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Techulon licenses technology that integrates diagnostics with therapeutics

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BLACKSBURG, Va., Oct. 26, 2010 – Techulon Inc., a life sciences company based in the Virginia Tech Corporate Research Center, has signed an exclusive license with Virginia Tech Intellectual Properties Inc.[2] to market a new, traceable DNA delivery platform created to deliver genetic medicine to cells while carrying a beacon so scientists can follow its progress.

The new material will join Techulon's existing Glycofect™ therapeutic delivery platform, and expand the company's product offerings into the diagnostic market.

The licensed theranostic material, so-called because it can integrate therapies with diagnostics, was created by Theresa Reineke, associate professor of chemistry in the College of Science at Virginia Tech, and Joshua Bryson, principal scientist at Techulon Inc.

"We're excited to bring this important technology to market," said Frank Akers, president at Techulon. "As treatments have become more targeted and cell-specific, clinicians need more integrated delivery and monitoring methods. Our goal with this technology is to deliver therapies to patients, and then image the precise location of the therapy and target," said Akers. "It is designed to help make treatments like cancer more targeted to tumor cell types."

Techulon develops biodegradable transfection platforms for medical research and therapeutic applications. The new license covers the novel approach to integrating therapies with diagnostics, called theranostics.

The Reineke group[3] is creating carbohydrate-based polymers for the delivery of genetic drugs to combat both cancer and heart disease. "Traditional drugs are aimed at treating disease at the protein level. Genetic drugs ? such as those that can alter or control gene expression ? aim to treat disease at the genetic level and have the added benefit of being more specific for their medicinal target," Reineke said. An example would be a genetic message that would arrest tumor growth.

"Synthetic polymers that are compatible with biological systems are playing important roles in the diagnosis and treatment of many diseases," she said.

A challenge has been that DNA and RNA drugs – pieces of genetic code that store information and instructions – cannot diffuse through the cell the way traditional small-molecule drugs can. Reineke's group created novel supramolecules that contains chemistry that binds and compacts nucleic acids –

pieces of the DNA – into nanoparticles. The repackaged DNA is protected from damage as it travels into the cells, and lanthanides allow visualization of the delivery into cells.

At the nanometer or cellular scale, the researchers are able to track the polymers using sensitive microscopes, which capture the nanoparticle luminescence. At the sub-millimeter or tissue scale, magnetic resonance imaging is used to see where the nanoparticles are going.

"This ability to track the movement and delivery of a gene-based drug provides an opportunity to understand the mechanism of delivery and monitor efficacy in real time, so that we can develop better materials for delivering genetic therapeutics and ultimately better treatments," Reineke said.

Molecules with delivery beacons also provide potential for the diagnosis and monitoring of diseases.

Reineke was recently awarded $2.4 million by the National Institutes of Health. Last year, she was awarded the National Institutes of Health Director's New Innovator Award. The research was published in the Oct. 6, 2009, edition of the *Proceedings of the National Academy of Sciences*, in the article "Polymer beacons for luminescence and magnetic resonance imaging of DNA delivery."

Techulon plans to bring the group's discoveries to market for the benefit of health-related research and drug development. This is the third licensing agreement for products from Reineke's group that Techulon has signed. The first two agreements, for biodegradable polymers that can transfer DNA and RNA into cells, were signed with the University of Cincinnati, where Reineke was previously a faculty member. Reineke and her research team joined the Department of Chemistry at Virginia Tech in 2008.

Techulon™ Inc.,[4] located in the Virginia Tech Corporate Research Center, is a life sciences company that develops novel biopolymers for a variety of biological research and therapeutic applications. Techulon is a privately held Virginia company founded in 2006.

Founded in 1872 as a land-grant college, Virginia Tech[5] is the most comprehensive university in the Commonwealth of Virginia and is among the top research universities in the nation. Today, Virginia Tech's nine colleges are dedicated to quality, innovation, and results through teaching, research, and outreach activities. At its 2,600-acre main campus located in Blacksburg and other campus centers in Northern Virginia, Southwest Virginia, Hampton Roads, Richmond, Southside, and Roanoke, Virginia Tech enrolls more than 28,000 undergraduate and graduate students from all 50 states and more than 100 countries in 180 academic degree programs.

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