

ON THE **EDGE** OF PROGRESS

Three OU-related research projects receive a big funding boost based on their potential to bolster economic growth while improving the health and quality of life in Oklahoma.

BY DEBRA LEVY MARTINELLI

Not often do the terms “organ transplant,” “weather radar” and “hospital-acquired infections” fit smoothly into the same sentence. Here is an exception: In November 2010, Oklahoma’s EDGE (Economic Development Generating Excellence) Policy Board approved a \$5.4 million funding disbursement from the EDGE fund for three University of Oklahoma-associated projects to develop and commercialize a therapy expected to dramatically reduce organ transplant rejection, an affordable but highly precise Doppler weather radar, and a drug that could wipe out certain hospital-acquired infections.

Recipients of three two-year, \$1.8 million grants are Pure Protein LLC; Biolytx Pharmaceuticals Corp.; and a partnership between Enterprise Electronic Corp., the world’s largest commercial manufacturer of weather radar, and the University of Oklahoma’s Atmospheric Radar Research Center.

Established in 2004, with the first grants awarded in 2008, the mission of EDGE is to bolster Oklahoma’s long-term economic growth by investing the earnings from the EDGE endowment in the state’s knowledge infrastructure. EDGE investments are specifically directed toward Oklahoma-based projects that have the potential to expand the number of researchers, technicians, support services and related activity within the state; increase the formation and growth of advanced technology companies; leverage additional funding through federal research grants or private investment; and improve the health and quality of life for Oklahoma.

Pure Protein, Biolytx and the ARRC/EEC partnership plan to do just that.

continued



More Transplants, Fewer Rejections

The number of people needing an organ transplant continues to rise faster than the number of donors. The federal government estimates that 4,100 transplant candidates are added to the national waiting list each month. Each day, nearly 80 people receive organ transplants, but another 18 die waiting for transplants.

Pure Protein hopes to change those sobering statistics.

The company was spun out of technology developed in 1999 by William Hildebrand, professor of microbiology and immunology at the OU Health Sciences Center. Since then, Hildebrand has been awarded more than \$30 million in funding to study the Human Leukocyte Antigen, the body's alarm system that alerts it to the invasion by viruses, bacteria and cancer.

Guided by Hildebrand, who also serves as Pure Protein's chief scientific officer, the company will use the \$1.8 million EDGE grant to develop a protein-based therapeutic device to suppress the body's negative reaction to organ transplants while leaving the other aspects of the immune system intact.

"False immune system alarms can cause the body to negatively react to a transplant," Hildebrand explains. "Current immunosuppressant drugs and therapies are like a sledgehammer—they remove all the antibodies from the system, leaving the patient with little protective immune response. We're building a device that would remove only those antibodies that are rejecting the transplant, leaving others intact."

The Pure Protein device would be used in concert with common dialysis or plasmapheresis (blood plasma removal, treatment and return) machines. A patient's blood would go into the system, the plasma would cycle over the HLA protein, to which the antibodies would stick and be removed. "That means they won't be there to stick to the transplanted organ," Hildebrand says.

The technology would be available to both pre-transplant and

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William Hildebrand, professor of microbiology and immunology at OUHSC, has garnered international attention for his development of a protein-based therapeutic device that reduces the risk of organ rejection in transplant patients. Hildebrand has received a \$1.8 million EDGE grant for continued research and development of the device.

post-transplant patients.

"Initially, it will be for pre-transplant patients who have antibodies that would reject an organ," Hildebrand says. "Then it would be available to post-transplant patients who begin to reject the organ."

The EDGE funding, combined with other sources of leveraged funding for Pure Protein, is expected to lead to as many as 30 high-paying jobs in Oklahoma over the next eight years and help make the state a center for organ transplants.

"In the transplant world, we can help people get and keep organs, which are in short supply," Hildebrand says. "From a broader strategic perspective, we can open the door for work in other areas, including autoimmune diseases like lupus, by beginning to turn off or delete particular immune responses. And we think we can do that with fewer suppressant drugs."

A New Drug for Bad Bugs

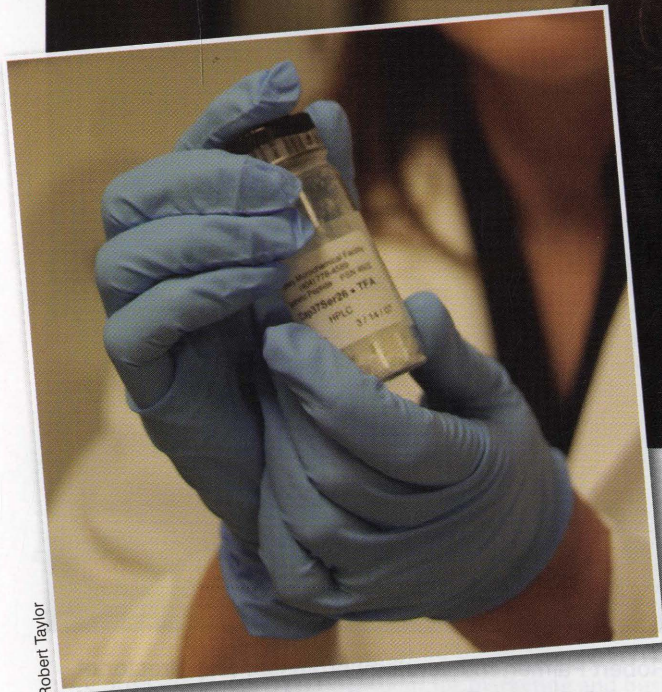
Of the approximately 1.7 million patients who contract hospital-acquired infections in the United States each year, 225,000 cases are due to pneumonia. The disease is fatal for more than 100,000 of these patients. The high mortality rate is due to the growing tide of antibiotic-resistant bacteria.

Anne Pereira calls it "bad bugs with no drugs."

Pereira, professor and associate dean of research in the Department of Pharmaceutical Sciences at the OU Health



Anne Pereira, professor and associate dean of research in the Department of Pharmaceutical Sciences at OUHSC, takes on the “bad bugs” that are to blame for more than 1.7 million cases of hospital-acquired infections each year. With help from EDGE, she hopes her company, Biolytx, will eradicate these bugs in hospitals across the country.



Sciences Center, is the chief scientific officer of Biolytx Pharmaceuticals Corp. The company was formed in 2005 to develop and commercialize a drug to help combat those bacteria.

The drug, known as CAP37, was created from a naturally occurring protein responsible for killing bacteria. It is particularly potent against *Pseudomonas*, which plagues hospital patients whose immune systems already are weakened by an underlying disease, trauma or surgery and who tend to contract pneumonia caused by the organism.

“As far as we know, very few new drugs have been developed for these infections, which show an especially high incidence of resistance,” Pereira explains. “CAP37 addresses a critical but unmet need.”

The EDGE grant enables Biolytx to hire three full-time scientists to determine the drug’s safety, formulation, delivery methods and shelf life, all of which are required before CAP37 can enter Federal Drug Administration-approved clinical trials. Supplemental work is to be conducted by two other Oklahoma biotech companies.

“We’ve been fortunate to obtain funding from the National Institutes of Health and OCAST (Oklahoma Center for the Advancement of Science and Technology) to get us this far, and we are confident we can get funding for the clinical trials,” Pereira explains. “The EDGE grant provides the crucial funding we need to bridge that gap.”

She credits a team from OU’s Center for the Creation of Economic Wealth with providing the business expertise needed to apply for EDGE funding.

“The CCEW team knew what was required to compile an EDGE grant and guided us on how to articulate the benefits of this project and the ways in which Biolytx might contribute to the future of biotechnology development in Oklahoma,” she says. “CCEW was an equal partner in the process.”

Pereira acknowledges that the immediate return on a \$1.8 million investment may not be readily apparent. She explains it this way: “Biolytx was created in Oklahoma, and it will stay here. If we are successful, we won’t sell the company to a big pharmaceutical concern. We will sell small portions so that our technol-



Accurate weather radar need not be massive nor expensive, says Robert Palmer, meteorology professor and director of OU's Atmospheric Radar Research Center, a partner of Alabama-based Enterprise Electronic Corp. An EDGE grant is allowing Palmer to continue research on the development of "mini-Dopplers," a boon to small, weather-sensitive businesses.

ogies can be marketed and distributed to treat people who need them. And we will reinvest that money into new technologies we are developing.

"Small companies like Biolytx will build the biotech industry for our state," she concludes. "We must lay the groundwork for that."

Affordable Weather Radar

The partnership between OU's Atmospheric Radar Research Center and Alabama-based Enterprise Electronic Corp. will use EDGE funds to develop and manufacture small, low-cost Doppler weather radars that collect data closer to the Earth's surface to provide more accurate information. The radars, for use by government and commercial entities in the United States and abroad, are to be developed and manufactured in Norman.

ARRC and EEC have collaborated for the past several years on improvements to EEC's commercial weather radar systems.

"Norman is the center of the weather community. The EDGE

funding will allow EEC to expand our office and manufacturing in Norman, adding approximately 30 technical jobs over the life of the project," says EEC president Allyson Turnbull. "The economic development opportunities in Oklahoma, tapping the existing talent pool from OU and Moore Norman Technology Center, make expanding in Oklahoma an obvious choice."

The Norman facility is expected to begin manufacturing in early 2012.

ARRC's role is to develop three major components for the radar system.

"With currently available technology, it is difficult to determine the difference among large raindrops and lots of small raindrops, a hailstone, snowflakes or ice crystals," explains ARRC director and OU meteorology professor Robert Palmer. "This new technology is so precise that it can distinguish among them and measure their size and shape, leading to improved rainfall estimation and tornado detection, for example."

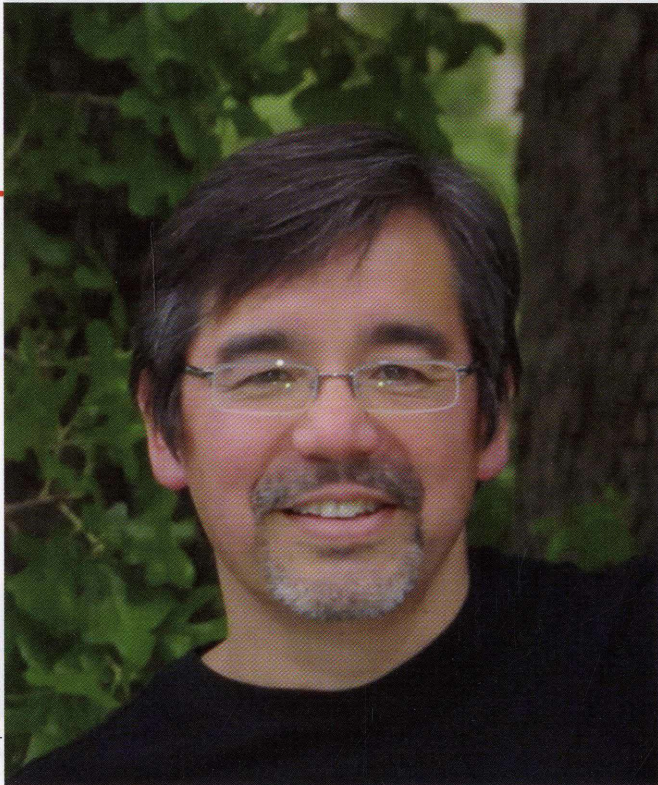


Photo provided

Meteorology professor Robert Palmer predicts manufacturing of the “mini-Dopplers” will begin in Norman as early as 2012.

Chris Goode, EEC vice president for marketing and business development, says the company sees immediate opportunity to assist national weather services both domestically and in the international marketplace looking to fill gaps in current radar coverage with smaller, lower-cost radar systems.

“We also see potential new customers in such markets as hydro-electric power companies, smaller to mid-size television stations and regional airports, all of which have critical missions that are extremely sensitive to the impacts of severe weather,” he adds.

Palmer notes that the EDGE-funded project is a culmination of the Strategic Radar Initiative started by OU President David Boren in 2005. “President Boren made a decision to invest heavily in a few key areas of research, one of which was weather radar,” he says. “I’m really proud and happy that the radar initiative is paying off for Oklahoma by expanding the weather radar industry here and creating interesting jobs for our students and other Oklahomans who want to stay in the state.”

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OU's Previous **EDGE** Recipients

In the two years since EDGE grants have been awarded, University of Oklahoma faculty have been well represented.

Among the 2008 awardees were:

Shivakumar Raman, professor of industrial engineering, “Shape Engineering towards Advanced Materials (SEAM),” \$3 million for four years;

John Greene, professor of geography, “The Renewable EDGE,” \$1,750,000 for three years.

Two private companies whose principal investigators are OUHSC faculty:

Paul DeAngelis, professor of biochemistry and molecular biology, Oklahoma Glyco-Manufacturing Facility: “Going Global with Next-gen Sugar-based Therapeutics,” \$1,238,000 for three years;

Jian-Xing Ma, professor of physiology, “Nanoparticle Mediated Drug Delivery for the Treatment of Diabetic Retinopathy and Age-related Macular Degeneration,” \$2,881,000 for three years.

Among the 2009 awardees were:

Jeffrey Harwell, professor of chemical, biological and materials engineering, “Boosting Oklahoma Oil Production with Next Generation Surfactants,” \$2,000,000 for four years;

David Kendrick, associate professor of internal medicine and pediatrics, OU-Tulsa, “Health Information Exchange Innovation,” \$500,000 for one year.