Failed synchronization of the womb's clock with mother's body clock critical in miscarriages

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If you are trying to have a baby, a good night's sleep is more important than ever. A new research report appearing in *The FASEB Journal* shows that the womb has its own "body clock" that needs to synchronize with the mother's body clock to ensure optimal conditions for fetal growth and development. The inability of a mother's body clock to synchronize with the womb's clock may be at least part of the reason why some women have difficulty carrying a pregnancy to full term. Specifically, the failed synchronization switches off body clock genes in cells lining the womb, which in turn, may jeopardize the pregnancy. This information may help researchers and fertility experts develop strategies

to optimize the fetal environment to help more women have children.

"Infertility affects one in six couples across the world. Miscarriage is the most common complication of pregnancy," said Jan Brosens, M.D., a researcher involved in the work from the Division of Translational and Systems Medicine and Reproductive Health at Warwick Medical School at the University of Warwick in Coventry, UK. "Approximately one in seven clinical pregnancies result in miscarriage, mostly prior to 12 weeks of pregnancy. It is estimated that five percent of women experience two clinical miscarriages and approximately one percent have three or more losses. From a medical perspective, recurrent miscarriages and implantation failure have remained frustratingly devoid of effective therapeutic strategies."

To make this discovery, Brosens and colleagues, obtained womb biopsies from 70 women who have experienced recurrent pregnancy loss. The cells from these biopsies were purified and then treated in such a way as to simulate a pregnancy. They found that failure of embryonic and maternal body clock genes to synchronize could have catastrophic consequences. Not only did they find that this could cause miscarriage or infertility, but they also found more subtle synchronization defects could increase the risk of complications in the later stages of pregnancy, such as pre-eclampsia, fetal growth restriction and pre-term birth. This work also provides new insights into the known link between shift or night work and reproductive disorders.

"This research offers some insight into why some women cannot bring pregnancies to full term," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*, "and it shows that the womb has a body clock of its own, and that this clock needs to synchronize with the mother's."

More information: Joanne Muter, Emma S. Lucas, Yi-Wah Chan, Paul J. Brighton, Jonathan D. Moore, Lauren Lacey, Siobhan Quenby,

Eric W.-F. Lam, and Jan J. Brosens The clock protein period 2 synchronizes mitotic expansion and decidual transformation of human endometrial stromal cells. *FASEB J.* April 2015 29:1603-1614; DOI: 10.1096/fj.14-267195