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News Release

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Wayne State researchers develop nanodevices for early diagnosis of intra-amniotic infections

DETROIT-Early and sensitive detection of biomarkers of diseases is highly desirable for the diagnosis, treatment and prevention of diseases. This is especially true in pregnancy. A team of researchers from Wayne State University's Department of Chemical Engineering in the College of Engineering and the Perinatology Research Branch of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD of the NIH) located in Detroit have developed a new method to detect biomarkers using nanotechnology.

This method is based on the use of dendrimers (a tree-like nanoscale polymer) for sensitive capture of ultra-low concentrations of inflammatory markers in the amniotic fluid. This led to a seven-fold improvement in the sensitivity over traditional assays used for the detection of intra-amniotic infection (IAI) and inflammation. These infections can be very serious, often leading to premature birth, which accounts for 75% of perinatal mortality and 50% of perinatal morbidity, and is a leading cause of cerebral palsy.



To prevent fetal damage or death, the team of researchers, led by Rangaramanujam Kannan, Ph.D., professor of chemical engineering in the College of Engineering, is developing highly sensitive diagnostic methods for the early detection of elevated concentrations of cytokines in amniotic fluid that can predict intra-amniotic infection/inflammation. This approach has been validated for important markers such as Interleukin-6 (IL-6) and IL-1 β , whose elevated levels play a key role in chorioamnionitis (maternal bacterial infection leading to inflammation of the fetal membranes).

"The work is an example of the synergy that can be created when talented scientists from different disciplines work together. In this case, it was the WSU nanotechnology group and the physicians taking care of pregnant women and their unborn babies," said Dr. Roberto Romero, chief of the Perinatology Research Branch of the NIH.

"Diagnostic methods and treatments for pregnancy complications is an underdeveloped area in medicine," said Kannan. "Product liability and the complexities of pregnancy have represented an important barrier to progress. We believe that this joint effort will lead to the early identification and successful treatment of infections in pregnant women. Moreover, in utero treatment may help to prevent fetal brain injury and cerebral palsy. Our recent paper in *Advanced Functional Materials* is a key step in that direction. This is part of a large translational nanotechnology research effort within the PRB."

To view the recent paper, visit <http://www3.interscience.wiley.com/journal/123227939/abstract>. *Advanced Functional Materials* is the leading full-paper materials science journal, with a 2008 ISI Impact Factor of 6.808.

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Wayne State University is one of the nation's pre-eminent public research universities in an urban setting. Through its multidisciplinary approach to research and education, and its ongoing collaboration with government, industry and other institutions, the university seeks to enhance economic growth and improve the quality of life in the city of Detroit, state of Michigan and throughout the world. For more information about research at Wayne State University, visit <http://www.research.wayne.edu>.

The Perinatology Research Branch is one of only a few research branches of the National Institutes of Health located outside of Bethesda, MD. The PRB is a 10-year contract that averages nearly \$15 million per year. The PRB has made it possible for Wayne State to provide health care for more than 15,000 pregnant women since 2002. The PRB provides knowledge-based employment for more than 120 people and has a significant economic impact annually in southeastern Michigan. For

more information about the PRB, visit <http://www.med.wayne.edu/prb/>.