# OOCYTE *IN VITRO* MATURATION TECHNIQUE IN A ONCOFERTILITY PERSPECTIVE

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## INTRODUCTION

Technique of oocyte in vitro maturation (IVM) was first demonstrated by Pincus and Enzmann in 1935 using rabbit oocytes. Since its introduction in the 1990s, *in vitro* maturation (IVM) has emerged as an attractive infertility treatment. This technique consists in the retrieving of immature oocytes from unstimulated or minimally stimulated follicles (< 10 mm) which are arrested in the prophase of first meiotic division and its maturation, in laboratory conditions, to methapase II. IVM requires little or no FSH in vivo and has been proposed as a safe and effective alternative Assisted Reproduction Technology (ART), approach to reduce important drawbacks of controlled ovarian stimulation (COS), such as the procedure costs and inconvenience of injectable gonadotropin therapy. Moreover, for patients undergoing IVM, the risk of ovarian hyperstimulation syndrome (OHSS) is practically eliminated. Most of the basic knowledge in the field of IVM has been derived from studies in mice, bovine and porcine species. For humans, the technique is done today in some labs around the world, however not efficient like conventional in vitro fertilization (IVF) procedure. The technique of IVM allows to culture cumulus oophorus complexes (COCs) from small and medium-sized (2 to 10 mm) follicles, and freeze the mature oocytes obtained. The purpose of this review and discussion was to present IIVM as an option for fertility preservation cancer patients, especially young patients, who haven't yet reached puberty or women who can no opt for ovary stimulation and cryopreservation of mature oocytes for reasons related to the cancer disease.

## OOCYTE *IN VITRO* MATURATION AND ONCOFERTILITY

The incidence of cancer in women has increased by up to 20%. Also the number of cancer survivors in increasing every day due to progress in cancer treatment. This leaving a growing number of women on reproductive age faced with the risk of premature ovarian failure and infertility. Female fertility requires normal functioning of the ovaries, fallopian tubes and uterus and while the surgically managed gynecologic cancers pose an obvious threat to future fertility by removal of these organs, the majority of cancer treatments impair future fertility by decreasing ovarian reserve. Recently, IVM has been proposed as the method of choice for all patients undergoing anticancer treatment, including prepuberbal girls, as no hormonal stimulation is needed. The technique of IVM allows to culture cumulus oophorus complexes (COC) from small and medium sized (2 to 10 mm) follicles, and freeze the mature oocytes obtained. Also, another possibility would be the retrieval of immature oocytes ex vivo at the time of ovarian cortex processing before its cryopreservation, its maturation in vitro followed by vitrification. IVM can be performed urgently irrespective of the phase of the menstrual cycle without affecting the quantity and maturation rate of the oocytes. Therefore, this technique may be a useful option for fertility preservation in cancer patients without ovarian stimulation and with no delay in the cancer treatment.

## CURRENT RESULTS AND FUTURE PERSPECTIVES

To date, it is estimated that approximately 3000 children have been born from IVM. It will require many more years do IVM data collection for a meaningful analysis, horever the data on the safety of IVM appears to be reassuring. Over the last 20 years, advances in culture conditions have continuously improved IVM's efficacy. Nonetheless, IVM does not support all nuclear and cytoplasmic changes that occur physiologically as a result of ovulatory stimulus *in vivo*. Although IVM may be not ready to offer to all types of infertility patients, the indications for this technique include women at risk of OHSS, those with estrogen-sensitive cancers, and those who require rapid fertility preservation before beginning potentially gonadotoxic treatments. Counseling regarding fertility preservation is essential.

## REFERENCES

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