles made a believer of Cresanti that day in Tampa. "He's obviously one of those people who is very passionate and really believes in what he's doing," says Cresanti. "That carries a lot of weight. He had the whole room hanging on every word when he made his presentation."

Sakezles believes that, given a choice, inventors, engineers, and researchers would rather not test their products on animals. That sounds good, of course. After all, most people don't want to harm animals. But Sakezles actually has developed a product with the potential for replacing many live animal tests and much of the cost associated with medical product development testing.

"I'm a former medical device engineer," says Sakezles (the name is pronounced Sak-a-lees), "If you work in that industry, the FDA requires you to perform simulated-use testing to prove the devices you're developing are safe and effective. Engineers test new devices on animals, cadavers,

and models they make in their laboratories. Right now, the gold standard for testing is animals."

Politically and ethically, of course, animal testing comes with a heavy price. "A lot of the animal testing in our industry is not only wasteful, it's counterproductive," Sakezles says. "Of course, you can always buy a pig and run a study. But it has to be conducted in an FDA-licensed facility. You have to have a veterinarian because the Animal Welfare Act requires that you document the fact that the animal is being cared for properly. You also have to write a protocol and have it reviewed by a committee of professionals. All of this effort is geared toward proving the study is necessary and the animal is not going to be abused."

Because of all the associated overhead, a "simple" study with only one animal can cost researchers tens of thousands of dollars, he says, and in the end it may not prove much because animals are notoriously unpredictable.

"Sometimes," Sakezles says, "the results from these studies are even thrown away because the desired results are not achieved. You don't want to have to convince the FDA that it wasn't your device that killed the pig. Something almost always goes wrong, and it can be catastrophic to get even one bad data point. And regardless of the device under development, it's never a good idea to rely on a few data points.

"Our customers use these products, versus animals or cadavers, as a way to reduce cost and risk," Sakezles says. "A company can use our models to test their products in actual human anatomy without the overhead, delays, and risk that come with an animal study. And they can

easily generate a very large number of data points.”

The company’s body parts are repairable. Damage a vein or artery and it can be replaced – and nobody dies. They’re made like jigsaw puzzles. There are also no biohazards. And because it’s a reproducible model, companies can use it to not only test their device, but also a competitor’s – and generate data that shows in detail how one device compares to another. “That’s impossible to do without our technology,” he says.

specific body parts into individual components [muscle, tendon, fascia, intima, etc.], develop synthetic analogs for each one of these components, and then build an artificial body part out of the synthetic tissues. The resulting body part may be used for testing devices or teaching medical and surgical procedures, but at the time I was using the technology as a hook to land consulting work.”

Over time it became apparent that the best product Sakezles had was not his consulting skill but

Ethicon, a division of Johnson & Johnson. “Everything was done in deep dark secret,” he says. “We didn’t want to let the cat out of the bag too soon.” His first patent was filed in January 2005 but not issued until February 2007.

The bay area is home for Sakezles, who was born in Tampa and earned an mechanical engineering degree from the University of South Florida and his masters and Ph.D. in polymer science from the University of Florida in Gainesville.



The crazy thing about Sakezles’ creations is that they seem so obvious you’re left wondering why no one thought of it sooner. “The kernel of the idea developed in 2004 in Princeton, N.J.,” he recalls. “I had started my own consulting practice, Princeton Product Innovation, to provide design services to individual inventors and small manufacturers. We were designing catheters and other disposable medical devices for our clients, and I was pitching these services to small-to medium-size companies.

What made us unique however, was our modeling technology. We would conceptually break down

the ability to make incredibly lifelike synthetic human tissues and body parts – and sell copies of them over and over again.

“Back then I was doing everything myself, all the live tissue testing, all the materials formulation and development, all the manufacturing,” he says. “I started out on a desk in my Princeton office, then I relocated to Florida and upgraded to a facility in the Tampa Bay area.”

That first year Sakezles did nothing but file patent and trademark applications and work for one client,

Curiously however, Sakezles had no formal training in anatomy upon graduating.

“My graduate research was related to medical devices, so I picked up the basics of anatomy on the fly. That’s the way it is in our industry. There isn’t any place that trains medical device engineers. You go into industry and learn on the job.”

So what brought him and his high-tech company here?

“Florida is trying to develop a home-grown simulation industry,” he says. “I originally thought there would be monetary support if the company

was located here, but so far that has not been the case. People here tend to invest in real estate. I think there is a desire to bring entrepreneurs like me to the area, but the powers that be want companies that already have hundreds of employees; they're not interested in grass roots growth."

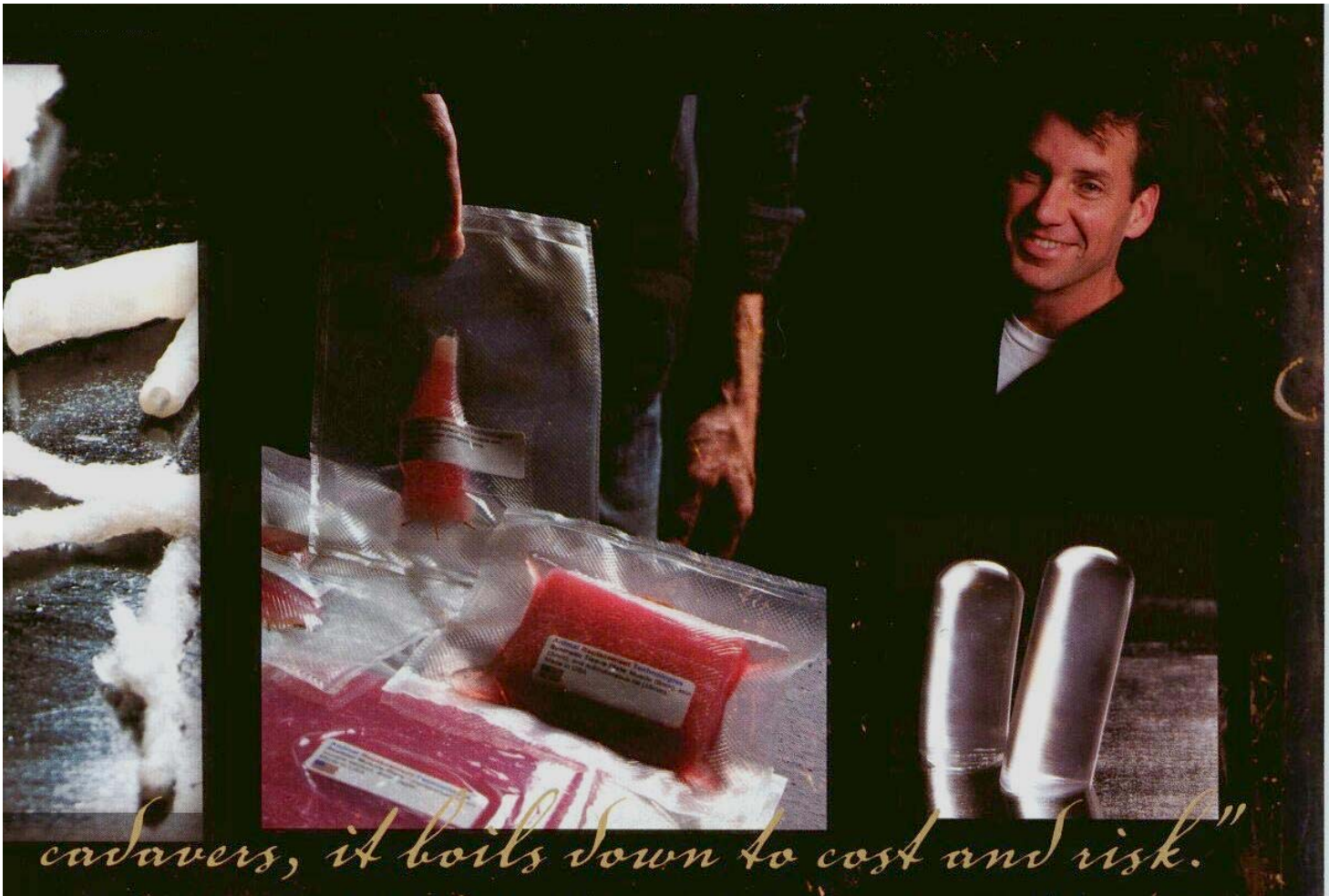
In the past year, new buyers for the company's products have included St. Jude Medical, the University of South Florida, Medical Education Technologies, and Cordis, yet another division of Johnson & Johnson.

our presence beforehand, there was constantly a crowd of engineers around our booth. There were reps from Chinese, Japanese, and Indian companies wanting to distribute. A Hollywood movie producer even stopped by – although I still have no idea why he might have been at the show. This technology appeals to a wide variety of different industries."

What's the big deal? We're not just talking about an uncanny level of realism here. These parts, fabricated

which is why we started there, but we are beginning to move into medical education, surgical simulation, and military applications as well."

Since incorporating in 2005, the company has been funded out of the pockets of Sakezles and his friends and family. "We haven't raised capital beyond our friends and family round," he says, "But someday soon we will be conducting a small stock offering for anyone interested. This will fund our expansion and partially finance the development of our main killer product,



"We didn't begin looking for new clients until the middle of last year, after we went to our first trade show," Sakezles says. "We didn't want the whole industry to know what we were doing until our first patents were filed. We finally went to the MDM West show in February, after we filed our first few patent applications. At that point I thought we were pretty well-protected."

And what was the reaction from unsuspecting trade show attendees upon being exposed to Sakezles' brainchild for the very first time? "Pandemonium – it was insane," he says. "Even though we didn't advertise

from the company's library of synthetic tissue analogs, have physical properties that don't just look and feel right, but are mechanically, structurally, and chemically similar to living tissue. "Our technology is naturally disruptive," Sakezles says.

When the company ramps up production, Sakezles expects to revolutionize medical device development – and possibly many related industries.

"There are a thousand things you can do with this technology," he says, "But as a startup it's important to maintain focus on your core market. I know the medical device industry,

a completely synthetic human cadaver – bones, tendons, muscles, veins, arteries, ears, eyes, and other organs. If everything goes according to the master plan, we should begin the preliminary work sometime during the middle of next year."