

NEWS RELEASE

October 11, 2006

WEST LAFAYETTE, Ind. - A recently developed method permits targeted drug treatment of cancer and other diseases, thanks in part to a Purdue professor who is this year's recipient of the university's Outstanding Commercialization Award.

The award is being presented to Phillip Low, the Ralph C. Corley Distinguished Professor of Chemistry, during the Inventors' Recognition Dinner on Wednesday (Oct. 11). The event, sponsored by the [Purdue Research Foundation](#), highlights the accomplishments of 35 university faculty or staff whose research has or may soon result in commercial applications.

"Many commercially viable technologies are represented by these remarkable scholars being honored here," said Joseph B. Hornett, the foundation's senior vice president, treasurer and chief operating officer. "Our [Office of Technology Commercialization](#) has helped to protect, market and license other research by offering support and services that allow entrepreneurs to keep innovation here in Indiana. It's not unreasonable to expect many of these inventions will eventually come to market through our incubation program or BusinessMaker process."

In fiscal year 2005, Purdue Research Foundation reported 213 invention disclosures, compared with 167 the year before, and 118 issued patents, compared with 95 the previous year. In the past six years, the university's invention and copyright disclosures have more than doubled. The foundation also reported the creation of three startup companies in 2004 and five in 2005.

Low is being honored for translating his research into commercial applications that have the potential to enhance the pharmacologic treatment of certain life-threatening illnesses. The commercialization of this methodology will help create jobs for Indiana, Low said. He will receive the award, sponsored by the [Central Indiana Corporate Partnership](#), to recognize his 28 worldwide patents with 32 additional patents pending. Patents and technologies spawned in Low's lab also led to the formation of [Endocyte Inc.](#), a Purdue Research Park company with 45 employees.

This is the fourth time Purdue has presented the award. Previous recipients include R. Graham Cooks, the Henry Bohn Hass Distinguished Professor of Chemistry in the College of Science; Leslie Geddes, the Showalter Distinguished Professor Emeritus of Bioengineering; and Fred Regnier, the John H. Law Distinguished Professor of Chemistry.

"These award recipients are legendary in their fields," said Victor L. Lechtenberg, Purdue's vice provost for engagement. "They are highly regarded by their peers throughout the world."

Low presented a lecture on his research Wednesday (Oct. 11) in Stewart Center, Room 218.

Low explained how he has helped in the fight against cancer and other diseases by developing a "Trojan horse" method to sneak large molecules into the pathologic cells that cause cancer, rheumatoid arthritis, Crohn's disease, atherosclerosis, lupus, osteoarthritis, diabetes and multiple sclerosis. This methodology can be utilized to both detect and treat cancer and other diseases. Highlights from preclinical studies with these targeted drugs were presented.



Phillip Low
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Low also summarized milestones in the formation and growth of Endocyte, the company he co-founded to commercialize his inventions.

Endocyte Inc. develops receptor-targeted therapeutics for the treatment of cancer and autoimmune diseases. It has licensed its vitamin-targeting technology to Bristol-Myers Squibb for use with its proprietary epothilone cancer chemotherapeutic agents. Endocyte currently has a targeted diagnostic agent, a targeted cytotoxic therapy and a targeted hapten therapy in Food and Drug Administration-regulated clinical trials.

In 1989, while studying signal processes involved in transporting molecules across the cell membrane in plants, Low's group discovered that by linking large molecules to the vitamin biotin, the molecules were allowed to enter the cell. Low said he immediately recognized that this process could be used medically and began to study the method in mammalian cells.

"The ability to get large molecules, such as proteins, antibodies or toxins, across the cell membrane was a problem that had defied the scientific community for years," Low said. "We recognized the potential applications for targeted treatments."

When it was reported in 1992 that many types of cancer cells had developed an enhanced need for folic acid and contained special receptors for folic acid that are not found on normal cells, Low's group was able to take steps toward the development of the diagnostics and treatments that are being evaluated in clinical trials today.

"We use the vitamin folic acid as a Trojan horse to carry molecules undetected past the gates of a cancer cell," he said.

The team's method takes advantage of the common cellular process endocytosis, which brings needed materials from outside the cell across the cellular membrane and into the cell. Folic acid is one of the few vitamins that uses this pathway, making it ideal for transporting molecules, he said. Because the cancer cell has a large appetite for the vitamin, even when a molecule is attached to folic acid, it is allowed to pass.

Low's group has been able to attach molecules to folate for both cancer detection and treatment. By attaching a radioactive imaging agent to folate, the cancer cells light up when the patient is exposed to a nuclear imaging scan. This "FolateScan" technology and diagnostic procedure is proprietary to Endocyte.

The method also offers several treatment advantages, Low said. By linking molecules to the vitamin, drugs are specifically targeted to pathologic cells, allowing efficient delivery and the potential for minimizing harm to healthy cells.

Traditional chemotherapy is not targeted and affects cells, both normal and cancerous, throughout the entire body and is associated with a range of undesirable side effects.

"Most new drugs under development will be targeted directly to disease-causing cells," Low said. "The understanding of how to deliver and unload a cancer drug can be extrapolated to all sorts of other diseased cells. The uptake pathways of the cancer cells are similar to those in cells involved in arthritis, multiple sclerosis, psoriasis and Crohn's disease."

Current clinical trials of three folate-linked drugs suggest that the folate receptor-targeting strategy holds great promise for increasing drug potency while reducing toxicity.

In addition to Low, the following faculty received plaques recognizing a patent(s) issued as a result of their research: Rashid Bashir, professor of electrical and computer engineering; Donald Bergstrom, associate head, medicinal chemistry/molecular pharmacology and Walther Professor of Medicinal Chemistry; Nien-Hwa Linda Wang, professor of chemical engineering; David Thompson, professor of chemistry; Eugene Spafford, professor of computer science/philosophy; Vladimir Shalaev, Robert and Anne Burnett Professor of Electrical and Computer Engineering;

David Sanders, associate professor of biological sciences; John Rice, W. Brooks Fortune Distinguished Professor of Computer Science; Daniel Raftery, professor of chemistry; Kinam Park, professor of pharmaceuticals and biomedical engineering; Haesun Park, industrial and physical pharmacy; Zheng Ouyang, assistant research scientist; David Nichols, professor of medicinal chemistry and molecular pharmacology; Kenneth Morris, associate head and professor, industrial and physical pharmacy; Dorothy Morre, professor of foods and nutrition; D. James Morre, Dow Distinguished Professor of Medicinal Chemistry; Mikhail Atallah, Distinguished Professor of Computer Science; Shailendra Mehta, visiting associate professor of management; Scott McLuckey, professor of chemistry; Daniel Leaird, senior research engineer; Richard Kuhn, head and professor of biological sciences; Timothy Johnson, dairy Extension specialist; Jules Janick, James Troop Distinguished Professor of Horticulture; Leslie Geddes, Showalter Distinguished Professor Emeritus of Bioengineering; Okan Ersoy, professor of electrical and computer engineering; Susan Eicher, USDA/ARS adjunct assistant professor; Vincent Drnevich, professor of civil engineering; Vladimir Drachev, senior research scientist in electrical and computer engineering; Edward Delp, Silicon Valley Professor of electrical and computer engineering; R. Graham Cooks, Henry Bohn Haas Distinguished Professor of Chemistry; Jean Chmielewski, Alice Watson Kramer Distinguished Professor of Chemistry; Alok Chaturvedi, associate professor of management/computer science; Clinton Chapple, professor of biochemistry; Ching-jer Chang, professor of medicinal chemistry; and Richard Borch, head of medicinal chemistry and molecular pharmacology and the Lilly Distinguished Professor of Medicinal Chemistry and Molecular Pharmacology.

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Related Web sites:

Purdue Office of Engagement: <http://www.purdue.edu/engagement>

Purdue Department of Chemistry: <http://www.chem.purdue.edu/>

Endocyte Inc.: <http://www.endocyte.com>

Purdue Research Foundation: <http://www.purdueresearchfoundation.org/>

Central Indiana Corporate Partnership: <http://www.cincorp.com/>

Office of Technology Commercialization: <http://www.prf.org/otc/>

PHOTO CAPTION:

Philip Low, Purdue's Ralph C. Corley Distinguished Professor of Chemistry, explains his research into targeted drug delivery for the treatment of cancer and inflammatory diseases. Low is the latest recipient of the university's Outstanding Commercialization Award. (Purdue News Service photo/David Umberger)

A publication-quality photo is available at <http://news.uns.purdue.edu/images/+2006/low-commercaward.jpg>