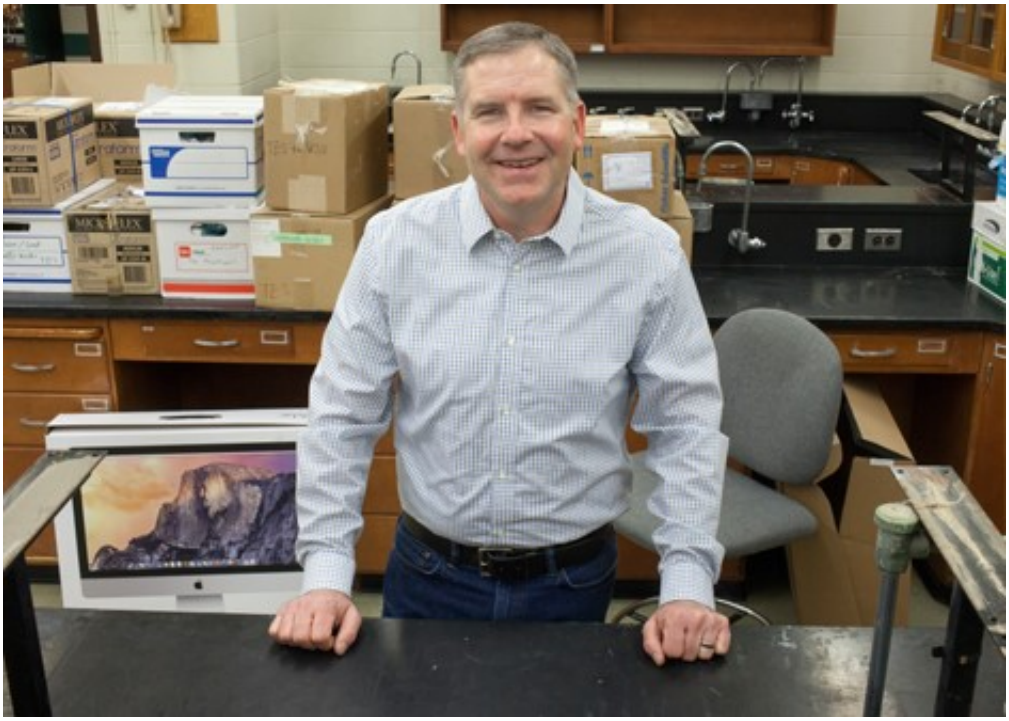
Uterine glands vital for embryo growth, successful pregnancies

February 6 2017, by Nathan Hurst



Tom Spencer, a professor of reproductive and developmental biology at MU, found that uterine glands have additional roles in promoting pregnancy beyond producing Leukemia Inhibitory Factor. Credit: University of Missouri-Columbia

The majority of pregnancy losses occur during the first trimester, when biological communication between the embryo and mother is critical for the establishment of the pregnancy. Scientists and doctors have known for several years that glands within the uterus produce Leukemia

Inhibitory Factor (LIF), which is vital for embryo implantation and successful pregnancies. Now, researchers at the University of Missouri have found that uterine glands have additional roles in promoting pregnancy beyond LIF. Tom Spencer, a professor of reproductive and developmental biology at MU, says this discovery is important for scientists and doctors to better understand how pregnancies develop and to prevent pregnancy loss and complications such as miscarriage and preeclampsia.

"Many serious problems that occur later in pregnancies, such as preeclampsia, are likely rooted in the early stages of pregnancy," Spencer said. "Understanding what factors in the uterus are vital for a healthy pregnancy is important in order to understand the causes of pregnancy loss. In the future, this will allow us to improve assisted reproduction and prevent issues that could pose serious health risks to babies and their mothers. This also is important in the agricultural world for improving reproduction in livestock, such as cattle and sheep."

In their study, Spencer and his team of researchers from the MU Division of Animal Sciences in the College of Agriculture, Food and Natural Resources (CAFNR) as well as Washington State University and the National Institute of Environmental Health Sciences, examined the development of mice embryos, which develop similarly to humans. The researchers removed a gene from the uteri of mice called FOXA2 using common genetic editing techniques. Some of the mice lacked uterine glands altogether. To the researchers' surprise, the uteri of adult FOXA2-deficient mice did not produce LIF. The researchers then added LIF to the mice mothers. The mice with uterine glands carried their embryos to term with successful pregnancies; the mice without uterine glands had failed pregnancies.

"We already knew that LIF was vital to ensuring successful pregnancies," Spencer said. "However, this study has proven that uterine

glands serve additional functions for supporting embryo growth and development beyond simply producing LIF. Our next step is to determine what additional factors uterine glands produce to support pregnancies. By understanding how these glands work, we can help improve the rates of healthy and successful human and animal pregnancies produced by natural and assisted means."

The study, "Forkhead box a2 (FOXA2) is essential for uterine function and fertility," was published in the *Proceedings of the National Academy of Sciences* (*PNAS*) and is highlighted "Hunting for Fox(A2): Dual roles in female fertility" in *PNAS*.

More information: Andrew M. Kelleher et al, Forkhead box a2 (FOXA2) is essential for uterine function and fertility, *Proceedings of the National Academy of Sciences* (2017). DOI: 10.1073/pnas.1618433114

Jeeyeon Cha et al, Hunting for Fox(A2): Dual roles in female fertility, *Proceedings of the National Academy of Sciences* (2017). DOI: 10.1073/pnas.1620648114

Provided by University of Missouri-Columbia