Newsletter

College of Physical and Mathematical Sciences

Dece,ber 2004

BYU licenses technology for compounds that treat antibiotic-resistant infections

BYU News Release
October 18, 2004

A Denver-based pharmaceutical company focused on dermatology and infectious diseases announced today it signed an exclusive licensing agreement with Brigham Young University for patented compounds and methods that treat antibiotic resistant bacterial infections.

Steven Porter, chief executive officer of Osmotics Corporation, says his company licensed BYU's technology because he believes it will address many of the drug-resistant bacteria that cause infections, such as pneumonia, staph infections and Salmonella.

Denver-based pharmaceutical company Osmotics has licensed technology created by BYU chemistry professor Paul Savage, who is shown here working in his lab.

"There is an increased need for a new antibiotic to combat increased drug resistant bacteria, increased costs of antibiotic therapy and limited numbers of new antibiotics in the drug-development pipeline," said Porter. "Additionally, this unique technology may demonstrate antiviral characteristics beyond the antibiotic efficacy for which we are currently testing."

Clinical testing is now underway to evaluate the compounds for the use in the treatment of gram-negative bacterial infections in burn victims. Approximately 60 percent of the deaths that occur among burn victims are due to uncontrolled bacterial infections.

The newly licensed technology is based on the research of Paul B. Savage, professor of chemistry at BYU, and has been the subject of more than 10 peer-reviewed journal articles. Extensive in-vitro testing has shown that the BYU compounds are highly effective against multi-drug resistant strains of Pseudomonas aeruginosa, Salmonella and other potentially lethal bacteria.

"Although the triumph of antibiotics over disease-causing bacteria is one of modern medicine's greatest success stories, widespread use of antibiotics has led to the development of new strains that are resistant to many antibiotics," said Savage. "The development of antibiotic resistance makes it more difficult to purge infections from the body and heightens the risk of acquiring infections in a hospital. Consequently, discovery of new antibiotics, especially those unlikely to cause bacterial resistance, is an essential step in controlling the spread of drug-resistant bacteria."

Most antibiotics target specific bacterial enzymes to inhibit bacterial growth. Enzymes are proteins that control the chemical reactions necessary to sustain life. Over time, bacteria can mutate their enzymatic pathways and become resistant to enzyme-targeting antibiotics. Savage and his colleagues at BYU have modeled their antibiotics after the body's defense system, which includes antibiotics that destroy bacteria by targeting and destroying their membranes instead of enzymatic pathways. However, unlike the body's antibiotics, which are relatively large molecules, Savage's antibiotics are small molecules that are easy to manufacture and purify.

Recent clinical testing has shown efficacy of the compounds against resistant strains of P. aeruginosa obtained from cystic fibrosis patients. P. aeruginosa is a major cause of hospital-acquired infections and tends to infect people with immunodeficiency or burns and those with catheters or on respirators. The bacteria can survive under conditions that few other organisms can tolerate and is resistant to most antibiotics.

In the month of December:

- Dec. 7—devotional: Daniel K. Judd, Ancient Scripture
- Dec. 9—last day of class.
- Dec. 10—College Christmas Social, ESC Pendulum Court
- Dec. 24—Christmas holiday.

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Carl Genberg, president of Osmotics Pharma, a division of Osmotics, said he sees this class of antibiotics as a very significant market opportunity for his company.

"Infections caused by drug resistant bacteria can affect anyone—antibiotic resistance is a particularly serious problem for patients with comprised immune systems, like people with HIV/AIDS and patients in critical care units," said Genberg. "The estimated cost to the health care system of resistant pathogens that require more expensive drug therapy or increased hospital stays is approximately $5 billion."

According to the Centers for Disease Control and Prevention:

- Nearly two million patients in the United States get an infection in the hospital each year. These infections contribute to the deaths of up to 88,000 of these patients.
- More than 70 percent of the bacteria that cause hospital-acquired infections are resistant to at least one of the drugs commonly used to control infection.
- Persons infected with drug-resistant organisms are more likely to have longer hospital stays and require treatment with second or third choice drugs that may be less effective, more toxic and more expensive.

Osmotics' Porter says his company hopes to market an easy-to-manufacture alternative to current antibiotic therapy that will effectively treat a broad range of maladies.

Physics students receive awards

Nine undergraduates, three graduate students and five faculty members participated in the 2004 joint Meeting of the Four Corners American Physical Society and the Quadrennial Congress of Sigma Pi Sigma that was held in Albuquerque, New Mexico, on October 15 and October 16, 2004. There were seventeen contributions from BYU on the program. Of all the institutions represented at the Conference, BYU received the largest number of student awards. In the best Graduate Student Presentation category, Jared Stenson received an award for his paper entitled, "Quantum Solutions to Stern-Gerlach Experiments" (Advisor, Jean-Francois Van Huele), in the Best Posters Category, Samuel Toble received an award for his contribution entitled, "Comparison of Non-Neutral Plasma Normal Modes with Calculation" (Advisor, Bryan Peterson) and in the Best Undergraduate Presentations category, Brad Underwood received an award for his paper entitled, "A High Efficiency Device For Resolving Incident Neutron Energy At Spalliation Sources" (Advisor, Branton Campbell).

Department of Statistics' exit poll is a success

On November 2, 2004, the Department of Statistics in collaboration with the Political Science department concluded another successful statewide exit poll. This project has been conducted every general election year since 1982 and this year involved about 1000 volunteers performing various tasks ranging from handing out the questionnaires at polling places, entering the voter responses into a database throughout election day, and analyzing the data to present results on KBYU after the polls closed.

The exit poll is a multi-disciplinary mentoring project planned and carried out by students under faculty supervision. BYU students involved come from the Departments of Statistics, Political Science, and Communications, supplemented with participating students from seven additional colleges and universities throughout the state. Students from Statistics 534 and 334 classes at BYU were involved in projecting voter turnout, determining which polling places to sample, analyzing the data, and evaluating the overall success of the statistical features of the exit poll.

The success of the exit poll is measured not only by the accuracy achieved each year, but also by incorporating new features to improve on the process of previous exit polls. Student understanding of how statistical principles are used in real world applications is a fundamental objective of the project.

The KBYU/Utah Colleges Exit Poll has carried with it a tradition of accuracy and as a result received live air-time on Channel 2 News and Fox 13. Results were also reported on Channel 4 and articles on the exit poll were featured in the Salt Lake Tribune.

College Publications

Chemistry and Biochemistry

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R. Bradshaw, J. Holt, and K. E. Seamons, "Concealing Complex Policies with Hidden Credentials," Eleventh ACM Conference on Computer and Communications Security, Washington, DC, October 2004.

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