Louisiana EPSCoR

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Economic Development Comes Full Circle with OPT-IN

This is part 2 of a 2 part series on the benefits & successes of OPT-IN.

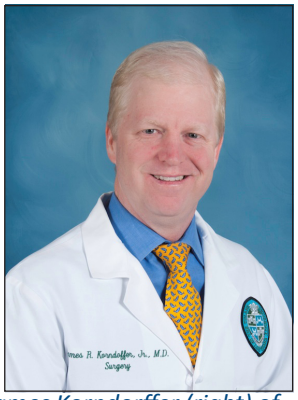
The State is already seeing immediate results from the opportunities granted by OPT-IN. Tulane University, the 7th largest employer in Louisiana, is the current host institution of a patent-pending laparoscopic surgical device invented by Tulane General Surgery Resident, Dr. Eric Simms.

"As a surgical resident, it became clear to me that minimally invasive surgery was missing something not only practical, but something necessary. It sounds a little sensationalistic, I know – the idea came to me in a dream, and it wasn't until after my second cup of coffee that morning that my conscious mind concluded that my idea may actually be one worth pursuing." *And indeed it has been.*

Dr. Simms received his undergraduate degree from Oberlin College in Ohio, and then received his post-baccalaureate from Cleveland State University, also in Ohio. Dr. Simms attended Tulane Medical School and is currently a general surgery resident there.

In December of 2011, Dr. Simms, along with his faculty advisor, an experienced minimally invasive surgeon (MIS) and the Director of the Tulane General Surgery Residency Program, Dr. James R. Korndorffer, applied for a Category II grant of $11,416 to begin the process for developing a prototype of what Dr. Simms calls the Hydra. "I drew pictures of it. I wrote descriptions of it, and of the concept, and I marveled at the fact that no one else had thought of it yet. It's not that it was obvious, but was just so necessary. I had it all figured out. Except how to make it, that is."

So he set out to establish a team to build, refine and prototype the idea and ultimately bring it to the market. By February of 2012, Dr. Simms had assembled the Hydra Laparoscopic Surgical System Invention Team, known as the "Hydra Team," which consists of: Justin Levy and John Christie from Tulane's Office of Technology Transfer (TOTT) and Intellectual Property Development; Joseph Young and Jordan Vance, Tulane Biomedical Engineering students; and Dr. Korndorffer. In coordination with the Hydra Team and TOTT, the Tulane Biomedical Engineering (BME) Department pledged two additional BME undergraduate students to help develop a functioning prototype of the Hydra. "Joe and Jordan wasted little time in materializing the idea," said Dr. Simms. "And with the funds provided by the OPT-IN grant, we were able to create several iterations of functional prototypes, now deemed the Hydra Minimally Invasive Surgical System."



Drs. Eric Simms (left) and James Korndorffer (right) of Tulane University, received an OPT-IN Phase 2 grant to create the Hydra, a tool for minimally invasive surgeons.

> ***Our success has now brought us to the formation of Nikola Tech, a company that represents the spirit of multidisciplinary collaboration between medical and physical sciences.***
>
> ***Eric Simms, Tulane General Surgery Resident***

The Hydra has the capacity to dramatically increase the efficiency of minimally invasive surgery (MIS) and to improve safety. According to Dr. Simms, the basic concept of the Hydra is a single device that contains multiple instruments, eliminating the need for surgeons to constantly insert and remove various instruments throughout the procedure. The device includes multiple automatically advanceable and retractable instruments in a single "housing" sheath. All instruments are interchangeable within the housing sheath, allowing surgeons to select specific arrays of instruments, which Dr. Simms calls "instrument profiles," to suit their preferences or to suit the specific surgery being performed. Each instrument also has basic retraction safety mechanisms, to assure that individual instruments cannot be accidentally retracted while still grasping tissue, assuring that no tissue, vessels and/or structures will be accidentally torn.

Even very basic MIS requires the switching of instruments approximately ten times. For more complex surgeries, that number can be greater than 50 and if you add to that difficult patient characteristics, a surgeon may be switching his instruments hundreds of times during one surgery. Given an estimation of 3 to 30 seconds of time per instrument switch, Dr. Simms notes that in-

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strument switching accounts for unnecessarily increased operative times. After multiple instrument switches, this process then accounts for excess minutes to hours of operative time. Not only can the Hydra significantly decrease the length of MIS by decreasing the time required for instrument switching, but it also decreases the amount of instrument movement inside body cavities, decreasing the chance of accidental injury to the patient and subsequent costs related to that injury.

By the end of October 2012, the Hydra Team had the first functional prototype complete and subsequent prototype troubleshooting assessments were addressed and completed. By the end of December 2012, a provisional patent application was completed and submitted. Following this successful completion of the prototype, the instrument began initial safety testing in January in the Tulane Vivarium, housed in the Department of Comparative Medicine.

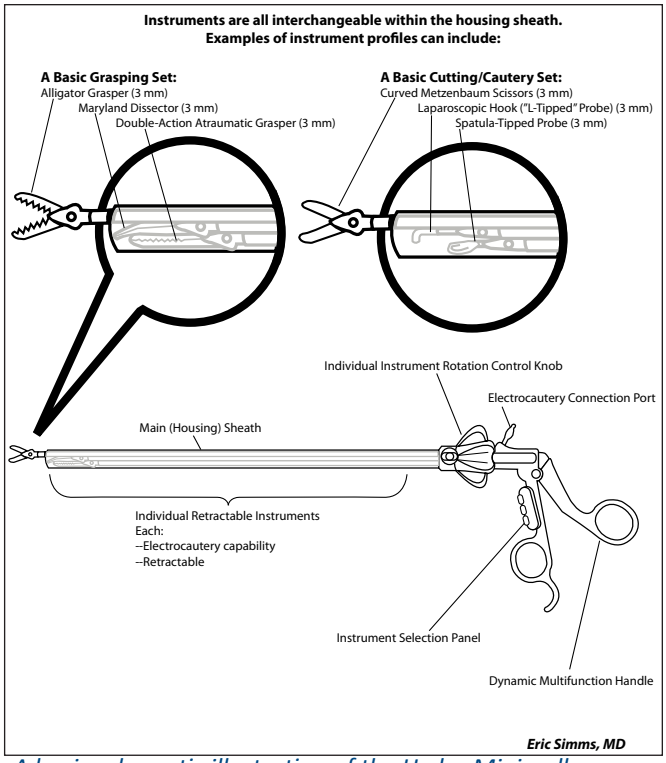
"Our success has now brought us to the formation of Nikola Tech, a company that represents the spirit of multidisciplinary collaboration between medical and physical sciences," said Dr. Simms. "Nikola Tech will foster this and other technology aimed at improving medical safety and efficiency, as well as patient and physician satisfaction and quality of life. We are thankful for the opportunities afforded us by Tulane and EPSCoR, and we look forward to continued collaborative creativity to meet the needs of society and medicine."

From this point, the Hydra test results will be submitted to peer reviewed journals, more studies and cost analyses will be done, and more grants will be applied for in order to create Nikola Tech, a spin-off business to package and market the prototype to medical device companies. Dr. Simms says based on the success with the Hydra Laparoscopic Surgical System, the Hydra Team will modify Nikola Tech to future opportunities, like investing in FDA approval before marketing products to potential licensees.

Commercialization of such a product is important not only for increasing patient safety, but also for decreasing healthcare costs. Dr. Simms said that, "Nikola Tech is filling the need for more efficient and user-friendly surgical instruments in MIS."

Dr. Simms may be reached for questions or more information at esimms@tulane.edu.

For more information about Louisiana EPSCoR , the OPT-IN program or other funding opportunities, visit web.laregents.org or call 225-342-4253



A basic schematic illustration of the Hydra Minimally Invasive Surgical System

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