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IVF: a short but exciting story

Juan Antonio Garcia Velasco^a and Emre Seli^b

^aIVI-Madrid, and Rey Juan Carlos University, Madrid, Spain

^bDepartment of Obstetrics, Gynecology, and Reproductive Sciences, Yale School of Medicine, New Haven, Connecticut, USA

Dr Robert G. Edwards and Dr Patrick Steptoe opened a new era in medicine when they successfully fertilized a human egg, grew it briefly in a petri dish and transferred it into a woman's uterus to produce a baby [1]. This revolutionary achievement enabled millions of infertile couples to conceive and women to have babies even after reaching menopause. Dr Edwards was awarded the Nobel Prize in 2010 for the development of IVF, while Dr Steptoe, who died in 1988, did not receive a share of the Nobel, as the prizes are not awarded posthumously.

Similar to many pioneers of science, Dr Edwards and Dr Steptoe achieved what they did despite a skeptical establishment and many vocal critics, some of whom believed that the idea of a 'test tube baby' was immoral. Denied financial support from the government, the two investigators relied on private financing, and conducted their experiments in a tiny laboratory at a small hospital outside Manchester, United Kingdom. It was there that they delivered the world's first IVF baby, Louise Brown, on 25 July 1978.

Soon after the birth of the first baby conceived through IVF, it was again Dr Edwards who observed that embryos that grow faster were more likely to result in a pregnancy [2]. Later came the concepts of controlled ovarian hyperstimulation (COH) to generate more than one egg per cycle [3], followed by embryo [4] and oocyte [5] cryopreservation, preimplantation genetic diagnosis [6,7], and intracytoplasmic sperm injection to overcome fertilization defects [8].

As it was the case for Dr Edwards and Dr Steptoe, many of the researchers who contributed to the advancement of infertility treatment were denied financial support from governments and relied on private funds. Consequently, the head spinning progress of IVF in the past 35 years occurred globally in private IVF centers as well as academic institutions, in the United States, Europe, Australia, Asia, and South America.

Within the past year, reproductive scientists continued to tackle issues related to the biology of reproduction as it relates to the testing, treatment, and outcome prediction for women undergoing IVF. In this inaugural issue of *Current Opinion in Obstetrics and Gynecology*

Correspondence to Emre Seli, MD, Department of Obstetrics, Gynecology, and Reproductive Sciences, Yale School of Medicine, 310 Cedar Street LSOB 304B, New Haven, CT 06520-8063, USA. Tel: +1 203 785 7873; fax: +1 203 785 7819; emre.seli@yale.edu.

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devoted to fertility, IVF, and reproductive genetics, we gathered an outstanding cadre of reproductive specialists from the United States, Canada, Spain, Belgium, France, the Netherlands, and Turkey to discuss the key advances in reproductive medicine.

First, as a testament to the recent progress in our understanding of reproductive biology as it relates to clinical applications, leading investigators summarize how genetic factors contribute to premature ovarian failure [9], and the role of oocyte mitochondrial function in reproduction [10]. It is noteworthy that the article on mitochondrial function coincides with the recent approval of mitochondrial DNA replacement therapy by the United Kingdom Parliament on 3 February 2015, to allow women who carry disease-causing mutations in their mitochondrial genes to give birth to genetically related children free of mitochondrial disease.

Also in this issue, a series of articles by experts in the field delineate new strategies to assess embryo viability and endometrial receptivity. Among those, the physiological basis of biomarkers in assisted reproductive technology is discussed by Dr Scott Nelson [11], focusing on optimal ways to individualize controlled ovarian stimulation to minimize the risks, followed by a review of exciting recent developments in endometrial receptivity assessment and how to individualize the luteal phase by Dr Carlos Simon [12]. Within the same context, opinion leaders in the field present the most promising emerging strategies for the improvement of embryo selection: morphokinetics and what it adds to embryo culture and understanding [13], and aneuploidy screening using PCR for multiple indications [14].

Also within the past year, alternative strategies to address challenges related to COH have been widely discussed. In this issue, three articles tackle the most challenging aspects of COH in contemporary infertility treatment: revisiting the use of aromatase inhibitors for ovulation induction [15], strategies to prevent ovarian hyperstimulation syndrome [16], a condition that should be a part of the past in the 21st century as there are ways to avoid it as we will see, and COH for fertility preservation [17], an increasingly growing field for both medical and nonmedical indications. The article by Dr Rosen complements one by Dr Jacques Donnez [18] on the current status of ovarian freezing, in addressing the key issues in fertility preservation in 2015, and focusing on this – still – experimental technique and associated risks.

Finally, also in this issue, very controversial issues are reviewed, such as the role of immune and thrombophilia testing in reproductive medicine [19], a highly demanded topic by patients but where the evidence of any benefit of intervention is extremely weak, the impact of endometrioma removal on ovarian reserve [20], a paradigm that changed not so long ago, and the significance of premature progesterone rise in the follicular phase of IVF [21], an area that is far from being fully understood.

We hope that the 2015 issue of *Current Opinion in Obstetrics and Gynecology* devoted to fertility, IVF, and reproductive genetics will provide a clear and concise resource for the readers as they navigate through the increasingly complex modalities available for diagnosing and treating infertility.

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