

## Better tests boost IVF success

Making a healthy baby through *in vitro* fertilization (IVF) requires choosing the best sperm, the best egg and, of course, the best embryo. For the past 25–30 years, fertility experts have judged these components primarily on their outward characteristics, but now they are probing deeper.

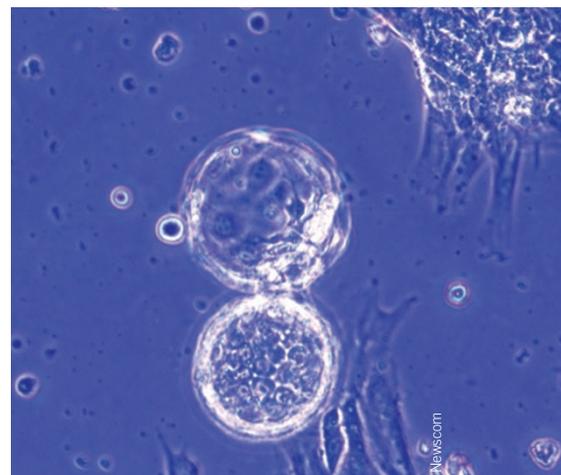
To ensure fertilization, scientists can inject sperm directly into the egg. This method, called intracytoplasmic sperm injection (ICSI), is particularly useful for men with defective sperm or low sperm counts. “We can even get sperm directly from testes of men who have no sperm in their semen,” says Zev Rosenwaks, who directs the Center for Reproductive Medicine and Infertility at the Weill Cornell Medical Center in New York.

But because ICSI is expensive and technically difficult, it would be helpful to have tests that could screen men to see whether ICSI is even necessary for them, notes Andrew La Barbera, the scientific director of the American Society for Reproductive Medicine in Birmingham, Alabama. Scientists have developed the hyaluronic acid–binding test, which looks for sperm membrane receptors that signal health and maturity. This test might serve as one of many parameters to assess sperm quality before men decide to go through with ICSI. “But you cannot assess the ability of sperm to fertilize an oocyte based on one component,” cautions

La Barbera. A study published earlier this year suggests that the hyaluronic acid–binding test might even improve ICSI success rates (*J. Assist. Reprod. Genet.* **25**, 197–203; 2008). However, “there is insufficient clinical pregnancy data to support this test at the moment,” says Denny Sakkas, director of the embryology laboratory at the Yale Fertility Center in New Haven, Connecticut.

When it comes to choosing the best eggs for IVF, scientists are beginning to probe the intercellular machinery of the cells, Sakkas explains. For example, a polarized microscope relying on special software can examine the integrity of the cell spindle—a structure inside the egg that has a pivotal role in cell division. Researchers are also characterizing the specific proteins that healthy eggs secrete into their environment and looking at gene expression markers in the cumulus cells surrounding the egg.

According to Rosenwaks, however, “at the end of the day, when it comes to IVF, the embryo is the main target” of quality checks. Typically, experts examine the embryo for symmetry, structural integrity of cells and overall growth two to five days after fertilization. Now scientists have begun looking beyond the embryo to focus on the medium in which it grows. Sakkas, who in addition to his position at the Yale Fertility Center also



Quality time: Tests assess embryo viability

serves as the chief scientific officer of the New Jersey–based Molecular Biometrics, is using chemical analyses and mathematical formulas to create a ‘metabolic fingerprint’ of a healthy embryo that might be used as barometer for gauging the survival potential of an embryo. Others are trying to identify the proteins secreted by thriving embryos and to measure the amount of oxygen consumed, which is usually a signal of growth, La Barbera explains. “All three approaches are in their infancy, but it’s exciting.”

Coco Ballantyne, New York

## Delivery decision is nothing to sneeze at

Soaring cesarean section rates in many middle- and high-income countries have prompted questions about the potential effects of the procedure on children—such as the possibility of increased risk of allergic and certain autoimmune disorders.

Studies for years have hinted that babies born by cesarean section (C-section) might be at increased risk for asthma and type 1 diabetes. Enough data has accumulated for researchers to perform meta-analyses—large-scale analyses of existing studies.

In a study published this past May, Chris Cardwell at Queen’s University Belfast in Northern Ireland and his colleagues combined the data from 20 studies and adjusted for factors such as maternal diabetes and breastfeeding. They concluded that cesarean section raises the risk of type 1 diabetes by 20% (*Diabetologica* **51**, 726–735; 2008). They also crunched the data from 23 studies

and showed the same increased risk for asthma—20%—in children delivered by C-section (*Clin. Exp. Allergy* **38**, 629–633; 2008).

“It’s a highly controversial area,” says Bruce Valance at the University of British Columbia in Vancouver. “Some studies find an association and others show no link. My guess is it probably does exist.”

The reason for these observations might originate with the gut. Babies born by cesarean section do not pick up microbes from the birth canal as they pass through. Research in mice has suggested that microbes literally consumed during a vaginal birth can help the immune system become tolerant to later exposures that might promote allergic or autoimmune disease (*J. Exp. Med.* **203**, 973–984; 2006).

Such observations dovetail with preliminary findings presented by University of California, San Francisco

researcher Ngoc Ly at the American Thoracic Society’s 2008 international conference in Toronto. She and her colleagues examined immune cells in cord blood from babies born by C-section and in babies born vaginally and reported that babies born by C-section had reduced function in their regulatory T cells—cells that can modulate the immune response.

The rate of cesarean section rose by nearly 50% in the US from 1996 to 2005, when it reached 30.2 percent—much higher than optimal limit of 10–15% recommended by the World Health Organization.

Other countries with rates above 20 percent include Canada, the UK, Mexico and Brazil.

