Researchers identify cells involved in placenta development

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(Medical Xpress)—Dr. Hanna Mikkola and researchers at UCLA's Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research have identified a specific type of cell and a related cell communication pathway that are key to the successful growth of a healthy placenta. The findings could greatly bolster our knowledge about the potential causes of complications during pregnancy.

Specifically, the findings could help scientists clarify the particular order in which progenitor cells grow in the placenta, which would allow researchers to track fetal development and identify complications. Progenitor cells are cells that develop into other cells and that initiate growth of the placenta.

The study was led by Mikkola, associate professor of molecular, cell, and developmental biology, and Dr. Masaya Ueno, a UCLA postdoctoral fellow. It was published online by the scientific journal *Developmental Cell* on Nov. 25 and will appear later in the journal's print edition.

The placenta is the organ that forms inside the uterus during pregnancy and enables oxygen and nutrients to reach the fetus, but little is understood about the biological mechanisms and cellular processes responsible for this interface. Studying mouse models, Mikkola and her colleagues tracked individual cells in the placenta to determine which cells and which cell communication routes, or signaling pathways, were responsible for the healthy development of the placenta.

The UCLA team was the first to identify the cells that form the placenta: Epcam^{hi} labyrinth trophoblast progenitors, or LaTP cells, can become the various cells necessary to form a specific tissue, in this case the placenta.

Mikkola and her colleagues also found a signaling pathway that consists of hepatocyte growth factor and its receptor, c-Met. The researchers found that this signaling pathway was required for the placenta to keep making LaTP cells. Production of LaTP cells, in turn, continues the production of the different cells needed to maintain the growth and health of the placenta while the fetus is growing. Placental health enables healthy transmission of oxygen and nutrients through the exchange of blood between the fetus and the mother. In the mice, when c-Met signaling stopped, fetal growth slowed, the liver did not develop fully and it produced fewer blood cells, and the fetus died.

"Identifying this novel c-Met–dependent multipotent labyrinth trophoblast progenitor is a landmark that may help us understand pregnancy complications that are caused by defective placental exchange, such as fetal growth restriction," Mikkola said.

More information: "c-Met-Dependent Multipotent Labyrinth Trophoblast Progenitors Establish Placental Exchange Interface." Masaya Ueno, Lydia K. Lee, Akanksha Chhabra, Yeon Joo Kim, Rajkumar Sasidharan, Ben Van Handel, Ying Wang, Masakazu Kamata, Paniz Kamran, Konstantina-Ioanna Sereti, Reza Ardehali, Meisheng Jiang, Hanna K.A. Mikkola. *Developmental Cell* - 25 November 2013 (Vol. 27, Issue 4, pp. 373-386). DOI: 10.1016/j.devcel.2013.10.019

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