



## Innovators pushing Arizona bio forward

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Right now, hundreds of scientists across Arizona are hunched over their laboratory equipment, working furiously to create new therapies, diagnose and find cures to diseases.

Many times, they forget about sleeping and eating, pushing themselves in a race against other researchers to get their work published, patented or funded.

But it's not always about the race.

"It's a situation where you are stuck with a clinical situation," said Dr. Richard Heuser, medical director of the **Phoenix Heart Center** and chief of cardiology at **St. Luke's Medical Center** in Phoenix. "You have a patient that you're treating and something isn't working, and so you've got to think of a way to improve it. This comes up all the time."

Looking back to 1997, Heuser remembers when he had a 70-year-old patient from Yuma who was having a heart attack in the middle of the night. Clot busters and drug thinners did nothing to help, and when he tried to open her blocked artery with a small balloon, the vessel burst.

The cloth-covered stent he had invented in 1993 was too big for her small vessels.

"So I took some of her blood, made it thicker and closed her artery with her own blood," he said. "I clotted it off and reopened it with a balloon and stent."

Heuser is just one many scientists and doctors in the Valley plugging away, night and day, to make patients' lives better.

A cure for Alzheimer's

Years ago, Joseph Rogers left his advertising job to become a scientist, and now is president and senior scientist at **Sun Health Research Institute**.

His goal is to find a cure for Alzheimer's disease.

As part of that process, he is working on a blood test to diagnose Alzheimer's disease. A blood test would be less expensive than existing brain imaging methods. Plus, it could be used to help create more accurate drugs for the neurological disease.

"If you had a biomarker, a diagnostic that would tell you if the disease is progressing or staying the same, that would cut the expense of these clinical trials down by a lot," Rogers said.

No doubt, Rogers is in a race with the best of scientists nationwide.

"At the last big international Alzheimer's meeting in Madrid last month, it seemed like everybody

there has an idea of a new diagnostic and biomarker," Rogers said.

He is getting about \$150,000 in funding from the National Institute on Aging and expects to receive another \$375,000 from the **Arizona Biomedical Research Commission** to further his research.

"They're going to allow us to see this through to the end," he said.

These days, scientists are working in collaboration, putting their brain power together to reach their goals. To that end, Rogers is working with Dr. Tim Vollmer at Barrow Neurological Institute, Dr. Geoff Ahern at the University of Arizona and Dr. Keith Joiner, the dean of the UA medical school, to collect blood samples from 200 patients.

If the blood test is successful, Rogers said he would sell the rights to a bigger company to conduct further tests and take the product to market.

"You really do need a lot more than we have to do that," he said. "That's not our business. Our business is discovery."

More and more, Rogers said, he is beginning to pay attention to the value of those discoveries.

"Instead of just publishing them, and letting someone else write the patent, we do now pay attention to patenting our discoveries," he said.

It may hinder science "a tiny bit" because there is a lag time before a patent is made public, compared to publishing in a medical journal to share findings with colleagues.

"But certainly in the cases of institutions like mine, we're going to share that information with everyone, ultimately," Rogers said. "But we might take a couple of weeks now to patent it. We've got to pay for our laboratories and the research to make these discoveries somehow or another. Instead of constantly begging the public for money, it's a good idea to earn it ourselves through patenting."

#### Creating superantibodies

Lately, the Valley has become a magnet for attracting top scientists, as the Translational Genomics Research Institute and the Biodesign Institute at **Arizona State University** create a buzz in the biotech industry worldwide.

Dr. Alton Morgan, president and chief executive of **InNexus Biotechnology Inc.**, is moving the headquarters of his Vancouver, British Columbia, drug development company to Scottsdale.

With more than 100 scientific publications and 60 patents and patent applications to his name, Morgan is a pioneer in developing monoclonal antibodies. These are clones of cells that can make antibodies used to fight off infections and diseases such as cancer and AIDS.

"We take those antibodies that target various diseases and turn them into ones that can target and treat," Morgan said.

InNexus has forged a partnership with Mayo Clinic to work on treating patients with these new types of super drugs and will move its headquarters to the Mayo Clinic campus this fall.

"Our business is making money on turning other people's antibodies into superantibodies and getting paid for that," he said.

Most recently, Morgan worked with a major biotech company that converted an antibody for lung cancer into a superantibody, making it more potent than the original.

"The company we were working with was bought by a major pharmaceutical company," he said.

"Two months ago, we were notified by that major pharma company that this was the only antibody project they kept from the original company and are continuing to work with us."

Partnerships grow in Valley

Partnerships among universities and hospitals continue to spur development, as more brain power is put together for a common cause.

Dr. Richard Herman of **Banner Good Samaritan Medical Center** in Phoenix is working with James Abbas and Ranu Jung from the Biodesign Institute to help spinal cord injury patients regain movement.

"For therapy, we say if we do the right type of exercise, maybe the nervous system will re-learn how to do things again," said Abbas, who serves with Jung as co-director of the Center for Adaptive Neural Systems at the Biodesign Institute at ASU.

Their goal is to help people with spinal cord injuries to exercise, stand and look at ways to prevent the onset of chronic diseases, such as diabetes, because of their inactivity.

They are beginning a study using an external electronic stimulator to exercise the legs of people who are in wheelchairs.

Another study is being planned for later this fall, in which an implanted simulation device will be used to help people stand. When the device is activated, it causes the muscle groups to contract, making it easier for a person to stand.

In a separate study, an external stimulation system will be used to help retrain people to walk. The electrodes for the devices are placed on the major leg muscle groups and connected to a small stimulator and battery pack.

"As we go through this, the first question is, 'Can we control the stepping movement on the treadmill?'" Abbas said. "We are confident it will work. We need to demonstrate that it will."

Research extends up north

While the Valley is fraught with scientists and researchers working on projects, Flagstaff's **Northern Arizona University** is making it easier for scientists to work together.

Its Strategic Alliance for Bioscience Research and Education was created more than a year ago to bring together NAU faculty and administrators with industry and business partners to help the university participate in the new economy, said Tim Porter, a professor in physics and the director of this new group, also known as SABRE.

The organization will help NAU professors take their inventions to market.

Porter said there are very few, if any, university professors who are knowledgeable enough or have the time or resources to take something that is their own idea and push it into a product or service that might potentially make money.

"What SABRE hopes to do here at NAU is to bring together into a single entity those parties that can help take this new knowledge or invention and bring it to market and translate it into something viable economically," he said.

Porter is working on his own invention that already has four patents.

He has created a medical device that can be used to sense or monitor concentrations of various bodily fluids in a human being.

"We've got a California company that was interested in the product and has raised money to develop the product into a commercial device," Porter said. "Their initial focus is going to be on

hydration sensing."

This non-invasive device would be able to monitor or measure a person's level of hydration within a few seconds, he said. The device is undergoing clinical trials at Stanford University in a pediatric setting, but also could be used for athletes, elderly patients and soldiers deployed in the field.

Also helping in the process to bring the product to market is Arizona Technology Enterprises, the technology transfer arm of ASU that also is helping NAU professors patent their products.

"Their responsibility is (intellectual property) development and protection for the inventor," Porter said.

Tuning fork sensors

AzTE is a blessing for professors, said Nonjiang Tao, a professor in ASU's electrical engineering department.

"They can make connections between individual research labs and find the best people to develop technology into products," Tao said.

Tao's group is working on technology that can measure a single molecule. Using a tiny quartz tuning fork found in watches, Tao said he can detect chemicals, toxic gas leaks and even monitor glucose in the bloodstream.

The tuning fork, which can be produced for pennies, has patents pending.

NAU's Porter said it's a long and grueling road to get a product to market.

"The hard truth of all of this is only a tiny fraction of even very good ideas in the laboratory ever make it to the point of a profitable product," he said. "When you do get a hit -- one that does become profitable -- it can result in a revenue stream for the university and for the local area where the company decides to base themselves and for the entire state of Arizona."

Each successful biotech company creates a breeding ground for others.

"Once you have a success story, it can generate revenue and employ people for decades," Porter said. "That's why we do it, to get those few successes."

Get connected

Arizona Biomedical Research Commission: **[www.adcrc.com](http://www.adcrc.com)**.

Banner Health: **[www.bannerhealth.com](http://www.bannerhealth.com)**.

Northern Arizona University: **[www.nau.edu](http://www.nau.edu)**.

Arizona State University: **[www.asu.edu](http://www.asu.edu)**.

Phoenix Heart Center: 602-234-0004.

Sun Health: **[www.sunhealth.org](http://www.sunhealth.org)**.

InNexus Biotechnology Inc.: **[www.innexusbiotech.com](http://www.innexusbiotech.com)**.