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Researchers study afterbirth to learn what happens before birth and beyond

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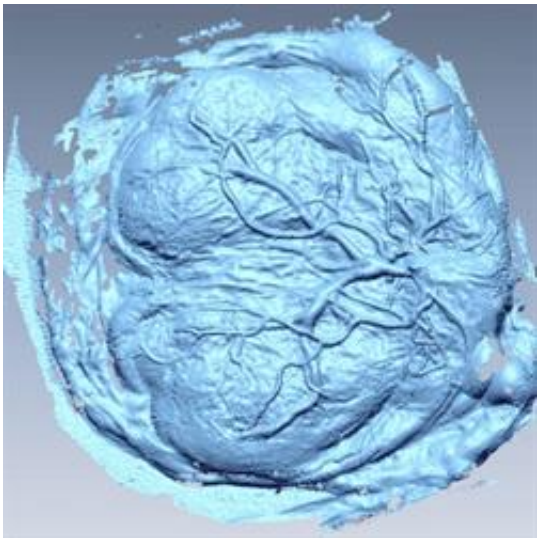

A 3-D image of a placenta shows a unique pattern of blood vessels. Scientists are studying this vascular patterning in relationship to pediatric and adult disease.

(PhysOrg.com) -- Researchers at the University of Rochester Medical Center are forging ahead with an important first step in the National Children's Study: Determining how to most accurately collect, preserve and analyze placentas to garner valuable information that may fuel new discoveries about children’s overall health and development. The National Children’s Study is the largest long-term study to better understand how children’s genes interact with the environment to influence their health.

The National Children's Study will follow 100,000 children from before birth to age 21, and Rochester, in collaboration with several other institutions across the country, is honing in on the "before birth" piece of the puzzle. Researchers believe what happens in the womb may provide clues as to how a child will fare later in life, and the placenta is a valuable window into what takes place before birth.

"The whole concept of the National Children's Study is to help kids grow up healthier. By analyzing placentae, we may be able to develop predictive tools that will help us determine if children are at risk for a variety of health problems, allowing us to intervene earlier and help children grow and develop as optimally as possible," said Richard Miller, Ph.D., principal investigator for the project and professor of Obstetrics and Gynecology at the University of Rochester Medical Center.

The primary goal of the placenta project is to develop standard protocols for collecting, processing and analyzing placentas so scientists can obtain useful data from these tissues now and in the future. Currently, there is great variability in how placentas are managed following labor when the placenta is delivered from the body, which is known as the afterbirth. Improper processing can severely limit the amount of information scientists can acquire from the placental tissue.

The placenta project team will collect 210 placentas from seven different sites across the country and assess the best way to handle placentas so they yield valuable information in the following four areas:

• Stem cells – These cells are a rich source of information about the newborns from which they are collected and their environment while in the womb.

• Genetics – RNA and DNA extracted from the placenta may be used in studies looking at how chemicals alter the activity of different genes in

the body, and how genetics are related to the individual's development.

• Morphology/pathology – The features of the placenta – size, shape, thickness and others – may yield information about how and when disease develops.

• Environmental contaminants – Identification of contaminants in the placenta may help determine which toxins are associated with negative effects on the fetus and/or the developing baby.

"With this study, we're trying to see how far we can push the envelope in terms of the usefulness of the placental tissue. How much time can pass between delivery of the placenta and analysis before the tissue is no longer useful? What conditions are required to ensure the tissue can be used for specific studies, such as environmental analyses? These are the types of questions we're working to answer," said Christopher Stodgell, Ph.D., director of the project's RNA and DNA studies, and a research associate professor in the Department of Obstetrics and Gynecology at the Medical Center.

The University of Rochester Medical Center will serve as the Placental Processing Center – the central resource for collecting all placentas that will be analyzed throughout the new study. The placenta project began in late August and Rochester is already receiving placentas from study participants – mothers enrolled in the National Children's Study who recently gave birth – for analysis.

According to co-investigator Philip Katzman, M.D., "there is considerable evidence that by looking at the placenta you can identify problems that the fetus had in utero which might influence development down the road. The idea is to make sure we're processing placentas in a consistent way that yields good data, so when researchers propose significant projects or studies in the future they are not dealing with a

bunch of junk data." Katzman, an associate professor in the department of Pathology and Laboratory Medicine, oversees the Placental Processing Center at Rochester.

In addition to Rochester, researchers from Mt. Sinai Medical School, Columbia University, the University of California at Davis, the University of California at Irvine, the University of Iowa, Wisconsin College of Medicine, the University of Utah, the University of North Carolina, Brown University, South Dakota State University, Children's Hospital of Philadelphia, the University of Massachusetts Boston, the University of Illinois at Chicago and Placental Analytics are involved in the study.

The placenta project is part of the first phase of the National Children's Study. The first phase, known as the Vanguard Study, is a preliminary study of 1,000 women recruited before they have conceived. The study is evaluating procedures and recruitment strategies to be used in the second phase of the study, which aims to enroll approximately 99,000 women and their children.

The placenta project is supported with $3.5 million in funding from the National Children's Study, and Rochester will receive approximately $1.5 million for its work on the project.

"In terms of connecting adult disease to things that did or did not happen in utero, these types of findings are probably 15 or more years off," according to Miller, who is also a professor of Environmental Medicine and Pathology and Laboratory Medicine and co-director of the New York State Center of Excellence in Children's Environmental Health at the University. "But the research we're doing now is laying the foundation for important discoveries that we hope will improve health outcomes for children in the future."

For example, the Rochester team is working with Carolyn Salafia, M.D., M.S., scientific director of Placental Analytics, Inc., in the development of state of the art imaging for the placenta to understand vascular patterning. Each placenta has a unique pattern of blood vessels, and the placenta project team is attempting to understand this vascular configuration in relationship to pediatric and adult disease.

Provided by University of Rochester Medical Center