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Stimulus: Keystone Innovation Zone helps fuel research projects

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The intellectual capital brewing potential cures for Alzheimer's disease or indicators for prostate or ovarian cancer or treatments for lymphoma, not only congregates in university-saturated environments like Boston and San Diego, but has also found a home here in the parameters of Delaware County, thanks in part to the Keystone Innovation Zone.

The Keystone Innovation Zone consists of geographical areas throughout Pennsylvania in which businesses are eligible for grants up to $250,000 for partnering with universities and for creating jobs for transferring discoveries into applicable forms in the marketplace.

A significant sector of the innovation zone here is comprised of the life sciences industry, a mix of small and medium-sized businesses dedicated to research and development to improve human health, according to John H. Dixon, coordinator of the Delaware County Keystone Innovation Zone.

"The companies employ well-educated and trained professionals, often times with well-established academic and research credentials and experience, and provide high-paying jobs often times well above average per capita income," Dixon said.

In addition to their economic impacts, these companies are also generators of pioneering discoveries in their own particular fields, he said.

"Life sciences-related companies generate patents, licenses and commercialize technologies that lead to creation and manufacture of high-end products," Dixon said. "Within the Delaware County KIZ, our life-sciences companies account for the majority of new patents and revenue and contribute to the Greater Philadelphia region's transformation into the knowledge-based economy of the 21st century."

According to Christopher Molineaux, president of Pennsylvania Bio, a bioscience resource community, there are 81,000 jobs directly employed in the 1,900 life sciences businesses in Pennsylvania.

Of these, the average salary is $78,000, compared to the general wage average of $44,000 in the commonwealth, he said.

"It's a significant revenue base for the state," Molineaux said.

QR PHARMA

Radnor-based QR Pharma has directed its mission toward the possibility of a cure for Alzheimer's disease, stemming from the results company officials have seen with a compound called Posiphen.

The study of Alzheimer's disease revolves around the heightened presence of amyloid precursor protein in the brain, similar to what occurs after head trauma, Maria L. Maccecchini, president and CEO of QR Pharma, explained.

When a brain is injured, images show increases of amyloid precursor protein.

"The more you look at head trauma, you see the more APP gets elevated," Maccecchini said, adding that people with depression, confusion and dementia also show larger levels of the protein in scans. "You could see this in mice and rabbits and humans."

Higher levels of amyloid precursor protein are also evident in individuals with Alzheimer's disease.

"What is old age?" Maccecchini asked. "It's a whole bunch of things that injure your brain."

So, her company is evaluating the correlation between amyloid precursor protein and Posiphen's ability to reduce it.

But, she said she understands it's a well-worn, unknown path as 170 other companies have done studies with Alzheimer's compounds and all have failed.

Yet, Maccecchini added so much is learned from the mistakes.

"I still have this delusion, allusion, belief we understand the brain better and we can develop something for the brain," she said.

Besides, she enjoys a good enigma.

The reason she formed QR Pharma two years ago and a former company, Symphony Pharmaceuticals, in 1992, was her predilection for mysteries.

"I only get excited by stuff I don't understand," Maccecchini said. "If it's easy, it wouldn't be fascinating. I like to work on something we don't understand and figure it out."

So, she located the QR Pharma office within the Delaware County KIZ, halfway between the laboratories the company uses at Lankenau Hospital in the Wynnewood section of Lower Merion and her West Chester home. "It was just really convenience," she said.

In the meantime, she and her academic partner, the Medical University of South Carolina, continue to study the effects of Posiphen in transgenic Alzheimer's mice.

"It would be nice to say, 'This is black, this is white,'" she said, but what is integral in the studies is what impact Posiphen has on preventing cognitive decline.

Then, her business takes another focus as Maccecchini searches for $20 million to move the trials to humans.

"Ideally, I would like to have a corporate partner for Posiphen," she said.

ACCEL SYNTHESIS

Having graduated from the garage to an office in Garnet Valley in January, Accel Synthesis Inc. is developing microwave technology for use in creating precursors to anti-cancer medicines and herbicides and pesticides.

"We worked out of our houses for the first 18 months," said Rich Wagner, Accel Synthesis' president and CEO, adding that the basement was the hotbed of activity. "We have done work in the garage, too."

Yet, even as the company was established in 2008, it located in Radnor before making its move to Concord, which was attractive because of the availability of laboratory space.

The company has been developing a novel, proprietary microwave technology through a device called a 12-Liter batch reactor, which is similar to a larger-sized home microwave oven.

Wagner said the technology originated in the former Soviet Union.

"They were looking at the domestic microwave market," he said. "Because we had access to the technology, we just advanced it."

Wagner, a former GlaxoSmithKline chemist, has focused on microchemistry for 10 years.

One of the issues was the appearance of hot and cold spots.

"It's like your domestic microwave," Wagner said. "It's a matter of how uniform the field is. If you don't have hot and cold spots, you can reproduce the outcome. We can produce a uniform field."

He explained that chemists often have to reformulate materials when they scale quantities up from milligrams to kilograms, but with his technology, that would be unnecessary.

In time, Wagner said, meal makers may benefit from this uniform heating if the technology finds its way to the marketplace.

"That eventually will be one of the markets that one of the founders will pursue," he said.

PHOENIX S&T

In Chester, Phoenix S&T is developing an automated nanospray source that allows researchers to detect deformities in proteins that may be linked to cancers such as prostate and ovarian.

Sun Lau Staats, president of Phoenix S&T, said the device, also called a micro-auto-nano liquid chromatographer, takes samples withdrawn from humans and sprays it similar to a perfume bottle for analysis.

"We spray the peptide molecules in a very efficient manner so customers only need a small sample," she said. "You really can't afford to lose any of it. It minimizes failure. It incorporates (a) feature that makes

the analysis much faster."

In addition, Staats explained that it is fully automated, reducing the need for large teams of researchers. Once the molecules are sprayed, they can be evaluated and identified.

"If something is malfunctioned, proteins are somehow deformed and different and it causes the disease," she said.

Stephen R. Master, director of the Endocrinology Laboratory at the University of Pennsylvania School of Medicine, uses the Phoenix S&T device in his cancer biomarker work for prostate cancer.

"He uses our equipment," Staats said. "He's a customer. He loves our system."

Staats explained that the company introduced the device at the American Society for Mass Spectrometry convention in Philadelphia last year.

Even though it had to borrow a spectrometer to properly display the mechanism, Phoenix S&T sold one of its nanospray sources at the show, she said.

"Now, we have several more customers," Staats said.

Originally from Elkton, Md., the company moved to University Technology Park in Chester for the incubator benefits, including a conference room and kitchen.

For Staats, she said she wants to help scientists make progress.

"We try to help our customers figure out how to do their protein work better," Staats said. "We go and help them. We figure out a way to make it work for them."

YAUPON THERAPEUTICS

Among Radnor-based Yaupon Therapeutics products in development are an agent to aid in the treatment of methamphetamine addiction and Attention Deficit Hyperactivity Disorder and a topical gel for cutaneous T-cell lymphoma.

Lobeline modulates dopamine and is in clinical testing for its ability to assist meth addiction and ADHD, as well as enhancing learning.

However, the 13-employee business has invested much of its resources toward creating a mechlorethamine gel, which is expected to be submitted as a New Drug Application to the Federal Drug Administration.

"Our goal is to submit that to the FDA by the end of the year," said Tom Hess, Yaupon senior vice president-finance and CFO.

Yaupon founder and CEO Robert Alonso explained the history of the gel.

Caused by a mutation of T-cells, cutaneous T-cell lymphoma is a rare form of non-Hodgkin's lymphoma that impacts about 30,000 patients in the United States, with approximately 3,500 newly diagnosed each year.

In this form of lymphoma, the malignant T-cells cause various lesions to appear when these cells migrate to the skin.

Treatment initially consisted of taking the drug in powder form and mixing it with water to paint onto the lesions, Alonso explained. However, patients experienced various reactions because of the potency of the drug.

In the 1970s, Stanford University researchers tried it in an ointment form, Alonso said. Yet, this form was still unpleasant to patients as the petroleum jelly could be uncomfortable, he said.

So, Yaupon developed a form that would have the drug mixed into a gel that could be applied onto the skin and evaporated in 10 minutes.

"It's designed specifically so it would be cosmetically better than the Vaseline version," Alonso said. "When we tested it on patients, they were quite pleased."

In fact, a study conducted in conjunction with the Fox Chase Cancer Center looked at 260 patients at 13 cancer centers throughout the United States.

The results were released last month and opened the possibility for Yaupon to submit the drug application to the FDA, which is something the Yaupon executives said could have long-term benefits.

"That approval," Alonso said, "would be critically important for patients and physicians."

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