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Dr. Roberto Romero named Crain's Detroit Business Health Care Hero

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Roberto Romero, M.D., chief of the Perinatology Research Branch at the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health located at Wayne State University, was selected as a 2010 "Health Care Hero" by Crain's Detroit Business for his leadership and innovations in advancing health care.

"I was pleasantly surprised and honored to be selected for this prestigious award," Dr. Romero said. "We believe that we are working in one of the frontiers of medicine in the 21st century -- fetal medicine -- and we hope that through understanding development during fetal life we will be able to prevent pregnancy complications and chronic adult diseases."

Dr. Romero, one of the world's leading experts in the study of complications of pregnancy, leads a research team that has made seminal discoveries in the disorders responsible for infant mortality in the United States: premature birth and birth defects.



Roberto Romero, M.D.

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Preterm birth (one that occurs before 37 weeks of gestation) affects 12 percent of pregnancies and costs \$26 billion annually in the United States alone. Premature babies are at increased risk for having short- and long-term complications such as cerebral palsy and developmental disorders. The causes of preterm birth have been a mystery, and the standard treatments aimed at stopping uterine contractions in women with premature labor have not been successful. Dr. Romero, who is also a professor of Molecular Obstetrics and Genetics at the Center for Molecular Medicine Genetics at WSU, proposed that preterm labor was not simply "labor before its time" but the result of pathologic insults that trigger the onset of labor.

The work of the PRB and the School of Medicine has identified that one of every three preterm babies is born to a mother who has a "silent" infection in the amniotic cavity. Bacteria in the amniotic fluid induce an inflammatory response that leads to the onset of premature labor. Sometimes, the bacteria in the amniotic fluid infects the fetus and can cause multiple complications such as neonatal sepsis, and the inflammatory response of the fetus may predispose to brain injury and cerebral palsy. Physicians and scientists working with Dr. Romero have developed rapid tests for the diagnosis of infection and identified the patient that may benefit from early antibiotic treatment.

Preterm birth occurs more frequently when the mothers have relatives who had delivered a premature baby; also, women who were born premature themselves are at a higher risk of delivering a premature baby. This suggests that genetic factors may alter the risk for preterm delivery. Dr. Romero's team recently identified specific DNA variants in mothers and fetuses that increase the risk of premature labor and delivery. Many of the DNA variants that predispose to prematurity were located in genes that control the inflammatory response in the mother and baby. This research received an award from the March of Dimes for the "Best Research in Prematurity" earlier this year.

The importance of this research is that it provides support for the introduction of "personalized medicine" during pregnancy. In this case, personalized medicine is unique because it must take into account the genetic makeup of the mother and fetus. Until now, personalized medicine had focused solely on one patient (child or adult).

Recently, the Perinatology Research Branch, in collaboration with the WSU Department of Pathology, specifically professor Chong Jai Kim, M.D., Ph.D., has identified another major cause of preterm labor in which the mother's immune system rejects the placenta and membranes. The placenta is considered equivalent to a transplanted organ, because 50 percent of its genetic makeup belongs to the father. Normal pregnancy requires tolerance to this transplanted organ; however, if rejection occurs, there is malfunction of the placenta and membranes, and this may lead to premature labor and delivery. Dr. Romero's team has discovered a molecular signature for rejection in amniotic fluid, and the team is now working on methods to treat such rejection.

To prevent preterm birth, the PRB is engaged in a multi-national randomized clinical trial to test whether vaginal progesterone can reduce the rate of preterm birth in women with a short cervix. This trial is conducted in partnership

with Sonia Hassan, M.D., an associate professor of the School of Medicine and a recognized authority in the study of the uterine cervix during pregnancy.

Dr. Romero's team is leading other major research studies, including the discovery of a set of biomarkers to identify pregnant women destined to develop preeclampsia (hypertension and proteinuria during pregnancy). Pregnancy requires the development of blood vessels to support the placenta and the fetus. Some mothers, however, produce factors that suppress the formation of blood vessels. They are at increased risk of having preeclampsia, intrauterine growth restriction and fetal death. At this point, the research group is working on early identification of the patient at risk with the goal of implementing therapeutic options.

An important line of investigation has been developed with a partnership with the WSU School of Engineering and the Department of Pediatrics (Sujatha Kannan, M.D., assistant professor of Pediatrics, and Rangaramanujam Kannan, M.D., professor of Chemical Engineering and Material Sciences, and Biomedical Engineering). This team has developed an animal model for cerebral palsy by exposing fetuses to microbial products. This system has been used to test the effect of anti-inflammatory agents delivered with nanotechnology. Treatment at the time of birth has been able to reverse the signs of cerebral palsy. "This promising line of investigation has changed the way in which we think of cerebral palsy (as a chronic and non-preventable disease)," Dr. Romero said.

The PRB has also developed new methods to diagnose congenital anomalies before birth. A major emphasis is the prenatal diagnosis of congenital heart disease. The team uses 3D and 4D ultrasound to improve the identification of defects that represent a neonatal emergency. Lami Yeo, M.D., associate professor of Obstetrics and Gynecology, and Luis Goncalves, M.D., assistant professor of Obstetrics and Gynecology, have played important roles in these discoveries.

"The Perinatology Research Branch, under Dr. Romero's leadership, has become a world leader in maternal-fetal medicine," said Valerie M. Parisi, M.D., M.P.H., M.B.A., dean of the School of Medicine. "His groundbreaking research is indicative of one of the brightest minds in the field, and I cannot think of a more deserving recipient of this award."

