

The Future of Assisted Reproductive Technology: Insights from Dr. Hitkari

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KEYWORDS: *assisted reproductive technology, in vitro fertilization, genetics, future, pregnancy, ethics*

Assisted Reproductive Technology (ART) helps to achieve a pregnancy by overcoming the barriers of natural conception. It is often indicated in infertility, advanced reproductive age, or recurrent pregnancy loss. In particular, an in vitro fertilization (IVF) cycle is a three-week ART intervention that involves the extraction of follicles from hormonally-stimulated ovaries, the insemination of oocytes in a laboratory culture setting, and the implantation of the developing embryo into the patient's uterus.¹ Since the successful birth of the first IVF baby in 1978, approximately 5 million babies worldwide have been born using this technique.¹ In 2012, 14,953 IVF treatment cycles were undertaken in 30 of 33 Canadian IVF centers, and the clinical pregnancy rate was 32% per IVF cycle performed.² In response to the growing demand, this relatively young specialty has exploded with research and development in the past 30 years including: improved safety and efficacy of fertility medications, refinement of surgical techniques, and most impressively, optimization of laboratory culture environment and embryo handling techniques.¹ Collectively, these observations suggest that the prospect of assisted reproductive technology in helping patients obtain a much-desired pregnancy continues to be promising.

Over the years of training and experience in this area, Dr. Jason Hitkari has observed major technological advancements that are especially targeted to help patients who may be carriers of chromosomal abnormalities or genetic diseases:

There have been exciting changes even in the last year or two. Recurrent pregnancy loss can be devastating for couples, but now there is a tool to help them. *Comprehensive Chromosome Screening* is a technique where the extracted embryos are biopsied and screened for chromosomal abnormalities that may be associated with recurrent spontaneous pregnancy loss. This is very informative for us. It allows us to identify a chromosomally-normal embryo to replace back into the patient and dramatically reduce the risk of miscarriage. Occasionally, there are situations

where all of a couple's embryos are non-viable and this allows us to explain why they have had repeated losses in the past and also allows the patient to move on to techniques such as egg or embryo donation which will change the outcome. Another incredible advancement is the *Pre-implantation Genetic Diagnosis* technique which can screen for single-gene disorders such as the classic example of Cystic Fibrosis.¹

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Dr. Hitkari believes that genetics will continue to play a pivotal role in determining the fittest embryos for a healthy, successful conception. Moreover, he envisions the field of ART to be completely revolutionized in a few decades:

I think that preserving frozen oocytes [until implantation at a later time] will be increasingly prevalent because this is an approach that eases women from the worries about a biological clock [within reason]. In the very long run, what would be terrific is the ability to create gametes such as oocytes and spermatocytes using stem cells from a patient. So, for that 30-year-old woman who is struggling with Premature Ovarian Insufficiency, we could recreate oocytes using her stem cells and help her have a baby that shares her genetics. Although really appealing as a concept, this is likely several decades away. That being said, researchers are working on this potential now.¹

The scientific knowledge and application of ART may be outpaced by its complex ethical, medical, and socioeconomic issues that are quickly surfacing in discussions. There have been concerns

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about ART being used for purposes beyond its original intention, for example, using ART to help select for preferred gender and genes. In addition, it has been reasoned that if a single gene loci encoding for certain pathologies can be identified and manipulated, it is technically possible to build a “designer baby” with the perfect physical and intellectual traits.¹

From a medical standpoint, the utilization of IVF is associated with an increased risk of multiple births and pre-term delivery compared to natural conception, and these consequences are further exacerbated by an increased maternal age.³⁻⁵ Moreover, there are uncertainties regarding the long-term health implications of the extension of reproduction into older age. From a socioeconomic point of view, the provision of ART services is becoming rapidly commercialized in the private sector.⁶ As a result, the accessibility to ART is highly limited by financial and geographical barriers as this medical intervention is expensive (costing a minimum of \$10,000 per intervention cycle in British Columbia) and the majority of the trained expertise and facilities are located in the urban centers.¹ Hence, patients from suburban and rural communities are the most affected as they must spend additional resources and time traveling to and from fertility clinics.¹ Evidently, these intricate issues are significant global topics that involve the government, society, and medical institutions. Yet, a paramount issue that is often overlooked is the impact of ART development on the personal interaction of the physician with the patients and their family.

With rapidly evolving medical advancements in ART that may “de-humanize” the natural process of conception and pregnancy, the quality of care and genuine patient-physician interaction become even more crucial to sustaining the essence of reproductive health care in the future.⁶ Conception, which has previously been a private decision between two individuals, may now involve clinicians, nurses, and laboratory technicians complicated with Petri dishes and embryo incubators. For patients who have struggled to start their own family, the journey of a healthy pregnancy enabled by ART is truly a miracle for the parents-to-be. However, ART can only increase the likelihood of a successful conception but does not guarantee it. In some cases, repeatedly failed IVF attempts may be discouraging and distressing for the patients and their family, and so this is a time in which they need specialized attention to their sensitive emotional needs. Currently, psychosocial support and counselling are offered as part of the management plan for patients who are experiencing infertility and undergoing the invasive procedures; however, the clinician continues to be the key communicator and caregiver in the face of these complex and sensitive issues. This is both a challenging and rewarding aspect of Dr. Hitkari’s clinical work as a reproductive endocrinologist and infertility specialist:

Medicine is filled with privileges. One of the best things about this field is the ability to help couples achieve the dream of starting their own family when they are not able to do so. But the flipside of that success is the greatest challenge of my work, which is dealing with the patients’ normal responses to grief [when treatment is unsuccessful], whether it be anger, withdrawal, or sadness.¹

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ACKNOWLEDGEMENTS

I want to sincerely thank Dr. Jason Hitkari for sharing his insight and knowledge with us, and wish him all the best in his future endeavours.

BIOGRAPHY

Dr. Hitkari is a Reproductive Endocrinology and Infertility specialist in the Department of Obstetrics and Gynecology at the University of British Columbia. He completed his MD Undergraduate program and residency in Obstetrics and Gynecology in Vancouver, and continued with a two-year fellowship program at Mt. Sinai Hospital in Toronto. Dr. Hitkari is currently the Medical Director of Olive Fertility Centre in Vancouver as well as a clinical assistant professor at UBC where he takes great pride in educating medical students as the Week Chair of the Year 2 Medicine Reproduction Block. Dr. Hitkari’s dedication in his field of expertise and education has been recognized through the *Humanitarian Award for Patient Care* and he has twice received the *Medical Undergraduate Class Educator of the Year Award*. Spending the majority of his time providing patient care, Dr. Hitkari has shared much clinical expertise especially regarding the current impact and the future direction of assisted reproductive technology. 🐦

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