Synthetic sperm protein raises the chance for successful in vitro fertilization

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Having trouble getting pregnant—even with IVF? Here's some hope: A new research report published in October 2014 issue of *The FASEB Journal*, explains how scientists developed a synthetic version of a sperm-originated protein known as PAWP, which induced embryo development in human and mouse eggs similar to the natural triggering of embryo development by the sperm cell during fertilization.

"We believe that the results of this study represent a major paradigm shift in our understanding of human fertilization by providing a precise answer to a fundamental unresolved scientific question in developmental biology," said Mahmoud Aarabi, M.D., Ph.D., a researcher involved in the work from the Department of Human Genetics at Montreal Children's Hospital Research Institute in Montreal, Canada. "Based on our findings, we envision that physicians will be able to improve their diagnosis and treatment of infertility, a problem that affects 10-15 percent of couples worldwide, and scientists will be able to finally resolve the signalling pathway leading to initiation of embryonic development in mammals."

To make their advance, Aarabi and colleagues injected transcripts coding for PAWP protein into human eggs, and the immediate fertilization events, including release of calcium inside the eggs, were investigated carefully. (The human eggs used in this study were donated by infertile women and consisted of immature eggs that were further matured in the laboratory and thus were not suitable for IVF.) The injected eggs were fixed before cell division. A similar protocol was

used in mice where the PAWP protein was injected into the eggs. The scientists found that when PAWP inhibitors were injected with the sperm cell into the eggs, a procedure known as ICSI in human infertility therapy, they blocked the sperm-induced fertilization. This is the first time that any sperm protein is shown to be susceptible to such an important inhibition effect.

"Reducing the number of IVF cycles for couple would save them money and disappointment," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*. "Equally important, this research helps us better understand the events that occur when an egg is first fertilized as well as what we can do to influence those events."

More information: Mahmoud Aarabi, Hanna Balakier, Siamak Bashar, Sergey I. Moskovtsev, Peter Sutovsky, Clifford L. Librach, and Richard Oko Sperm-derived WW domain-binding protein, PAWP, elicits calcium oscillations and oocyte activation in humans and mice. *FASEB J*. fj.14-256495; DOI: 10.1096/fj.14-256495

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