

Assisted reproductive technologies (ART) in Canada: 2003 results from the Canadian ART Register

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Objective: To present the success rates of assisted reproductive technologies (ART) cycles performed in 2003 in Canada. This is the third annual report of outcomes compiled in the Canadian Assisted Reproductive Technologies Register.

Design: Prospective cohort study.

Setting: Twenty-four of 24 ART centers in Canada.

Patient(s): Couples undergoing ART treatment in Canada during 2003.

Intervention(s): ART treatments, including in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), frozen embryo transfer, and oocyte donation.

Main Outcome Measure(s): Clinical pregnancy, live birth, and multiple birth rates.

Result(s): A total of 10,656 ART cycles was reported to the Canadian ART Register. There were 7535 IVF/ICSI cycles using the woman's own oocytes. Per cycle started, the clinical pregnancy rate was 31.2% (37.3% per embryo transfer procedure), and the live birth rate was 23.9%; the multiple birth rate per delivery was 31.3%, with a triplet birth rate of 1.6%. Of cycles with oocytes retrieved, IVF was performed in 44% and ICSI in 56%; the outcomes were similar with the two procedures. There were 462 IVF/ICSI cycles using donor oocytes. The clinical pregnancy rate was 43.9%, and the live birth rate was 31.4%; the multiple birth rate, all twins, was 36.5%. There were 2309 frozen embryo transfer cycles using the woman's own oocytes. The clinical pregnancy rate was 21.1%, and the live birth rate was 16.1%; the multiple birth rate was 27.1%, with a triplet birth rate of 1.9%. There were 350 cycles of various other ART types, including 91 cycles involving gestational carriers.

Conclusion(s): For 2003, the Canadian ART Register achieved 100% voluntary participation from Canadian ART centers. Success rates were higher and multiple birth rates lower in 2003 than in previous years. (Fertil Steril® 2007;88:550–9. ©2007 by American Society for Reproductive Medicine.)

Key Words: Assisted reproductive technology, success rates, in vitro fertilization, intracytoplasmic sperm injection, frozen embryo transfer, oocyte donation, multiple births

The Canadian Assisted Reproductive Technologies Register (CARTR) was first established in 1999 for the collection of treatment cycle data from the Canadian fertility centers that were using assisted reproductive technologies (ART), including in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), and frozen embryo transfer (FET). The IVF Directors Group of the Canadian Fertility and Andrology Society directs the CARTR program, and participation of ART centers in CARTR is voluntary.

The first complete report from CARTR, describing results from ART cycles performed in 2001, was published in 2005 (1). The CARTR results from 2002 were published the following year (2). This is the third annual published report of Canadian ART outcomes. The purpose of this paper is to re-

port the results of ART cycles performed in Canadian centers in the 2003 calendar year and submitted to CARTR.

MATERIALS AND METHODS

As in previous years, CARTR collected data for 2003 using the Society for Assisted Reproduction Clinical Outcome Reporting System version 2 computer program, generously provided to the Canadian Fertility and Andrology Society by the Society for Assisted Reproduction. Staff at each center entered information about patient demographics, diagnosis, and obstetric history; details of treatment; and pregnancy and birth outcomes for each ART treatment cycle initiated. The completed anonymous case records were sent electronically from each ART center to the CARTR coordinating center, where they were checked for accuracy and completeness. Corrections or clarifications were requested from the centers as necessary, but no on-site data validation from source documents was performed. The records from each center were then aggregated for data analysis using the computer program

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Statistical Package for the Social Sciences (SPSS), version 13 (SPSS, Inc., Chicago, IL). The ART cycles started between January 1 and December 31, 2003 were submitted to CARTR in batch mode twice: once in mid-2004 when the pregnancy outcomes were known, for an internal interim report, and again in mid-2005 when all the birth outcomes were known, for this published report.

It was not necessary to obtain institutional review board approval for this study because data collection is one of the requirements for accreditation of centers providing ART services, as organized by the Canadian Fertility and Andrology Society in conjunction with the Canadian Council on Health Services Accreditation. Although participation in accreditation is voluntary, most of the ART centers in Canada have agreed to the process and are obliged to inform patients that such data will be collected in a manner that is anonymous. Centers that choose to avoid accreditation need not report their data to CARTR; currently, there are no consequences for nonparticipation in CARTR.

These data from CARTR for 2003 were presented to the Medical and Laboratory Directors at the annual IVF Directors' Meetings in November 2004 (pregnancy results) and October 2005 (birth results). A brief summary of the national success rates was provided to the media, with the Directors' permission, immediately after each meeting. Before submission for publication, this report was read and approved by all IVF Directors.

Definitions of Outcomes

The definitions established by the International Committee Monitoring Assisted Reproductive Technologies (ICMART) are followed by CARTR (3). A treatment cycle is considered to have "started" when a woman undergoing ovarian stimulation receives the first dose of gonadotropins; or, in a non-stimulated cycle (e.g., for frozen embryo transfer), when a decision is made to attempt ART treatment in that cycle. A canceled cycle is one that is stopped before the oocyte retrieval procedure or thawing of embryos.

Clinical pregnancy includes intrauterine gestation (presence of a gestational sac on ultrasonography), ectopic pregnancy, and miscarriage occurring before an ultrasound examination has been done but with histologic evidence of pregnancy. Cycles with only a positive pregnancy test are not considered to have a clinical pregnancy. Implantation rate is the number of gestational sacs observed on ultrasonography, divided by the number of embryos transferred.

Pregnancy loss includes miscarriage and therapeutic abortion of a clinical intrauterine pregnancy occurring at or at less than 20 weeks' gestation. Any pregnancy termination, either spontaneous or therapeutic, occurring after 20 weeks' gestation with no liveborn infant is considered a stillbirth. A delivery is the birth of one or more infants, either living or not, after 20 weeks' gestation. A live birth is a delivery that results in at least one living infant (but, if a multiple birth, may include one or more stillborn infants). A neonatal death is the

death of an infant in the first 28 days of life. A multiple birth is the delivery of more than one infant, either liveborn or stillborn, including deliveries with all infants stillborn. High-order multiple births (triplets or more) are reported separately.

Unless otherwise noted, the clinical pregnancy rate is reported per cycle started. Cycle cancellation, ectopic pregnancy, and other complications are reported per cycle started. The miscarriage or pregnancy loss rate is reported per intrauterine pregnancy. The live birth rate is reported per cycle started, excluding from both the numerator and the denominator the cycles in which the outcome of the clinical pregnancy has not been reported. Because of these missing data, the live birth rates reported may underestimate the true live birth rates. The multiple birth rate, which includes stillbirths, is reported per delivery.

RESULTS

Participating Centers

All of the 24 Canadian ART centers operating in 2003 contributed to CARTR for that year (listed in the [Appendix](#)). Nine of the 24 centers performed more than 500 ART cycles in 2003, nine centers performed between 200 and 500 cycles, and six centers performed fewer than 200 cycles.

Overall Success Rates

In total, 10,656 treatment cycles involving ART were reported to CARTR for 2003. Overall, 3128 ART cycles (29.4% of cycles started) resulted in a clinical pregnancy, at least 2346 cycles resulted in a delivery (22.4%), and at least 2324 cycles resulted in a live birth (22.2%). There were 204 cycles with ongoing pregnancies (8% of ongoing pregnancies) for which the birth outcome was not reported. Overall, there were at least 725 multiple births (30.9% of known births): 689 twin births (29.4%) and 36 triplet births (1.5%).

The various procedures and their success rates are described herein. The results of the most common procedures are summarized in [Table 1](#).

IVF/ICSI with Own Oocytes

In vitro fertilization, including ICSI, was the most common procedure performed, with 7535 cycles reported. This category, to distinguish it from those of oocyte donation and gestational carrier cycles, includes only cycles in which the parenting woman's own oocytes are used and the same woman receives the resulting embryos. However, cycles using donated sperm are included. Because the decision to use ICSI might not be made until the sperm and oocytes are assessed in the embryology laboratory, cycles canceled before oocyte retrieval cannot be classified by type of insemination procedure; thus, results per cycle started can only be calculated for IVF and ICSI cycles grouped together.

Per cycle started, the clinical pregnancy rate was 31.2%, the live birth rate was 23.9%, and the singleton live birth

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