EDITORIAL

The Optimization of Polar Body Diagnosis

A Consequence of the German Embryo Protection Act

Peter Propping

Couples wishing to have progeny want to rule out an increased health risk for their children. Most of them do everything possible to recognize a potentially elevated risk in good time. This is a natural, but also justified concern, and medicine has an obligation to help these couples. Sociological reasons are to a great extent responsible for the fact that women's reproductive time window has become steadily smaller and age at childbirth has increased over the last few decades. While in the old Federal Republic of Germany 8.4% of children were born to women over 35 years of age in 1975, in 2002 this rate had increased to 15.4% in Germany and to as high as 17 % in 2006 (1). The probability of conception decreases rapidly in women from the age of 35 years onwards. Many couples wishing to have children then frequently pin their hopes on reproduction medicine and especially on in vitro fertilization (IVF) techniques and intracytoplasmic sperm injection (ICSI). The older age of these women has in turn led to an increased rate of numerical chromosome aberrations in the oocytes. In a 40-year-old woman, 50% to 70% of the mature oocytes are affected by aneuploidy (2, 3). Most numerical aberrations are associated with such severe developmental disorders that early embryonic demise is the result.

Reduction of aneuploidies

One possibility for reducing aneuploidies in the oocytes is chromosome screening of the polar body. Polar body diagnosis (PBD) can supplement IVF/ICSI. In this edition of *Deutsches Ärzteblatt*, the research team of van der Ven and Montag present the results obtained with this method.

Polar bodies are in a sense waste products of oogenesis. As a result of the first meiosis, one chromosome set each enters the oocyte and the first polar body. If a certain chromosome is missing in the polar body, it must be present additionally in the oocyte. Differential analysis of the polar body can thus make it possible to deduce the presence of chromosome maldistribution in the oocyte. Since cryopreservation of the oocyte is still difficult, PBD is subject to great time pressure. A maximum 12 of the 23 chromosomes can be included in the test. The detection of chromosomes is also technically difficult because the first polar body contains only two DNA copies, and the second polar body only one copy. The detection of individual chromosomes fails in two to three percent of cases. The results of van der Ven et al. show that the abortion rate after PBD is lower and the

implantation rate is somewhat higher in women with an increased risk of aneuploidy because of their relatively advanced age. A trend towards an improved birth rate was also observed. These results are encouraging, but the authors draw attention to the evidential limits of the method.

These findings are counterbalanced by results obtained by exclusion of aneuploidy by means of preimplantation diagnosis (PID) (4). The mean age of the women studied was lower than in the study of van der Ven et al. The pregnancy rates were found to be lower compared to IVF without PID. Further research will be needed to explain these discrepancies.

PBD has been particularly promoted in Germany because the German Embryo Protection Act prohibits the genetic screening of early embryonic stages. The question arises whether it is a fair situation for us here in Germany to have to continue relying on PID results generated abroad for comparison purposes. Moreover, some of these results have in fact been obtained in German couples visiting centers outside Germany as "PID tourists."

Conflict of interest statement

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REFERENCES

1. Statistisches Jahrbuch für die Bundesrepublik Deutschland 2006. www.ec.destatis.de.
2. Hassold T, Jacobs PA, Leppert M, Sheldon M: Cytogenetic and molecular studies of trisomy 13. *J Med Genet* 1987; 24: 725–32.
3. Kuliev A et al.: Frequency and distribution of chromosome abnormalities in human oocytes. *Cytogenet Genome Res* 2005; 111: 193–8.
4. Mastenbroek S, Twisk M, van Echten-Arends J et al.: In vitro fertilization with preimplantation genetic screening. *N Engl J Med* 2007; 357: 9–17.

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