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FOCUS: UNIVERSITY RESEARCH

WSU team uses nanotechnology in effort to fight cerebral palsy

By Gabe Nelson

There's no cure for cerebral palsy, a neurological condition inhibiting muscle coordination that affects about 10,000 newborns in the U.S. each year, but a husband-and-wife research team at **Wayne State University** believes nanotechnology could be the key to preventing and treating the disease.

The team, led by chemical engineering professor Rangaramanujam Kannan and assistant pediatrics professor Dr. Sujatha Kannan, has patented the use of tiny tree-shaped polymers called dendrimers to target brain inflammation, the ailment's root cause.

The polymers are between 5 and 10 nanometers long — more than 700 times smaller than a human red blood cell — and can carry medicine directly to inflamed areas. Rangaramanujam Kannan said dendrimers, combined with the team's research on diagnosing neuroinflammation in newborns, could allow doctors to dampen or avert the development of cerebral palsy.

“This kind of targeting could have a tremendous impact across a wide variety of neurodegenerative diseases,” he said.

The Grosse Pointe Farms-based **Ralph Wilson Medical Research Foundation** provided \$200,000 in startup funding for the project two years ago, and the Wayne State-based **National Institutes of Health** perinatology research branch provides the bulk of the project's \$1 million annual research budget.

The NIH branch, which collaborates with the Kannans and focuses on the pregnant mother's role in cerebral palsy, is directed by Dr. Roberto Romero, professor of obstetrics and gynecology at Wayne State.

Cerebral palsy is caused by brain damage, which often stems from illnesses during infancy or infections in the womb. The disease is particularly difficult to prevent because many children are not diagnosed until reaching age 2 or 3, and by then, the bulk of the

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damage has been done.

Kannan, also a physician in the pediatric critical care unit at **Children's Hospital of Michigan**, has developed the ability to detect in newborn rabbits the type of brain inflammation that leads to cerebral palsy. Using PET (positron emission tomography) scans, doctors might eventually be able to detect brain inflammation in human newborns and use dendrimers to treat it, she said.

“Right now, the only time you diagnose cerebral palsy is when the baby is older and the baby is not developing normally,” she said.

“We are looking to see if we can diagnose it early enough, and treat it efficiently enough, to actually reverse this process,” her husband and collaborator added.

He is also co-chief technical officer of Bloomfield Township-based **Nanoscience Engineering Corp.**, which has marketed the polymer technology for automotive applications.

The researchers might eventually try to market their health discoveries, but they intend to continue testing the safety and efficacy of their treatment in animal models before pursuing any human clinical applications.

He said the cost of treatment would be “trivial” compared with the cost of treating a cerebral palsy patient for a lifetime — \$921,000 per case, according to a 2004 report by the **Centers for Disease Control and Prevention**.

The researchers are also developing the use of dendrimers to treat macular degeneration and other eye ailments.

“We are being very deliberate about how to commercialize it,” he said.