

Idea to marketable device

BY LINDA PICONE

It's hard to be a good inventor, it's hard to be a good engineer and it's hard to be a good surgeon, says Alan W. Johnson, MD, MS.

But Johnson has managed to be—and to continue being—all three. He gives no small credit for that to the Innovation Fellowship Program at the University of Minnesota. “Really, the groundwork for everything was laid during the Innovation Fellowship,” he says.

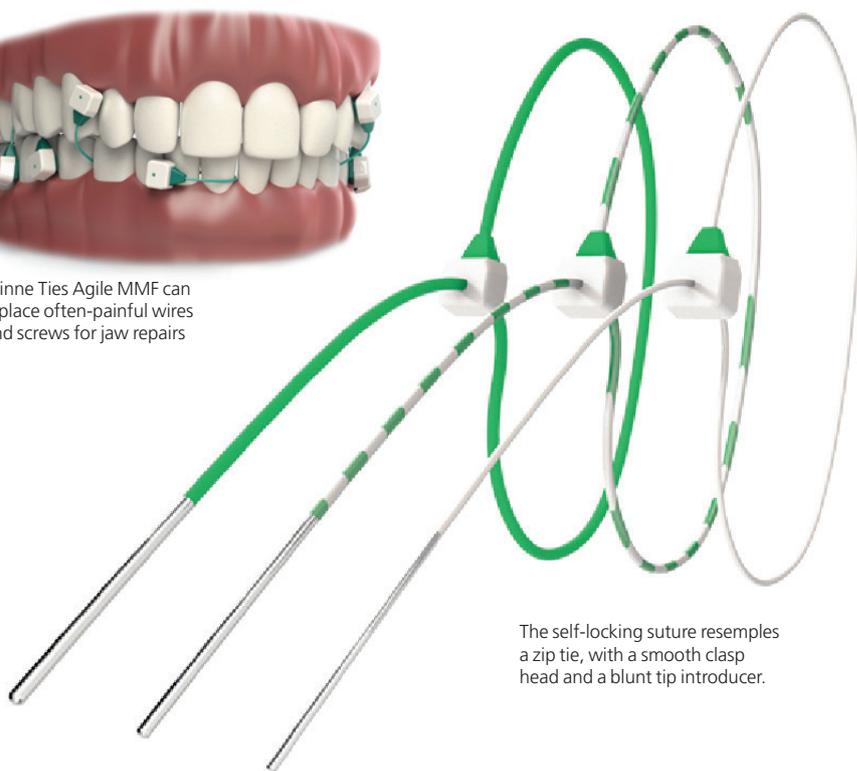
Johnson was a chemical engineering major at Northwestern University and, through the university's cooperative engineering program, he worked at Procter & Gamble's Health Care Research Center and assisted in consumer medical product development. Even while training as an engineer, Johnson says, he was thinking about ways to take that background into medicine.

He went to the University of Minnesota Medical School, earning not only his medical degree but also a master's in otolaryngology. He did his residency in head and neck surgery at the University, and then looked for a way to synthesize the medicine and the engineering and his entrepreneurial spirit in a formal program: The Innovation Fellowship.

“It's a one-year program that didn't exist when I started medical school,” Johnson says. “But I knew that Stanford had one and I was looking for opportunities. When



Minne Ties Agile MMF can replace often-painful wires and screws for jaw repairs



The self-locking suture resembles a zip tie, with a smooth clasp head and a blunt tip introducer.

the program started at Minnesota, I was excited—and I was able to get into the fifth-year class. You get to be paid to dream and create.”

The Innovation Fellows Program, part of the Earl E. Bakken Medical Devices Center, was started with four fellows in 2008-2009 to offer a more structured approach to designing medical devices, says Joseph Hale, PhD, director of the Fellows Program. Hale was himself a member of the first class of fellows.

Today, between four and eight fellows are chosen each year from roughly 60 applicants, Hale says.



Alan W. Johnson, MD, MS, got the time and support he needed to develop Minne Ties during his year in the Innovation Fellowship Program at the University of Minnesota.

“We are looking for people who are entrepreneurs, with a creative, innovative spirit.” Although a medical degree or doctorate is preferred, some fellows have had bachelor's degrees—with experience in the medical device industry. The goal is to put together a group of people with diverse backgrounds who will stimulate and support each other. At least one of the fellows will be a physician but fellows have included attorneys, a veterinarian, even someone with experience in fashion design. “We are very intentional about creating diverse teams,” Hale says. “That's

where the fun and creativity come in.” Although a product may be developed by one fellow, the interaction and support of the group is important throughout the process.

Physicians who apply tend to be in the early stages of their career, Hale says. The relatively modest stipend for fellows is similar to that of any post-doctoral fellowship, which means it can be difficult for an established physician to give up a practice, even for a year, for a reduced income.

Since its beginning in 2008, the fellowship has resulted in more than 100 patent applications, at least nine patents issued, at least nine start-up companies created and 26 products that were licensed, optioned and/or donated.

The patents for products developed through the fellowship are held by the University of Minnesota. If successfully marketed, the company that develops the product would pay royalties to the University; the University gets a third of that compensation, the department gets a third and the inventor(s) get a third.

Minne Ties

A zip tie for fractured jaws was one of Johnson’s first ideas when he started his fellowship in 2013 and he kept coming back to it as he tried out others and worked with the other fellows in the group. “It’s simple enough to be manufactured, and the other technology out there isn’t that good,” he says. Once he had the idea, he spent most of his fellowship time and almost all his free time trying to figure out how to prototype the idea of zip ties, how to make them in the lab, “how to put them on cadavers and test dimensions.”

By the end of the fellowship year, he had the devices refined enough to try them on himself: “I spent all my Saturdays making these things, deburring them, using zip ties I bought at Home Depot. I used cuticle scissors to deburr them so I wouldn’t tear up my own gums.

“I went into the call room on campus and sat in front of mirror and put them on. And they worked.”

The next year, 2014, Johnson pitched the product to potential partners. He talked with venture capitalists in Silicon Valley. And he pitched it to Summit Medical in St. Paul. “Summit was gracious enough and ambitious enough to take on the project,” he says. “Since then, I’ve been able to work closely with them. They did some excellent work.”

The product, Minne Ties Agile MMF, got FDA approval in April 2017 and has been marketed not just in the United States but also in Europe and Canada. It was awarded a silver award in the 2018 Annual Medical Design Excellence Awards, an awards program for the med-tech industry.

Minne Ties resemble typical zip ties, with a smooth clasp head on one end and a stainless steel blunt tip introducer on the other. The self-locking ties are applied through the interdental space to provide a secure bite. The benefits include:

- No sharp wires or screws.
- The self-locking sutures allow for quick and easy procedures in either a surgical or non-surgical setting.
- Each Minne Ties suture takes less space in the mouth than standard wires and screws, so there’s better access for the physician.
- The blunt introducer is trimmed after the Minne Ties suture has been done, leaving only the smooth clasp head; the patient is more comfortable.

“A way to think of this is that surgeons doing facial trauma are craftsmen with a toolbox,” says Johnson. “We’ve had the hammers, the drills, the wires, but never anything like a zip tie. They come in really handy for a lot of reasons.”

Minne Ties are definitely in Johnson’s toolbox: He is an otolaryngologist, more commonly known as an ear, nose and throat surgeon, at Altru Health System in Grand Forks, North Dakota, his home town. “It’s fun for me to be able to use these things clinically for my own patients,” he says. “I have one patient I used them on recently and they’re holding his occlusion in perfect position.”

Hale says Minne Ties are not the only successful product to come out of the fellowship, but Johnson’s success was unusual because he was able to develop the concept and license it shortly after the year of the fellowship. Another successful product developed through the fellowship is the cell phone app Soundly, developed by Brian Krohn. The app is essentially “pushups for the tongue,” Hale says, to help strengthen upper airway muscles and reduce snoring. Like Minne Ties, Soundly is generating revenue now. “But 90 percent of medical product concepts never end up being commercially successful.”

What’s next

“I’m still enjoying being a practicing surgeon,” Johnson says. “Looking forward, this project is probably at the end of what I can contribute to, although I’d like to help train people in it.”

“The next step is to try to run the gauntlet again, with a new invention,” he says. “But this is such a consuming process that if you try to do more than one at a time, you’re unlikely to put the time in that it needs.”

It’s not as if he has a lot of time on his hands right now; besides his surgical practice, Johnson and his wife have three young sons and the two of them train for and run triathlons, most recently in the half-Ironman world championships in South Africa. “Every minute of the day is spoken for,” he says.

Because inventing and then marketing a medical device takes enormous time, Johnson says. “Expect that if you’re going to pursue this, it’s going to take a half decade and lots of your time and energy to get consensus from all the stakeholders involved, from insurance companies, from a company that might license and develop it, from attorneys ... and most important, from patients.

“Innovation isn’t about wonderful ideas that no one else has thought of; it’s really about consensus building.” **MM**

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