

Stanford researchers find way to predict IVF success

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Researchers at the Stanford University School of Medicine have identified a method that can predict with 70 percent accuracy whether a woman undergoing in vitro fertilization treatment will become pregnant. This information may someday help the tens of thousands of couples who want to undergo IVF each year, and their doctors, decide on their course of action.

The new method involves using four factors to determine a woman's chance of becoming pregnant from an IVF cycle. These variables may prove "critical in counseling patients, improving treatment, and ultimately in developing... more customized treatments," the authors wrote in a paper that will appear in the July 2 issue of *Public Library of Science-ONE*.

The research was led by Mylene Yao, MD, assistant professor of obstetrics and gynecology, whose work focuses on early embryo development.

IVF is a treatment given to boost the chances for women to get pregnant. During IVF, a woman is given drugs to stimulate ovulation, and her eggs are removed from the ovaries. The eggs are then combined with sperm in a culture dish in a laboratory.

A typical IVF cycle produces five to 12 embryos, and doctors aim to transfer the "best quality" one or two into a woman's uterus. Doctors use a variety of criteria to identify which embryos are most likely to result in

a live birth, including how the embryo looks and whether the embryo has hit certain milestones, such as having reached the eight-cell stage by its third day of existence.

Doctors also look at dozens of additional factors, such as the age of the woman, levels of certain hormones, the quality of her eggs and individual characteristics of each embryo, to help predict the likelihood that the patient will become pregnant. However, according to Yao, there isn't a consistently accurate test yet to determine whether an individual woman will have success with IVF.

"The information isn't yet customized to the individual patient," said Yao. "And what patients really want to know is: 'What is my chance of getting pregnant?'"

Nationwide, the percentage of IVF cycles that result in pregnancy for women using their own eggs ranges from about 18 to 45 percent, depending on age and other factors, according to the Society for Assisted Reproductive Technology.

Yao said she and her colleagues launched this study in an effort to identify the most important factors in predicting IVF outcome. For the study, they analyzed clinical data from 665 IVF cycles performed at Stanford in 2005. They looked at 30 variables (on patient characteristics, clinical diagnoses, treatment protocol and embryo characteristics) and examined the association of each variable with IVF outcomes, as defined by results of a pregnancy test.

Going beyond previous studies, Yao's team also examined whether some factors influenced others. They found some of the variables were redundant - they didn't add any new information - but others were critical to making predictions.

The researchers found that four factors - total number of embryos, number of eight-cell embryos, percentage of embryos that stopped dividing and would die, and the woman's follicle-stimulating hormone level, a measurement that estimates ovarian function - were most important in determining a woman's chance of becoming pregnant. The four together were 70 percent accurate in predicting whether the current IVF cycle would result in a pregnancy.

The researchers also found that these four factors were more predictive than any single measure of the actual transferred embryo(s). An individual embryo could meet all the criteria for a transfer, but if the IVF cycle produced a small number of embryos, few eight-cell embryos and a high percentage of embryos that stopped dividing, the woman's chance of getting pregnant could actually be quite low.

"If you talk with IVF patients or doctors, they wouldn't be surprised" to hear that the quality of all embryos in a cycle - not just the transferred one - matters, Yao said. "But it's important to go beyond intuition and to prove it scientifically, in order to move the field forward."

Their findings, the researchers said in the paper, call for a "paradigm shift from strictly focusing research efforts on selecting the 'best' embryos to identifying methods that would improve the quality of the entire [embryo group]."

Yao said she hopes the method of using these factors will someday help doctors counsel those patients trying to decide whether to go for another IVF cycle. IVF is expensive - both financially and emotionally - and she suspects many couples would embrace information that would better inform their decision. "People make decisions based on probability," said Yao. "At that point, it's really important to give a more accurate prediction."

Yao said more information is needed before clinicians adopt the new method, and she and her collaborators are now analyzing results from a follow-up study. The larger, more comprehensive study involves four years of data and uses live birth, rather than a positive pregnancy test, as the outcome.

Source: Stanford University

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