

Oocyte vitrification—Women's emancipation set in stone

The techniques of vitrification of oocytes and the subsequent warming process being used today are now producing results far superior to the results that are obtained with slow-freezing techniques, and it would seem that this is the method of female fertility preservation that will be widely used in the near future. The reported success of the use of this method should stimulate a renewed debate on oocyte storage for fertility preservation without a medical indication. (Fertil Steril® 2008; ■: ■–■. ©2008 by American Society for Reproductive Medicine.)

While men are capable of manufacturing 1000 sperm in the space of one heartbeat up to a ripe old age, the female of the species steadily but surely loses her eggs from birth to menopause, with an accelerated loss from the midthirties onward. Accompanying this loss of eggs is an equally severe decline in egg quality with age. Consequently, female fertility potential rapidly dwindles from the age of 37 on.

Sperm cryopreservation was first successfully performed (in snow!) more than 200 years ago. The cryopreservation of oocytes for fertility preservation has been attempted much more recently but has undergone a complex history, which has been largely unsuccessful. The slow-rate freezing of oocytes results in extracellular and intracellular crystallization of ice, which can cause irreparable damage to the spindle. In addition, the egg is particularly sensitive to chilling injury, which assuredly can occur with most slow-freezing protocols.

It now seems that the rapid-freezing method to induce vitrification of oocytes has broken the ice. The first attempts of vitrification of sperm were started about 70 years ago (1, 2). The techniques of vitrification of oocytes and the subsequent warming process being used today are producing results equal to those using fresh oocytes and are, certainly, far superior to those using slow-freezing techniques. In the last 2 years, highly successful survival rates of oocytes of over 90% after vitrification and warming, fertilization rates of 75%–90%, pregnancy rates of 32%–65% per ET, and live-birth rates of over 50% have been reported. Successful deliveries after oocyte vitrification have been reported from countries as far flung as Japan, the United States, Colombia, and Italy and Germany in Europe (3–14). Particularly relevant is a prospective randomized study from Cobo et al. (9) comparing the outcome of oocyte vitrification (Cryotop

method) with that of fresh donor oocytes coming from the same cycle. No significant differences in the excellent clinical outcomes were seen. Similar encouraging results were very recently reported by Nagy et al. (15) in a prospective study, which validate the use of oocyte vitrification for egg donation.

In addition, the vitrification process is considerably less complicated than slow freezing, avoids the complication of intracellular ice crystallization, and is less expensive and time-consuming. The initial worry that the use of the high concentrations of cryoprotectants needed would cause toxic and osmotic effects (16) have so far proved unfounded as long as the eggs are only left in the highest concentration of cryoprotectant for less than 60 seconds.

Assuming that the safety of the vitrification of oocytes will continue to be verified, it would seem that this is the method of female fertility preservation that will be widely used in the near future. The reported success of the use of this method should stimulate a renewed debate on oocyte storage for fertility preservation without a medical indication (assuming that impending ovarian failure is not a medical indication).

The European Society for Human Reproduction and Embryology Task Force on Ethics and Law published ethical considerations for the cryopreservation of gametes and reproductive tissues for self-use in 2004 (17). In clause 2.2, it stated, "In view of the lack of success and clinical application in the case of ovarian tissue, this application (reproductive tissue cryopreservation) should not be offered to women as a means to preserve their fertility potential when there is no immediate threat to their fertility." In addition, "According to similar reasoning, oocyte freezing for fertility preservation without a medical indication should not be encouraged." In a similar vein, the Practice Committee of the American Society for Reproductive Medicine released a statement in late 2007 that "oocyte cryopreservation should not be a means for women to delay reproduction" (18). Should the initial encouraging results

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continue to flow, we believe that these statements should be reconsidered or, to quote Bob Dylan (circa 1964), “the times they are a-changin’.”

We believe that the time has come to consider redressing the balance between the male and female fertility potential now that we apparently have the technology to do so. While sperm may be naturally capable of inducing a pregnancy even up to the age of 80, the limited reproductive life span of oocytes has restricted women to conceiving and delivering a baby up to the age of 45 at the best but with increasing difficulties from the mid to late thirties onward. The successful preservation of oocytes by vitrification will provide the “aging” woman who has had to delay her childbirth, for any reason, the opportunity to conceive and deliver using her own oocytes at the time she decides.

Society dictates the widespread use of medical advances, and society is seemingly presently intent on women delivering at later ages. The laws of the country will dictate the age limit up to which ET may be performed after the fertilization of previously vitrified oocytes in the same way that the age limit after ovum donation is applied. While ovum donation has been highly successful in providing a solution for women with incompetent oocytes, the preference of using their own genetic material is overwhelming. Legal, ethical, and logistic problems of ovum donation may also be overcome with the use of the subject’s own vitrified oocytes.

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