

GERMINAL TISSUE CRYOPRESERVATION: POTENTIAL FERTILITY PRESERVATION ALTERNATIVE FOR MALE AND FEMALE CANCER PATIENTS

Mariana Andressa Silva Reis (BSc)¹, Jhenifer Kliemchen Rodrigues (BSc, MSc, PhD)^{1, 2, 3}

¹ Associação Instituto Sapiientiae, São Paulo/SPBrazil; ² In Vitro Consultoria, Belo Horizonte/MG, Brazil; ³ Latin America Global Oncofertility Network - Oncofertility Consortium.

jhenifer.kr@invitroconsultoria.com.br

INTRODUCTION

It is estimated for 2016, the occurrence of 596.070 new cases of cancer in Brazil, specifically breast and prostate, the more common in women and men respectively. Advances in cancer detection and therapy have improved survival rates for cancer patients. However, the treatment can adversely impact reproductive function, both for men and women, making the preservation of gametes an issue increasingly valued by patients and scientific community. Although the options available to preserve fertility, endorsed by the American Society of Reproductive Medicine (ASRM) and recommended by the American Society of Clinical Oncology (ASCO), are cryopreservation of semen, embryo and mature oocytes following in vitro fertilization (IVF). The cryopreservation of germinal tissue is currently a very promising technique, but still considered as experimental, both for ovarian and testicular tissue. Those methods would be an alternative for fertility preservation (FP) for people with cancer, especially for 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. Recent tests has been shown promising results in banking testicular tissue to generate spermatogenesis from spermatogonial stem cells, but it is still at a laboratorial stage. Therefore, large-scale studies should be executed to optimize these protocols in order to reduce the clinical risks and social side-effects and so it can be applied in clinical routine.

PURPOSE

The purpose of this review was to present the FP options for cancer patients and to discuss outlines about the experimental methods among women and men cancer patients, focusing on the results about ovarian and testicular tissue, which have been shown excellent results with mammals and humans.

MATERIAL AND METHODS

The literature on germinal tissue cryopreservation and the experimental methods for FP was searched using PubMed database. The scientific background, current developments and potential future applications of these methods were reviewed.

RESULTS AND DISCUSSION

The cryopreservation of semen, embryo and mature oocytes following in vitro fertilization are currently the methods confirmed and considered established by ASRM and recommended by ASCO for fertility preservation. The cryopreservation of germinal tissue is currently a very promising technique, but still considered as experimental, however it has been reported 60 live births and 5 ongoing pregnancies after ovarian tissue cryopreservation and transplantation. Recent tests has been shown promising results in banking testicular tissue to generate spermatogenesis from spermatogonial stem cells and also in maturing oocytes in vitro from cryopreserved ovarian tissue.

The choice of the best technique for fertility preservation applicable in each case will depend on the age of the patient, type of treatment, if the patient has a partner or not, the time available until the start of chemotherapy and the cancer potential to produce metastasis. The table below presents individual advantages and disadvantages of each technique.

TECHNIQUES	ADVANTAGES	DISADVANTAGES
<u>Embryo cryopreservation</u>	Established technique with thousands of live births	Must be postpubertal; need partner or donor sperm; it is a cost-based procedure, requiring ovarian stimulation, oocyte collection, and the use of assisted reproduction techniques
<u>Oocyte cryopreservation</u>	Do not need sperm source; several studies demonstrating live birth rates similar to procedures using fresh embryos	Must be postpubertal; requires a cycle of ovarian stimulation which could delay the cancer treatment and increase the risks of stimulating hormone-sensitive cancers
<u>Sperm cryopreservation</u>	Can be used for intrauterine insemination or IVF; IVF success rates are comparable with patients who have cryopreserved sperm for other reasons	Must be postpubertal
<u>Germinal tissue cryopreservation (ovary and testis)</u>	The only practical option for prepubertal patients with cancer; option for women with hormone-sensitive cancers or women who require an immediate cancer treatment	Still experimental method; requires surgical procedure; risk the transmission of malignant cells; it needs to be improved
<u>Spermatogonial Stem Cell cryopreservation</u>	May be the available option for prepubertal boys with cancer to preserve fertility	Require surgical biopsy of testicular tissue from prepubertal boys; method is limited because of poor clinical results; laboratorial stage

CONCLUSION

Given that many of the children and young adults diagnosed with cancer will go on to survive treatment, a focus on survivorship and fertility is of the utmost importance. Studies provided reassuring data on safety and efficacy of oocyte and embryo cryopreservation, and both embryo and oocyte vitrification are excellent options for female patients to preserve reproductive fertility. For adult males, cryopreservation of spermatozoa is a well established method and ensures good results in the preservation of the reproductive material. Treatments need to be discussed early following cancer diagnosis and often need to be individualized based on the disease process and individual patient preference. With continued research and clinical progress in this area, fertility preservation can be a safe, affordable, and successful option for these cancer survivors.

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