Proteins in sperm unlock understanding of male infertility says new study

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Proteins found in sperm are central to understanding male infertility and could be used to determine new diagnostic methods and fertility treatments according to a paper published by the journal *Molecular and Cellular Proteomics* (MCP). The article demonstrates how proteomics, a relatively new field focusing on the function of proteins in a cell, can be successfully applied to infertility, helping identify which proteins in sperm cells are dysfunctional.

"Up to 50 percent of male-factor infertility cases in the clinic have no known cause, and therefore no direct treatment. In-depth study of the molecular basis of infertility has great potential to inform the development of sensitive diagnostic tools and effective therapies," write co-authors Diana Chu, assistant professor of biology at San Francisco State University and Tammy Wu, post-doctoral fellow at SF State. The study is included in a special Oct. 10 issue of MCP dedicated to the clinical application of proteomics.

"We suggest how the study of proteins is useful in the clinic, to help people move from infertile to fertile and ultimately to help couples have a baby," Chu said. "The ultimate goal is that a doctor would be able to say to a patient, 'this is the protein that is misregulated in your sperm and this is the drug that corrects it or decreases the level of that protein.' Understanding sperm proteins also means that a doctor could be able to inform patients of the likely success rates of different fertility therapies, an important factor given the high cost of fertility treatments."

More than 2 million couples in the U.S. are facing infertility. While many scientific studies examine the supply of sperm, its mobility and its ability to fertilize, Chu argues that a wider array of sensitive tests – including studies of cell proteins – are needed to determine the root causes of male infertility.

Proteins found in sperm cells are unique. This means therapies can be developed that target only these proteins and do not produce side effects in the patient or defects in the resulting offspring.

Chu's paper highlights a selection of recent advances in the study of proteins in sperm cells, citing studies that have identified specific proteins that correlate with infertility.

Chu argues that further large-scale clinical studies are needed to identify patterns in the proteins found in the sperm of infertile patients. This would help scientists to better understand which proteins to focus on, since each sperm cell contains more than 2,000 proteins and each patient's sperm varies slightly in its protein content.

Understanding the function of individual proteins in sperm cells may not only aid scientists' understanding of fertility, but can also explain the causes of miscarriages, 50 percent of which have unexplained causes. Chu also suggests that further studies of the proteins found in sperm cells will have a significant impact on our understanding of the paternal protein contribution that can have long lasting effects on future generations.

Source: San Francisco State University