Genetic mutations may contribute to preterm birth risk

31 January 2008

Genetic mutations in the enzyme methylenetetrahydrofoloate reductase (MTHFR) and coagulation protein Factor V appear to have significant association with blood clots and tissue injury to the placenta and developing baby, researchers from the University of Pittsburgh's department of obstetrics, gynecology and reproductive sciences report at the 28th annual meeting of the Society for Maternal-Fetal Medicine.

"This indicates a possible genetic predisposition to a condition of real clinical consequence in terms of intrauterine growth restriction, preeclampsia and spontaneous preterm birth," said Hyagriv Simhan, M.D., assistant professor of obstetrics, gynecology and reproductive sciences at the University of Pittsburgh School of Medicine, who is presenting the work. "These are conditions that can have lifelong consequences for those affected."

MTHFR is an enzyme related to amino acid metabolism. Intrauterine growth restriction results in malnutrition of the developing fetus and babies of low birth weight and can be related to a host of factors usually reflective of the mother's health, including infection, high blood pressure, use of tobacco, alcohol or illicit drugs.

For the study, researchers analyzed DNA from placental tissue samples and cord blood from 111 women and their babies, finding that one fetal single nucleotide polymorphism (SNP) in MTHFR (rs17421462) and one fetal SNP in Factor V (rs10489185) demonstrated "highly significant association with thrombotic and inflammatory lesions," irrespective of adjustment for maternal race, smoking and lower genital tract infection, all of which can contribute to genetic mutation. Women and babies with MTHFR mutation were 4.2 times more likely to exhibit blood clots and injury to placental tissue than those without the mutation, Dr. Simhan noted. For those with Factor V mutation, the association was less pronounced, but still elevated.

"These are different mutations than those that have been previously described in MTHFR and Factor V," continued Dr. Simhan. "Being aware of these genetic mutations may lead to better screening efforts."

Defined as any birth prior to 37 weeks gestation, preterm birth affects some 12 percent of pregnancies in the United States. Costs have been estimated at $26 billion, or $52,000 per infant, in medical care and lost productivity as of 2005, according to The Institute of Medicine. A recent study from the U.S. Centers for Disease Control and Prevention found that preterm birth contributed to more than a third of infant deaths – twice as many as previously thought and making it the leading cause of infant deaths – yet the underlying causes of premature birth remain poorly understood.

More than 500,000 babies are born too soon each year nationwide, and the preterm birth rate has increased more than 30 percent since 1981. Babies who do survive face risks of lifelong challenges related to cerebral palsy, mental retardation, chronic lung disease, and vision and hearing loss, as well as other developmental problems.

Source: University of Pittsburgh