

Assisted reproductive technology in the United States: 1999 results generated from the American Society for Reproductive Medicine/Society for Assisted Reproductive Technology Registry*

Society for Assisted Reproductive Technology and the American Society for Reproductive Medicine

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Objective: To summarize the procedures and outcomes of ART initiated in the United States in 1999.

Design: Data were collected electronically by using the SART Clinical Outcome Reporting System software and submitted to the American Society for Reproductive Medicine/Society for Assisted Reproductive Technology Registry.

Participant(s): Three hundred sixty programs submitted data on procedures performed in 1999. Data were collated after November 2000 so that the outcome of all pregnancies established would be known.

Main Outcome Measure(s): Incidence of clinical pregnancy, ectopic pregnancy, abortion, stillbirth, and delivery.

Result(s): Programs reported initiating 88,077 cycles of ART treatment. Of these, 63,639 cycles involved IVF (with and without micromanipulation), with a delivery rate per retrieval of 29.4%; 838 were cycles of gamete intrafallopian transfer, with a delivery rate per retrieval of 27.9%; 945 were cycles of zygote intrafallopian transfer, with a delivery rate per retrieval of 29.8%. The following additional ART procedures were also initiated: 6,509 fresh donor oocyte cycles, with a delivery rate per transfer of 41.8%; 12,005 frozen embryo transfer procedures, with a delivery rate per transfer of 18.6%; 2,488 frozen embryo transfers using donated oocytes or embryos, with a delivery rate per transfer of 23.6%, and 821 cycles using a host uterus, with a delivery rate per transfer of 33.6%. In addition, 398 cycles were reported as combinations of more than one treatment type, 18 cycles as research, and 416 as embryo banking. As a result of all procedures, 21,904 deliveries were reported, resulting in 30,967 neonates.

Conclusion(s): In 1999, more programs reported ART treatment and reported cycles increased significantly (7.5%) compared to 1998. In comparable cycle types, the overall success rate (deliveries per retrieval) increased by 0.4%, which represents an increase of 1.2% compared to the success rate for 1998. (Fertil Steril® 2002;78:918–31. ©2002 by American Society for Reproductive Medicine.)

Key Words: Assisted reproductive technology, in vitro fertilization, gamete intrafallopian transfer, zygote intrafallopian transfer, cryopreserved embryos, donor oocytes.

In 1988, the Society for Assisted Reproductive Technology (SART) began publishing annual reports of ART activities (1). These annual reports were based on voluntary data submission by programs and provided a forum for sharing information early in the development of the technology.

In 1992, the U.S. Congress passed the Fertility Clinic Success Rate and Certification Act (2), which requires the Centers for Disease Control and Prevention (CDC) to publish clin-

ic-specific pregnancy success rates for ART procedures in the United States. Through collaboration with SART and their data collection system, data from 1995 were first collected and published under the Act (3).

In addition to the annual CDC report, SART has continued to review and analyze annual data to explore trends in ART activities in more detail. This report summarizes the procedures and outcomes of ART initiated in the United States in 1999. The format used for this report

*The procedures and outcomes of assisted reproductive technology in the United States in 1999 are summarized. These results were generated from the SART Clinical Outcome Reporting System.

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follows that of the previous year to assist the reader in comparing data.

The SART has prepared this report in conjunction with the American Society for Reproductive Medicine (ASRM) and the CDC. It represents mandatory reporting by 370 programs offering ART, 352 (95.1%) of which were members of SART. Each clinic's submitted data were tabulated and summarized by SART and subsequently verified by each clinic's medical director, and all data were subject to validation through on-site visits and medical record review.

MATERIALS AND METHODS

The data on ART treatments initiated from January 1, 1999 through December 31, 1999 were collected in part prospectively and in part retrospectively. Programs collected patient- and cycle-specific data in electronic form by using the SART Clinical Outcome Reporting System, a software program designed for ART data collection. The ART programs submitted the final data in December 2000 to permit reporting of outcomes of all pregnancies initiated in 1999.

Each reporting clinic submitted an export diskette and a printed clinic summary that was verified as accurate by the medical director. The export diskette was created by using the SART Clinical Outcome Reporting System and contained demographic characteristics, history, and diagnosis for each patient and medication, treatment methods, and outcomes for each cycle.

Data on patients who underwent more than one cycle of ART were collected and analyzed separately for each cycle. Therefore, the cycle number reported is always equal to or greater than the number of patients. The data were then tabulated by SART and compiled to create the annual clinic data set. Each clinic was also sent a clinic summary table so that it could reconfirm outcome and treatment data. Analysis was completed over the 10 months after data submission.

In addition, the CDC subsidized on-site data validation at 29 randomly selected clinics. Approximately 25 data elements in each of 50 randomly selected cycles were verified in the medical and laboratory records of the program by two members of the SART Validation Committee, who were occasionally accompanied by a CDC observer.

The ART procedures were divided into several categories for reporting purposes: IVF, gamete intrafallopian transfer (GIFT), zygote intrafallopian transfer (ZIFT), cryopreserved embryo transfer, donor oocyte, cryopreserved embryo transfer from donor oocytes, and ART cycles for host uterus transfer. Programs also submitted information on cycles in which ICSI was performed.

For reporting purposes, cycles were divided into five categories according to the age of the woman at the time of cycle start: <35 years, 35–37 years, 38–40 years, 41–42 years, and >42 years. These age groups were then further

categorized by reported primary diagnosis. Stimulated cycles (during which ovulation induction medications were used) and unstimulated cycles were combined in each of the categories described above.

A clinical pregnancy was defined as the occurrence of at least one ultrasonographically confirmed gestational sac in the uterus (which excludes ectopic and biochemical pregnancies but includes heterotopic pregnancies). Ectopic pregnancies were reported separately. A pregnancy loss was defined as a clinical pregnancy that did not result in a delivery.

The following definitions were used in measuring outcomes. A live birth is a cycle that resulted in at least one live-born neonate, regardless of the number of other neonates and whether they were live born or stillborn. A stillbirth is a cycle that resulted in no live-born neonates and one or more stillborn neonates. The number of deliveries was equal to the sum of live birth cycles plus stillbirth cycles, which was the same as the sum of cycles that resulted in one or more live born neonates plus cycles that resulted in all stillborn neonates. A live-born neonate showed signs of life after complete expulsion or extraction from its mother. Signs of life were breathing, beating of the heart, pulsation of the umbilical cord, or definite movement of the voluntary muscles, regardless of gestational age at birth. Heartbeats were distinguished from transient cardiac contractions and respirations were distinguished from fleeting respiratory efforts or gasps. A stillborn neonate was born at 18 weeks or later from the date of transfer and showed no signs of life after complete expulsion or extraction from the mother, and no certificate of live birth was filed. The number of neonates (infants born) was equal to the sum of live-born neonates plus stillborn neonates.

RESULTS

All ART Procedures

In 1999, 370 programs reported initiating 88,077 cycles of ART treatment. Of these cycles, 63,639 used IVF and fresh transfer of embryos derived from the patient's own oocytes (nondonor), including 27,135 cycles that used ICSI. There were 838 cycles of fresh nondonor GIFT and 945 cycles of fresh nondonor ZIFT, of which 694 used ICSI. There were 6,509 cycles involving donor oocytes and fresh embryo transfer, including 2,521 that used ICSI and 821 cycles with embryo transfer to a host uterus. In addition, 12,005 nondonor cryopreserved embryo thaw procedures and 2,488 donor oocyte or embryo derived cryopreserved embryo thaw procedures were performed. Three hundred ninety-eight combination cycles were performed. Eighteen cycles were reported as research and 416 as embryo banking.

All research cycles had research protocols and consent forms approved in advance by SART. As a result of all ART procedures and all cryopreserved embryo transfers, 21,904

TABLE 1

Comparison of reported outcomes for ART procedures^a.

Outcome	IVF	GIFT	ZIFT	Donor oocyte transfer ^b	CPE transfer ^c	CPEDO transfer	Host uterus transfer
No. of treatments ^d	63,639	838	945	6,509	12,005	2,488	821
Cancellations (%)	13.7	12.5	9.0	6.9	7.8	5.3	6.7
No. of retrievals	54,939	733	860	NA	NA	NA	766
No. of transfers	51,149	721	792	5,808	10,532	2,267	730
Transfers per retrieval	93.1	98.4	92.1	NA	NA	NA	95.3
No. of clinical pregnancies	19,428	270	312	2,897	2,543	665	304
Rate of pregnancy loss (%)	16.7	24.4	17.9	16.1	23.1	19.4	19.4
No. of deliveries	16,175	204	256	2,430	1,956	536	245
Deliveries per retrieval	29.4	27.8	29.8	NA	NA	NA	32.0
Deliveries per transfer (%)	31.6	28.3	32.3	41.8	18.6	23.6	33.6
Singleton delivery (%)	62.9	68.1	66.4	58.0	72.9	70.3	63.3
No. of ectopic pregnancies	422	10	6	44	81	14	4
Rate of ectopic pregnancy (%)	2.2	3.7	1.9	1.5	3.2	2.1	1.3

Note: CPE = cryopreserved embryos; CPEDO = cryopreserved embryos from donor oocytes; GIFT = gamete intrafallopian transfer; NA = not applicable; ZIFT = zygote intrafallopian transfer.

^a Except combination (*n* = 1,800), research (*n* = 25), and embryo banking (*n* = 398) cycles.

^b Includes known or anonymous but not host uterus or surrogate.

^c Cryopreserved ET cycles not done in combination with fresh ET and not with donor egg or embryo.

^d Includes all cycles, regardless of age and cause of infertility.

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deliveries resulting in the birth of 30,967 neonates were reported.

Of all deliveries, 13,909 (63.5%) were singleton, 6,971 (31.8%) were twin, 980 (4.5%) were triplet, and 44 (0.2%)

were deliveries of higher order than triplet. Table 1 shows summary data, and Tables 2 and 3 show IVF and GIFT data, compared with the 1998 report.

IVF

All Cycles

Of the 63,639 initiated cycles of IVF (with and without ICSI), 54,939 (86.3%) led to retrieval. The overall cancellation rate was 13.7%. Of the 54,939 retrievals, 51,149 (93.1%) led to a transfer. A total of 19,428 clinical pregnancies were reported, for a clinical pregnancy rate of 30.5% per initiated cycle, 35.4% per retrieval, and 38.0% per transfer. A total of 16,175 deliveries were reported, for a delivery rate of 25.4% per initiated cycle, 29.4% per retrieval and 31.6% per transfer. The rate of clinical pregnancy loss was 16.7%. Four hundred twenty two ectopic pregnancies were reported, which represented 2.2% of clinical pregnancies.

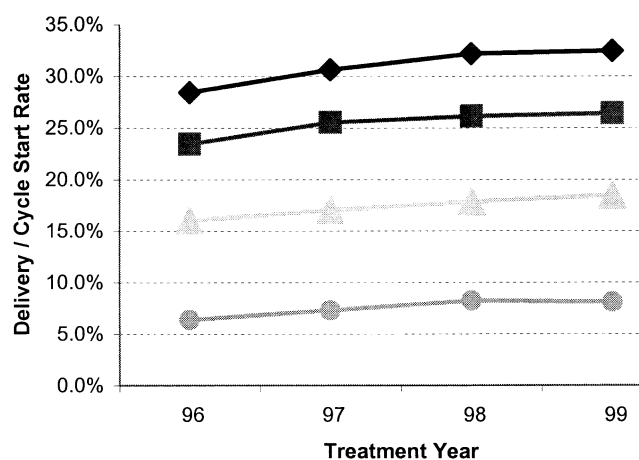
Overall, 62.9% of deliveries were singletons, 32.2% were twins, 4.7% were triplets, and 0.2% were higher-order multiples. There were 266 stillborn infants (12 per 1,000 neonates), with 74 stillborn infants in singleton deliveries, 138 in twin deliveries, and 55 in triplet or higher-order deliveries.

Treatment Success Rates During Four Consecutive Years

1999 is the fourth year that ART treatment and outcome data were reported exclusively through the SART Clinical Outcome Reporting System. Standardized reporting allows multiyear review of ART success rates. Since a preponder-

FIGURE 1

Annual comparison of IVF delivery rates. Diamonds represent women <35 years of age, squares represent women 35 to 37 years of age, triangles represent women 38 to 40 years of age, and circles represent women >40 years of age.



ASRM/SART. ASRM/SART registry. *Fertil Steril* 2002.

TABLE 2

IVF procedures (with and without ICSI), by age group and cause of infertility.

1999 IVF Procedures	No. of retrievals	Canceled cycles (%)	Transfers per retrieval (%)	No. of pregnancies	No. of deliveries	Deliveries per retrieval (%)	Multiple births per delivery (%)
No male factor infertility							
Women <35 years of age	15,363	10.0	93.7	6,424	5,615	36.5	42.0
Women 35–37 years of age	8,060	14.6	93.9	3,010	2,518	31.2	37.3
Women 38–40 years of age	6,785	18.2	92.5	2,014	1,550	22.8	29.5
Women >40 years of age	4,098	23.4	89.4	720	433	10.6	13.6
Male factor infertility							
Women <35 years of age	10,685	8.8	94.3	4,298	3,726	34.9	39.9
Women 35–37 years of age	4,732	12.5	93.1	1,663	1,403	29.6	34.0
Women 38–40 years of age	3,444	16.4	92.5	995	746	21.7	27.1
Women >40 years of age	1,772	21.0	88.9	304	184	10.4	15.2
1999 totals	54,939	13.70	93.10	19,428	16,175	29.40	37.10
1998 totals	50,771	13.90	93.60	17,943	14,789	29.10	38.20

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ance of treatments during this period was fresh nondonor IVF, we present success rates from 1996, 1997, 1998, and 1999, stratified by age group.

For the youngest patient group (women <35 years of age at the time of cycle start), success rates (delivery per cycle) were 28.4%, 30.7%, 32.2%, and 32.4% for 1996, 1997, 1998, and 1999, respectively. Among women 35 to 37 years of age, success rates were 23.4%, 25.5%, 26.1%, and 26.4% for the consecutive years. In women 38 to 40 years of age at cycle start, the success rates were 16.0%, 17.0%, 17.9%, and 18.5%, and in women >40 years of age, rates were 6.4%, 7.3%, 8.3%, and 8.1%. Each age group experienced a significant increase in success rates over 4 years (Fig. 1).

IVF Cycles by Age and Male Factor Infertility

All 63,639 IVF cycles were analyzed by age of the woman at the time of retrieval and by presence or absence of male factor infertility. Overall, 45.2% of all IVF cycles were initiated in women <35 years of age, 23.3% in women 35 to 37 years of age, 19.5% in women 38 to 40 years of age, 8.0% in women 41 or 42 years of age, and 3.9% in women >42 years of age.

Male factor infertility was reported in 36.9% of all IVF cycles. Table 2 shows the analysis for standard IVF cycles, with and without ICSI.

Couples With No Male Factor Infertility. Among women <35 years of age with no male factor infertility, 17,076

cycles were initiated. The cancellation rate was 10.0%. The 15,363 retrievals and 14,392 transfers resulted in 6,424 pregnancies and 5,615 deliveries, for a delivery rate of 32.9% per initiated cycle, 36.5% per retrieval, and 39.0% per transfer. The rate of pregnancy loss was 12.6%.

There were 9,433 cycles in women 35 to 37 years of age with no male factor infertility. The cancellation rate was 14.6%. The 8,060 retrievals and 7,570 transfers resulted in 3,010 pregnancies and 2,518 deliveries, for a delivery rate of 26.7% per initiated cycle, 31.2% per retrieval, and 33.3% per transfer. The rate of pregnancy loss was 16.3%.

Among women 38 to 40 years of age with no male factor infertility, 8,295 cycles were initiated. The cancellation rate was 18.2%. The 6,785 retrievals and 6,277 transfers resulted in 2,014 pregnancies and 1,550 deliveries, for a delivery rate of 18.7% per initiated cycle, 22.8% per retrieval, and 24.7% per transfer. The rate of pregnancy loss was 23.0%.

There were 5,350 cycles initiated in women >40 years of age with no male factor infertility; the cancellation rate was 23.4%. The 4,098 retrievals and 3,664 transfers resulted in 720 clinical pregnancies and 433 deliveries, for a delivery rate of 8.1% per initiated cycle, 10.6% per retrieval, and 11.8% per transfer. The rate of pregnancy loss was 40.4%.

Couples With Male Factor Infertility. Among women <35 years of age with male factor infertility, 11,712 cycles were initiated. The cancellation rate was 8.8%. The 10,685

TABLE 3

GIFT procedures, by age group and cause of infertility.

1999 GIFT Procedures	No. of retrievals	Canceled cycles (%)	Transfers per retrieval (%)	No. of pregnancies	No. of deliveries	Deliveries per retrieval (%)	Multiple births per delivery (%)
No male factor infertility							
Women <35 years of age	242	5.5	98.8	104	87	36.0	46.0
Women 35–37 years of age	136	11.1	97.8	48	34	25.0	17.6
Women 38–40 years of age	144	17.7	98.6	58	46	31.9	32.6
Women >40 years of age	119	19.6	99.2	33	17	14.3 ^a	0.0 ^a
Male factor infertility							
Women <35 years of age	35	5.4	97.1	12	11	31.4 ^a	9.1 ^a
Women 35–37 years of age	19	5.0 ^a	94.7 ^a	9	5	26.3 ^a	40.0 ^a
Women 38–40 years of age	15	25.0 ^a	100.0 ^a	3	2	13.3 ^a	50.0 ^a
Women >40 years of age	23	20.7	95.7	3	2	8.7 ^a	0.0 ^a
1999 totals	733	12.50	98.40	270	204	27.80	31.90
1998 totals	1084	16.20	98.50	376	297	27.40	35.70

Note: GIFT = gamete intrafallopian transfer.

^a The percentage was calculated based on a denominator of less than 20; therefore interpretations may be unreliable.

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retrievals and 10,080 transfers resulted in 4,298 pregnancies and 3,726 deliveries, for a delivery rate of 31.8% per initiated cycle, 34.9% per retrieval, and 37.0% per transfer. The rate of pregnancy loss was 13.3%.

There were 5,409 cycles in women 35 to 37 years of age with male factor infertility. The cancellation rate was 12.5%. The 4,732 retrievals and 4,404 transfers resulted in 1,663 pregnancies and 1,403 deliveries, for a delivery rate of 25.9% per initiated cycle, 29.6% per retrieval, and 31.8% per transfer. The rate of pregnancy loss was 15.6%.

In women 38 to 40 years of age with male factor infertility, 4,121 cycles were initiated. The cancellation rate was 16.4%. The 3,444 retrievals and 3,184 transfers resulted in 995 pregnancies and 746 deliveries, for a delivery rate of 18.1% per initiated cycle, 21.7% per retrieval, and 23.4% per transfer. The rate of pregnancy loss was 25.0%.

In women >40 years of age with male factor infertility, 2,243 cycles were initiated. The cancellation rate was 21.0%. The 1,772 retrievals and 1,576 transfers resulted in 304 pregnancies and 184 deliveries, for a delivery rate of 8.2% per initiated cycle, 10.4% per retrieval, and 11.7% per transfer. The rate of pregnancy loss was 41.1%.

Analysis of Clinics by ART Volume

Two analyses assessed the effect of clinic volume on outcomes. To standardize the comparison of clinics, success rates for two groups are presented; women <35 years of age and women 35 to 37 years of age.

In the first analysis, the total number of ART cycles was divided into roughly equal quartiles of approximately 22,000 starts each of all treatment types. Clinics were then distrib-

uted within the quartiles by clinic volume. Thus, quartile A consisted of a large number of the lowest-volume programs, and quartile D consisted of a small number of the highest-volume programs. An ART program or clinic is defined as a legal entity practicing under state law, recognizable to the consumer, that provides ART to couples who have experienced infertility or are undergoing ART for other reasons. The number of treatments and the average delivery rate per cycle were compared among quartiles (Table 4).

In quartile A, 244 clinics performed 22,043 ART cycles, with a median volume of 90 cycles per clinic. Quartile A clinics reported 8,196 IVF cycles for patients <35 years of age (sample 1), with a delivery rate of 29.7% per cycle, and 3,728 cycles in patients 35 to 37 years of age (sample 2), with a delivery rate of 23.6%. The 72 clinics in quartile B reported 22,291 total cycles, with a median volume of 310 cycles.

Quartile B reported 7,203 cycles in sample 1, with 34.3% of cycles resulting in a delivery, and 3,777 IVF cycles in sample 2, with a delivery rate of 27.1%. In the 40 clinics in quartile C, 22,440 cycles were performed, with a median volume of 561 cycles per clinic.

Quartile C clinics performed 6,704 cycles in sample 1, with a delivery rate of 34.3% per cycle, and 3,553 treatments in sample 2, with a delivery rate of 29.2%. A total of 21,303 cycles were performed at the 14 clinics in quartile D; the median number of cycles per clinic was 1,522. Quartile D clinics performed 6,685 cycles in sample 1, with a delivery rate of 32.0% per cycle, and 3,784 cycles in sample 2, with a delivery rate of 27.0%.

In the second analysis of cycle volume, clinics were

TABLE 4

IVF success, by quartiles of cycle volume.

Clinic quartile ^a	All Cycles				Sample 1 ^b		Sample 2 ^c	
	Cycle volume	Total cycles in quartile	No. of clinics in quartile	Median no. of cycles per clinic	No. of cycles in sample	Deliveries per cycle in sample	No. of cycles in sample (%)	Deliveries per cycle in sample (%)
Quartile A	≤218	22,043	244	90	8,196	29.7%	3,728	23.6%
Quartile B	218–412	22,291	72	310	7,203	34.3%	3,777	27.1%
Quartile C	422–962	22,440	40	561	6,704	34.3%	3,553	28.2%
Quartile D	≥976	21,303	14	1,522	6,685	32.0%	3,784	27.0%
Quartile W	≤65	3,522	92	38	1,363	27.4%	625	22.2%
Quartile X	66–132	8,582	93	92	3,218	28.9%	1,488	22.8%
Quartile Y	133–309	18,529	92	201	6,549	32.4%	3,034	25.6%
Quartile Z	≥312	57,444	93	618	17,658	33.5%	9,695	27.5%

^a For explanation of quartiles, see text.^b IVF treatment of women <35 years of age for all diagnoses.^c IVF treatment of women 35–37 years of age for all diagnoses.ASRM/SART. ASRM/SART registry. *Fertil Steril* 2002.

divided into four quartiles of 92 clinics each. Quartile W comprised clinics performing <66 cycles. These 92 clinics performed 3,522 total cycles, with a median volume of 38 cycles. Quartile W clinics reported 1,363 cycles in sample 1, with a delivery rate of 27.4% per cycle, and 625 cycles in sample 2, with a delivery rate of 22.2%.

Quartile X contained clinics that performed 66 to 132 cycles; the total was 8,582 cycles and the median was 92 cycles. Quartile X clinics performed 3,218 cycles in sample 1, with a delivery rate of 28.9% per cycle, and 1,488 cycles in sample 2, with a delivery rate of 22.8%.

Quartile Y comprised clinics that performed 133 to 309 cycles. A total of 18,529 cycles were performed in quartile Y clinics; the median was 201 cycles. Quartile Y clinics performed 6,549 cycles in sample 1, with a delivery rate of 32.4% per cycle, and 3,034 cycles in sample 2, with a delivery rate of 25.6%.

Quartile Z included the 93 largest clinics (those reporting ≥312 cycles); these clinics performed 57,444 cycles (65.2% of all cycles), and the median cycle volume was 618 cycles. Quartile Z clinics performed 17,658 cycles in sample 1, with a delivery rate of 33.5% per cycle, and 9,695 cycles in sample 2, with and delivery rate of 27.5%.

ICSI

A total of 28,858 transfers involved embryos fertilized with ICSI. Overall, 10,898 clinical pregnancies were established, resulting in 8,982 deliveries (64.0% singleton, 31.4% twin, 4.3% triplet, and 0.3% higher-order gestations). The pregnancy loss rate was 17.6%. Two hundred two ectopic pregnancies occurred.

Fertilization with ICSI was used in 27,135 of 63,639 IVF

cycles (42.6%). The clinical pregnancy rate for IVF cycles using ICSI was 34.3% per retrieval and 36.6% per embryo transfer (compared with 36.4% and 39.3%, respectively, in IVF cycles without ICSI). The delivery rate for IVF cycles using ICSI was 28.3% per retrieval and 30.2% per embryo transfer (compared with 30.5%, and 33.0%, respectively, for cycles without ICSI).

In IVF cycles using ICSI, the cancellation rate was zero because the data entry software required reported cycles to progress to retrieval to report ICSI. Thus, the cancellation rate in non-ICSI IVF cycles (23.8%) is probably artificially high, since it is likely that ICSI was planned but cycles were canceled in several cases.

The average age of women undergoing in IVF cycles with ICSI was 34.5 years compared to 35.4 years in IVF cycles without ICSI. The rate of ectopic pregnancy among patients undergoing ICSI was 1.9% per clinical pregnancy compared with 2.4% among patients undergoing non-ICSI procedures.

Of 945 initiated ZIFT cycles, 694 (73.4%) were performed with ICSI. The clinical pregnancy rate for ZIFT cycles using ICSI was 38.2% per retrieval and 41.4% per embryo transfer (compared with 28.3%, and 30.9%, respectively, in ZIFT cycles without ICSI). The delivery rate for ZIFT cycles using ICSI was 31.4% per retrieval and 34.1% per embryo transfer (compared with 22.9%, and 25.0%, respectively, in cycles without ICSI). The ectopic rate was 1.5% per pregnancy (compared with 4.3% in ZIFT cycles without ICSI). The average age of women undergoing ZIFT cycles with ICSI was 34.0 years compared to 35.8 years in those undergoing ZIFT cycles without ICSI.

Of 6,509 initiated fresh donor oocyte and fresh donor

embryo cycles, 2,521 (38.7% of all fresh donor cycles) were performed with ICSI. The clinical pregnancy rate for donor transfers using ICSI was 48.2% and the delivery rate was 39.6% per embryo transfer, compared with 51.1% and 43.4%, respectively, in cycles without ICSI. In donor cycles using ICSI, the rate of ectopic pregnancy was 1.9% per clinical pregnancy compared with 1.3% in cycles without ICSI, and the average age of the recipient patients was 40.9 years compared with 40.8 years, respectively.

In addition, 456 cycles were performed that used ICSI of other treatments (combinations, gestational carrier, and research).

GIFT

All Cycles

Eighty programs reported 838 cycles of GIFT. A total of 733 retrievals (87.5% of cycles) and 721 transfers (98.4% of retrievals) were performed. These resulted in 270 clinical pregnancies, for a clinical pregnancy rate of 32.2% per initiated cycle, 36.8% per retrieval, and 37.4% per gamete transfer.

There were 204 deliveries, for a delivery rate of 24.3% per initiated cycle, 27.8% per retrieval, and 28.3% per gamete transfer. Ten ectopic pregnancies were reported, for a rate of 3.7% per clinical pregnancy. A total of 282 infants were born, of which 68.1% were singletons, 26.0% were twins, 5.4% were triplets, and 0.5% were higher-order deliveries. There were four stillborn infants.

GIFT Cycles by Age and Male Factor

Cycles of GIFT were stratified by age of the woman at retrieval and by presence or absence of male factor diagnosis. Overall, 35.0% of GIFT cycles were initiated in women <35 years of age, 20.6% in women 35 to 37 years of age, 23.3% in women 38 to 40 years of age, 12.2% in women 41 or 42 years of age, and 8.9% in women >42 years of age. Male factor diagnosis was reported in 12.6% of all GIFT cycles. Table 3 shows results in each category.

Couples With No Male Factor Infertility. In women <35 years of age with no male factor infertility, 256 cycles were initiated, with 242 retrievals (5.5% cancellation rate) and 239 gamete transfers. One hundred four clinical pregnancies and 87 deliveries resulted. The delivery rate was 34.0% per initiated cycle, 36.0% per retrieval, and 36.4% per gamete transfer. The rate of pregnancy loss was 16.3%.

Women 35 to 37 years of age with no male factor infertility had 153 cycles initiated. There were 136 retrievals (11.1% cancellation rate) and 133 gamete transfers. Forty-eight clinical pregnancies and 34 deliveries resulted. The delivery rate was 22.2% per initiated cycle, 25.0% per retrieval, and 25.6% per gamete transfer. The rate of pregnancy loss was 29.2%.

Women 38 to 40 years of age with no male factor infertility had 175 cycles initiated. There were 144 retrievals (17.7% cancellation rate), and 142 gamete transfers. Fifty-eight clinical pregnancies and 46 deliveries resulted. The delivery rate was 26.3% per initiated cycle, 31.9% per retrieval, and 32.4% per gamete transfer. The rate of pregnancy loss was 20.7%.

Women >40 years of age with no male factor infertility had 66 cycles initiated. There were 119 retrievals (19.6% cancellation rate), and 188 gamete transfers. Thirty-three clinical pregnancies and 17 deliveries resulted. The delivery rate in this subgroup was 11.5% per initiated cycle, 14.3% per retrieval, and 14.4% per gamete transfer. The rate of pregnancy loss was 51.5%.

Couples With Male Factor Infertility. In 37 initiated cycles in women <35 years of age with male factor infertility, 35 retrievals (5.4% cancellation rate), and 34 gamete transfers occurred. There were 12 clinical pregnancies and 11 deliveries. The delivery rate in this subgroup was 29.7% per initiated cycle, 31.4% per retrieval, and 32.4% per gamete transfer. The rate of pregnancy loss was 8.3%.

In 20 initiated cycles in women 35 to 37 years of age with male factor infertility, 19 retrievals (5.0% cancellation rate) and 18 gamete transfers were performed. Nine clinical pregnancies and five deliveries resulted. The delivery rate in the subgroup was 25.0% per initiated cycle, 26.3% per retrieval, and 27.8% per gamete transfer. The rate of pregnancy loss was 44.4%.

In 20 initiated cycles in women 38 to 40 years of age with male factor infertility, 15 retrievals (25.0% cancellation rate) and 15 gamete transfers were performed. Three clinical pregnancies and two deliveries resulted. The delivery rate in the subgroup was 10.0% per initiated cycle, 13.3% per retrieval, and 13.3% per gamete transfer. The rate of pregnancy loss was 33.3%.

In 29 initiated cycles in women >40 years of age with male factor infertility, 23 retrievals (20.7% cancellation rate) and 22 gamete transfers occurred. Three clinical pregnancies and two deliveries were reported. The delivery rate in this subgroup was 6.9% per initiated cycle, 8.7% per retrieval, and 9.1% per gamete transfer. The rate of pregnancy loss was 33.3%.

Additional ART

ZIFT

Fifty-five programs reported initiating 945 ZIFT cycles, with 860 retrievals, (9.0% cancellation rate) and 792 transfers (92.1% of retrievals). From these, 312 clinical pregnancies were established that resulted in 256 deliveries, for a delivery rate of 27.1% per initiated cycle, 29.8% per retrieval, and 32.3% per zygote transfer. Six ectopic pregnancies were reported (1.9% per clinical pregnancy). Of the

deliveries, 66.4% were singletons, 28.1% were twins, 4.7% were triplets, and 0.8% were higher-order deliveries. Three infants were stillborn (8 per 1,000 neonates).

Donor Oocytes and Donor Embryos

Two hundred eighty-five programs reported use of donor oocytes. Known and anonymous donor cycles were reported together. A total of 6,509 cycles were initiated, and 5,808 transfers were performed. The number of cases in which oocytes from one donor were used for multiple recipients is unknown.

Clinical pregnancies were reported in 2,897 cycles, for a rate of 49.9% per embryo transfer. There were 2,340 deliveries (41.8% per transfer). A total of 3,565 neonates were reported; of these, 58.0% were singletons, 37.4% were twins, 4.4% were triplets, and 0.1% were higher-order deliveries. 44 ectopic pregnancies were reported (1.5% per clinical pregnancy), and 28 neonates were stillborn (8 per 1,000 neonates).

Transfer of Cryopreserved Embryos

Three hundred forty-eight programs reported transfer of cryopreserved nondonor embryos as a separate procedure, using eggs obtained from the intended recipient, for 12,005 thaw and 10,532 transfer procedures (87.7% of thaws resulting in transfer). Clinical pregnancies resulted in 2,453 cycles (21.2% of thaw and 24.1% of transfer procedures), and 1,956 deliveries occurred, for a rate of 16.3% per thaw and 18.6% per transfer procedure.

A total of 2,544 neonates resulted from 1,956 deliveries with known outcome from nondonor cryopreserved embryo transfers. There were 72.9% singleton, 24.3% twin, 2.8% triplet, and 0.1% higher-order deliveries. Eighteen stillborn infants (7 per 1,000) neonates) were reported.

Transfer of Cryopreserved Embryos from Donated Oocytes

Two hundred thirty-seven programs reported transfers of cryopreserved embryo transfers from donated oocytes or embryos. A total of 2,488 thaw and 2,267 transfer procedures, resulting in 665 clinical pregnancies (rates of 26.7% per thaw and 29.3% per transfer procedure) and 536 deliveries (rates of 21.5% per thaw and 23.6% per transfer procedure).

A total of 708 neonates resulted from 536 deliveries with known outcome from cryopreserved embryo transfers from donated oocytes or embryos. Eight stillborn infants (11 per 1,000 neonates) were reported.

Host Uterus Transfer

One hundred sixty-seven programs reported performing host uterus cycles, in which embryos generated from the intended parenting couple were placed into a gestational carrier. A total of 821 cycles were initiated, resulting in 737

transfers. Clinical pregnancies were reported in 304 cycles, for a rate of 37.0% per initiated cycle and 41.6% per embryo transfer. A total of 245 deliveries were reported, including 63.3% singleton, 32.7% twin, 4.1% triplet, and no higher-order births. The delivery rate thus was 29.8% per initiated cycle and 33.6% per transfer. Four ectopic pregnancies and one stillborn infant (3 per 1,000) was reported.

DISCUSSION

In conjunction with the CDC, SART has attempted to facilitate collection of data from all programs providing ART services in the United States. Of 370 reporting programs, 351 (94.9%) were SART members. Twenty-nine medical practices performing ART did not report treatment and outcome data to SART. It is estimated that owing to compelling professional, public, and governmental concerns about ART, almost all programs performing ART now report their data. Annual reporting of data is a requirement of SART membership.

In 1999, there was a 2.8% increase in the number of programs reporting data to the ASRM/SART Registry and a 7.5% increase in the number of procedures reported compared with 1998 (5). In contrast, increases from 1997 to 1998 were 20.0% for the number of reporting clinics and 12.1% for procedures performed (5). In 1999, the number of IVF cycles increased by 8.0%, the number of GIFT cycles decreased by 35.2%, and the number of ZIFT cycles decreased by 10.3% compared to 1998.

In terms of deliveries per transfer, the success rates for all procedures (deliveries per transfer) increased from 30.0% (in 1998) to 30.5% (in 1999), for a relative increase of 1.7%. The success rate for IVF procedures increased in 1999 (29.4%) compared with 1998 (29.1%). Delivery rates for GIFT cycles increased to 27.8% per retrieval in 1999 compared with 27.4% in 1998. The delivery rate for ZIFT increased to 29.8% per retrieval in 1999 from 29.6% in 1998.

Although the difference is not statistically significant for the second year in a row, the success rate of IVF was higher than that of GIFT. However, cycle profiles reveal different age distributions, different diagnostic categories, and differences in numbers of gametes and embryos transferred per patient. These and other factors may influence changes in success rates from year to year (5). The SART continues to work with the CDC to standardize definitions wherever possible and to collect and analyze data, so that registry data can be better analyzed from year to year for stability of results and trends. This approach will help SART identify clinically meaningful differences.

The 1999 cancellation rates (13.6% of all initiated IVF, GIFT, and ZIFT cycles) did not significantly differ from 1998 rates (12.1%). The cancellation rate for IVF procedures (13.7%) in 1999 was similar to that reported 1998 cycles (13.9%). The rate of transfer per retrieval was highest with

GIFT (98.4%), reflecting the fact that fertilization is not a prerequisite for transfer, whereas the IVF and ZIFT procedures yielded transfer rates of 93.1% and 92.1% per retrieval, respectively. Cancellation rates and transfers per retrieval were combined to determine the rate of transfer per initiated cycle. Cycles using GIFT and ZIFT had a higher transfer rate (86.0% and 83.8%, respectively) per initiated cycle than did IVF cycles (80.4%).

The 1999 data further demonstrate the profound effect of age on the success of ART. In IVF, GIFT, ZIFT, and nondonor cryopreserved embryo cycles, the likelihood of success (in terms of deliveries per transfer) in the oldest women (>42 years of age) was 45.7% lower than that for women 41 or 42 years of age, 66.9% lower than that in women 38 to 40 years of age, 74.9% lower than that in women 35 to 37 years of age, and 78.1% lower than that in women <35 years of age. The likelihood of success for women 41 or 42 years of age was 39.1% lower than that in women 38 to 40 years of age, 53.8% lower than that for women 35 to 37 years of age, and 59.6% lower than that in women <35 years of age. The likelihood of success for women 38 to 40 years of age was 24.1% lower than that for women 35 to 37 years of age and 33.7% lower than that for women <35 years of age. The effect of age was also evident in the two youngest groups: Women 35-37 years of age had a 12.6% lower likelihood of success than did women <35 years of age. The greatest effect of age was seen in GIFT cycles, in which women >42 years of age had a 62.3% lower success rate than did women 41 or 42 years of age.

The ages of 35, 38, 40, and 42 years at the time of retrieval were selected arbitrarily as the division points. Future efforts to analyze data by individual patient age will allow more precise determination of probabilities in women at each age.

Age was less of a factor in determining success only in donor oocyte cycles (fresh or cryopreserved) and host uterus transfer cycles.

The effects of male factor infertility continue to be less evident than before 1995, suggesting that clinics with proficiency in ICSI may be able to mitigate the effects of this diagnosis. The technique was used in approximately 43% of all IVF cycles, making 1999 the fifth consecutive year of widespread use of this more successful approach to treatment of male factor infertility. When all IVF cycles are classified as "male factor infertility" and "other diagnosis," patients with male factor infertility had the same delivery rate per retrieval (29.4%) as those with other diagnoses (29.4%).

Data were not collected on the ability of sperm function assays, morphologic assessment, or antibodies to influence ART outcomes. None of these characteristics was included in the definition of male factor for this reporting interval.

The incidence of ectopic pregnancies for all procedures was 0.8% per transfer and 2.2% per clinical pregnancy. This

compares favorably to an estimated overall incidence of ectopic pregnancy in the United States of 2% per reported pregnancy (5).

The incidence of multiple gestations was also determined. The percentage of singleton deliveries ranged from 58.0% for fresh donor cycles to 72.9% for thawed nondonor cycles. Twin deliveries represented 87.2% of all the multiple deliveries reported and 31.8% of all deliveries. The remainder of deliveries were higher-order multiples. The 980 triplet deliveries accounted for 4.5% of all deliveries and 12.3% of all multiple deliveries; 44 quadruplet deliveries represented 0.2% of all deliveries and 0.6% of all multiple deliveries, and no quintuplet deliveries occurred. The incidence of prematurity was not analyzed. The multiple pregnancy rate was unchanged in 1999 compared with 1997 and 1998 (4, 6).

In IVF cycles, singletons represented 63.9% of all deliveries in women 35 to 37 years of age and 58.9% of deliveries in women <35 years of age. The number of embryos transferred averaged 3.2 and varied little by age group. The average number of embryos transferred was 3.0 in women <35 years of age, 3.2 in women 35 to 37 years of age, 3.4 in women 38 to 40 years of age, 3.5 in women 41 or 42 years of age, and 3.2 in women >42 years of age.

Concern about the higher incidence of adverse outcomes associated with multiple pregnancy led SART to establish new guidelines recommending the number of embryos or oocytes to be transferred in certain patient groups (7). These guidelines are based on analysis of the U.S. experience as reported to SART (8). The impact of implementation of these guidelines, which were released in January of 2000, will not be known for several years. Whether new technologies, such as blastocyst culture, will significantly affect the incidence of high-order multiple pregnancies is also yet to be determined.

SUMMARY

The number of programs reporting increased in 1999, as did the number of cycles of ART (7.5%), with an increased overall probability of success. The increase in number of cycles reported is largely attributable to the increase in the number of clinics combined with an increase in the number of treatments at many higher-volume clinics. This greater reporting activity probably relates to the implementation of the federal Fertility Clinic Success Rate and Certification Act. The SART continues to ease the burden of ART reporting but requires all SART member clinics to report their results and participate in an on-site validation process.

The overall delivery rate per transfer increased from 29.9% in 1998 to 30.3% in 1999. This represents a 0.4% absolute increase and 1.2% relative increase. Combined with a 6.8% increase in transfers, this resulted in 1,663 additional deliveries, for a 8.2% increase. The dominant adverse effect of female age on outcomes was corroborated, whereas male

factor infertility now appears to have a limited effect on outcomes because of the availability of ICSI. The number of couples receiving fresh and frozen oocyte donation and cryopreserved embryo cycles increased by 23.4%, 30.1%, and 6.9% respectively. Rates of live birth per transfer with these three types of cycles were 1.5%, 0.7%, and 3.8% higher, respectively, than in 1998. Outcomes of IVF pregnancies are adversely affected by multiple pregnancies. Guidelines for embryo transfer and improved laboratory technology should help ameliorate this problem. Otherwise, the data do not suggest that outcomes matched for singletons, twins, or higher-order pregnancies differ from those in the general population; however, improved long-term follow-up studies are needed to confirm this finding.

COMMENTS

This activity report for the year 1999 is the fourth in which ART outcome reporting is compiled solely from patient- and cycle-specific data submitted by ART programs to SART, in cooperation with the CDC. The functions of data collection and validation are carried out under the auspices of the SART Executive Council and the CDC, with input from the SART Registry, Validation, Quality Assurance, and Research Committees, as well as the National Coalition for the Oversight of ART. The ASRM and SART believe that the efforts of the SART Executive Council and SART committees, in both the data reporting and laboratory accreditation arenas, facilitate compliance by ART programs with the Federal Fertility Clinic Success Rate and Certification Act of 1992.

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APPENDIX

The data for each reporting program were published separately in the annual Clinic Specific Report for 1999. The programs that submitted data are listed below.

Alabama: ART Program of Alabama, Birmingham; University of Alabama at Birmingham, Birmingham; Center for Reproductive Medicine, Mobile; University of South Alabama IVF and ART Program, Mobile.

Arkansas: Intra Vaginal Culture Fertilization Program of Arkansas, Little Rock; University of Arkansas for Medical Sciences IVF, Little Rock.

Arizona: Fertility Treatment Center, Chandler; West Valley Fertility Center, Glendale; Arizona Reproductive Medicine Specialists, Phoenix; IVF Phoenix, Phoenix; Southwest Fertility Center, Phoenix; Arizona Center for Fertility Studies, Scottsdale; Mayo Clinic Scottsdale, Scottsdale; Arizona Center for Reproductive Endocrinology and Infertility, Tucson.

California: Center for Reproductive Medicine University of Colorado Health Sciences Center, Aurora; Alta Bates In Vitro Fertilization Program, Berkeley; Reproductive Medicine and Surgery Associates, Beverly Hills; Reproductive Medicine and Surgery Associates, Beverly Hills; West Coast Infertility Medical Clinic, Inc., Beverly Hills; West Coast Fertility Centers, Fountain Valley; Reproductive Partners—San Diego, La Jolla; Reproductive Sciences Center, La Jolla; Scripps Clinic Fertility Center, La Jolla; Jane L. Frederick, M.D., Inc., Laguna Hills; Loma Linda University Center for Fertility and IVF, Loma Linda; Reproductive Partners—Long Beach, Long Beach; University of California, Los Angeles Fertility Center, Los Angeles; University of Southern California Reproductive Endocrinology and Infertility, Los Angeles; Brian Su, M.D., Monterey Park; Reproductive Specialty Medical Center, Newport Beach; Northridge Center for Reproductive Medicine, Northridge; IVF-Orange, Orange; Susan P. Willman, M.D., Orinda; Nova In Vitro Fertilization, Palo Alto; Huntington Reproductive Center, Pasadena; Center for Advanced Reproductive and Endocrinology Services, Redding; Reproductive Partners—Redondo Beach, Redondo Beach; Northern California Fertility Medical Center, Roseville; University of California—Davis Assisted Reproductive Technology Program, Sacramento; The Fertility and Gynecology Center, Salinas; IGO Medical Group of San Diego, San Diego; Infertility

Clinic Naval Medical Center, San Diego, San Diego; Sharp Fertility Center, San Diego; ASTARTE Fertility Center, San Francisco; San Francisco Fertility Centers Pacific Fertility Center, San Francisco; Simon R. Henderson, M.D., San Francisco; University of California, San Francisco; In Vitro Fertilization Program, San Francisco; Carmelo S. Sgarlata, M.D., San Jose; Fertility Physicians of Northern California, San Jose; Reproductive Science Center of the San Francisco Bay Area, San Ramon; Center for Assisted Reproductive Medicine/CFA, Santa Monica; Issa M. Shamonki, M.D., Fertility Clinic, Santa Monica; Parker-Rosenman-Rodi Gynecology and Infertility Medical Group, Santa Monica; North Bay Fertility Center, Inc., Santa Rosa; Valley Center for Reproductive Health, Sherman Oaks; Stanford University IVF/ART Program, Stanford; Infertility and Gynecology Institute, Tarzana; The Center for Fertility and Gynecology Vermesh/Ben-Ozer Center for Fertility, Tarzana; The Fertility Institutes/Jeffrey Steinberg, M.D., Incorporated, Tarzana; Fertility and Surgical Associates, Thousand Oaks; Pacific Reproductive Center, Torrance; San Antonio Fertility Center, Upland.

Colorado: Colorado Springs Center for Reproductive Health, Colorado Springs; Reproductive Medicine and Fertility Center of Southern Colorado, Colorado Springs; Colorado IVF at Rose, Denver; Reproductive Genetics In Vitro, Denver; The Colorado Center for Reproductive Medicine, Englewood; Rocky Mountain Center for Reproductive Medicine, Fort Collins; Conceptions Reproductive Associates, Littleton.

Connecticut: The Center for Advanced Reproductive Services at the University of Connecticut Health Center, Farmington; Yale University School of Medicine In Vitro Fertilization Program, New Haven; New England Fertility Institute, Stamford; The Stamford Hospital, Stamford.

District of Columbia: Columbia Hospital for Women ART Program; Reproductive Science Center, Walter Reed Army Medical Center; George Washington University Medical Faculty Associates.

Delaware: Delaware Institute for Reproductive Medicine, P.A., Newark; Reproductive Associates of Delaware, Newark.

Florida: Boca Fertility, Boca Raton; Palm Beach Fertility Center, Boca Raton; Advanced Reproductive Care Center, P.A., Boynton Beach; Reproductive Health Associates Catherine L. Cowart, M.D., Clearwater; The Center for Human Reproduction Edward Zbella, M.D., P.A., Clearwater; F.I.R.S.T. Florida Institute for Reproductive Sciences and Technologies, Cooper City; Specialists In Reproductive Medicine and Surgery, P.A., Fort Myers; University of Florida/Park Avenue Women's Center, Gainesville; Fertility Institute of Northwest Florida, Gulf Breeze; Assisted Fertility Program of North Florida, Jacksonville; Florida Institute for Reproductive Medicine, Jacksonville; North Florida Gyne-

cologic Specialists, Jacksonville; IVF Florida Memorial Advanced Fertility Treatment Center, Margate; Women's Healthcare Specialists IVF Miami, Miami Beach; Fertility and IVF Center of Miami, Inc., Miami; Palmetto Fertility Center of South Florida, Miami; Arnold Palmer Hospital Fertility Center, Orlando; Center for Infertility and Reproductive Medicine, PA, Orlando; Reproductive Health Institute, Orlando; Reproductive Medicine and Fertility Center, Orlando; University of Florida - Pensacola, Pensacola; Center for Advanced Reproductive Endocrinology, P.A., Plantation; Fertility Institute of Fort Lauderdale, Plantation; Fertility Center of Sarasota Julio E. Pabon, M.D., P.A., Sarasota; South Florida Institute for Reproductive Medicine, South Miami; Advanced Reproductive Technologies Program at University Community Hospital; Drs. Verkauf, Bernhisel, and Tarantino, Tampa; Genetics and IVF Institute of Florida, West Palm Beach.

Georgia: Emory Center for Reproductive Medicine and Fertility, Atlanta; Reproductive Biology Associates, Atlanta; Augusta Reproductive Biology Associates, Augusta; Atlanta Center for Reproductive Medicine, Woodstock.

Hawaii: Pacific In Vitro Fertilization Institute, Honolulu; Tripler Army Medical Center, Tripler.

Iowa: McFarland Clinic, P.C. Assisted Reproduction, Ames; University of Iowa Hospitals and Clinics/Center for Advanced Reproductive Care, Iowa City; Mid-Iowa Fertility, P.C., West Des Moines.

Idaho: Idaho Center for Reproductive Medicine, Boise.

Illinois: Advanced Institute of Fertility, Arlington Heights; Rush-Copley Center for Reproductive Health, Aurora; Life-Women's Health Center, Berwyn; IVF Illinois, Inc., Chicago; Northwestern University, Chicago; Rush Center for Advanced Reproductive Care, Chicago; University of Illinois At Chicago IVF Program, Chicago; Watertown Women's Center, LLC, Chicago; Midwest Fertility Center, Downers Grove; Advanced Fertility Center of Chicago, Gurnee; Highland Park IVF Center, Highland Park; Hinsdale Center for Reproduction, Hinsdale; Center for Human Reproduction-IL, Hoffman Estates; Reproductive Health Specialists, Ltd., Joliet; Oak Brook Fertility Center, Oak Brook; Reena Jabamoni, M.D., S.C., Oakbrook; Advanced Reproductive Health Centers, Ltd., Orland Park; Lutheran General Hospital IVF Program, Park Ridge; Advanced Reproductive Center, Rockford; Reproductive Health and Fertility Center, Rockford; Reproductive Endocrinology Associates, S.C., Springfield; Southern Illinois University School of Medicine, Springfield.

Indiana: Associated Fertility and Gynecology, Fort Wayne; Advanced Fertility Group, Indianapolis; Family Beginnings, PC, Indianapolis; Indiana University Hospital, Indianapolis; Midwest Reproductive Medicine, Indianapolis; Reproductive Endocrinology Associates, Indianapolis; Reproductive Surgery and Medicine, P.C., Indianapolis; Me-

morial Hospital Center for Assisted Reproduction, South Bend.

Kansas: University of Kansas Medical Center Women's Reproductive Center, Kansas City; Drs. Marshall, Henning, and Catterson P.A., D.B.A. IVF Reproductive Services, Manhattan; Reproductive Resource Center of Greater Kansas City, Overland Park; Reproductive Medicine and Infertility Shawnee Mission Medical Center, Shawnee Mission; The Center for Reproductive Medicine, Wichita.

Kentucky: Fertility and Endocrine Associates, Lexington; University of Kentucky, Lexington; University of Kentucky James W. Akin, Lexington; University OBGYN Associates Fertility Center, Louisville.

Louisiana: Woman's Center for Fertility and Advanced Reproductive Medicine, Baton Rouge; The Center for Fertility and Advanced Reproductive Care, Metairie; Fertility Institute of New Orleans, New Orleans; Center for Fertility and Reproductive Health, Shreveport.

Massachusetts: Center for Assisted Reproduction/Center for Reproductive Medicine, Boston; Massachusetts General Hospital Vincent IVF Unit, Boston; New England Fertility and Endocrinology Associates, Brookline; Fertility Center of New England, Inc./New England Clinic of Reproductive Medicine, Reading; Baystate IVF, Springfield; Boston IVF, Waltham; Reproductive Science Center of Boston, Waltham.

Maryland: Fertility Center of Maryland, Baltimore; Greater Baltimore Medical Center Fertility Center, Baltimore; Helix Center for ART, Baltimore; University of Maryland Medical School—Center for Advanced Reproductive Technology, Baltimore; Chang and Abbasi, M.D., P.A., Bethesda; Johns Hopkins Fertility Center, Lutherville; Center for Reproductive Medicine, Rockville; Shady Grove Fertility Center, Rockville.

Michigan: University of Michigan, Ann Arbor; Center for Reproductive Medicine Oakwood Hospital and Medical Center, Dearborn; The Center for Reproductive Medicine Hurley Medical Center, Flint Michigan, Flint; Grand Rapids Fertility/Spectrum Health East, Grand Rapids; Michigan Reproductive and IVF Center, P.C., Grand Rapids; West Michigan Reproductive Institute, P.C., Grand Rapids; Infertility and Gynecology Center of Lansing, PC, Lansing; Michigan State University Center for Assisted Reproductive Technology, Lansing; Fakh Institute of Reproductive Science and Technology, Rochester Hills; The Center for Reproductive Medicine At Rochester Hills, Mi, Rochester Hills; William Beaumont Fertility Center, Royal Oak; Hutzel Hospital/Wayne State University ART Program, Southfield; Henry Ford Reproductive Medicine, Troy; Ann Arbor Reproductive Medicine Associates, P.C., Ypsilanti.

Minnesota: Center for Reproductive Medicine, Minneapolis; The Midwest Center for Reproductive Health, P.A., Minneapolis; Mayo Clinic Assisted Reproductive Technol-

ogies, Rochester; Reproductive Medicine and Infertility Associates, P.A., St. Paul.

Missouri: Advanced Reproductive Specialists, Chesterfield; Infertility Institute, Chesterfield; Mid-Missouri Center for Reproductive Health, Columbia; University of Missouri Hospital and Clinics/IVF Embryology Laboratory, Columbia; Infertility and IVF Center, St. Louis; Infertility Center of St. Louis, St. Louis; Washington University and Barnes-Jewish Hospital Center for Reproductive Medicine, St. Louis.

Mississippi: University of Mississippi Medical Center, Jackson; Women's Specialty Center, Jackson.

North Carolina: North Carolina Center for Reproductive Medicine/The Talbert Fertility Institute, Cary; University of North Carolina A.R.T. Clinic, Chapel Hill; Institute for Assisted Reproduction, Charlotte; Program for Assisted Reproduction, Carolinas Medical Center, Charlotte; The Fertility Center at Northeast Medical Center, Concord; Duke University Medical Center Division of Reproductive Endocrinology and Infertility, Durham; East Carolina University Women's Physicians, Greenville; Wake Forest University Program for Assisted Reproduction, Winston-Salem.

Nebraska: Center for Reproductive Medicine, Omaha; Nebraska Methodist Hospital REI, Omaha.

New Hampshire: Dartmouth-Hitchcock Medical Center, Lebanon.

New Jersey: Shore Institute for Reproductive Medicine, Brick; Reproductive Gynecologists, P.C., Cherry Hill; Center for Advanced Reproductive Medicine and Fertility, Edison; North Hudson I.V.F. Center for Fertility and Gynecology, Englewood Cliffs; Dr. Philip R. Lesorgen Women's Fertility Center, Englewood; IVF of North Jersey, PA, Fairlawn; Center for Reproductive Medicine At Hackensack University Medical Center, Hasbrouck Heights; Delaware Valley OBGYN and Infertility Group, Lawrenceville; Princeton Center for Infertility and Reproductive Medicine, Lawrenceville; East Coast Infertility and IVF, P.C., Little Silver; Institute for Reproductive Medicine and Science/Saint Barnabas Medical Center, Livingston; Cooper Center for In Vitro Fertilization, P.C., Marlton; Delaware Valley Institute of Fertility and Genetics, Marlton; South Jersey Fertility Center, PA, Marlton; Diamond Institute for Infertility, Millburn; The Center for Reproductive Endocrinology, Morristown; Robert Wood Johnson Medical School—IVF Program, New Brunswick; IVF New Jersey, Somerset; Dr. Louis R. Manara, Voorhees; Center for Human Reproduction of New Jersey, Westwood.

New Mexico: Center for Reproductive Medicine of New Mexico, Albuquerque; Southwest Fertility Services, Albuquerque.

Nevada: Fertility Center of Las Vegas, Las Vegas; Nevada Fertility C.A.R.E.S./University Institute for Fertility,

Las Vegas; Sher Institute for Reproductive Medicine, Las Vegas; The Nevada Center for Reproductive Medicine, Reno.

New York: Albany IVF, Fertility and Gynecology, Albany; Leading Institute for Fertility Enhancement (LIFE), Albany; Brooklyn IVF, Brooklyn; Montefiore's Fertility and Hormone Center, Dobbs Ferry; Garden City Center for Advanced Reproductive Technologies/Yu-Kang Ying, M.D., P.C., Garden City; North Shore University Hospital Center for Human Reproduction, Manhasset; Reproductive Science Associates, Mineola; Advanced Fertility Services, New York; Brandeis Center for Reproductive Health, New York; Brooklyn Fertility Center, New York; Center for Human Reproduction, New York; Columbia Presbyterian Medical Center/Center for Women's Reproductive Care, New York; Dr. Lillian D. Nash, M.D., New York; Martin Keltz, M.D./St. Luke's Roosevelt Hospital, New York; Nabil Husami, M.D., New York; New York Fertility Institute, New York; New York Medical Services for Reproductive Medicine, New York; New York University Medical Center—Program for In Vitro Fertilization, New York; Weill Medical College of Cornell University, the Center for Reproductive Medicine and Infertility, New York; The Capital Region Genetics and IVF Center Bellevue Woman's Hospital, Niskayuna; Long Island IVF Associates, Port Jefferson; Institute for Reproductive Health and Infertility, Rochester; Strong Infertility and IVF Center, Rochester; Children's Hospital IVF Program, Snyder; Division of Reproductive Endocrinology and Infertility, Stony Brook; CNY Fertility Center, Syracuse; Westchester Fertility and Reproductive Endocrinology, White Plains; Reproductive Medicine/IVF, Williamsville.

Ohio: Akron City Hospital IVF Center Summa/Health System, Akron; Fertility Unlimited, Inc., Akron; University Hospitals of Cleveland Goldfarb/Desai IVF Program, Beachwood; Bethesda Center for Reproductive Health and Fertility, Cincinnati; Center for Reproductive Health, Cincinnati; Greater Cincinnati Institute for Reproductive Health, Cincinnati; Cleveland Clinic Foundation—Main Campus, Cleveland; MetroHealth Medical Center Fertility Clinic, Cleveland; Ohio Reproductive Medicine, Columbus; Miami Valley Hospital Fertility Center, Dayton; Kettering Reproductive Medicine, Kettering; Fertility Center of Northwestern Ohio, Toledo; The Reproductive Center, Youngstown.

Oklahoma: Center for Reproductive Health, P.C., Oklahoma City; Henry G. Bennett, Jr., Fertility Institute, Oklahoma City; Tulsa Center for Fertility and Women's Health, Tulsa.

Oregon: Northwest Fertility Center, Portland; University Fertility Consultants—Oregon Health Sciences University, Portland.

Pennsylvania: Toll Center for Reproductive Sciences at Abington Memorial Hospital/Abington Reproductive Medicine, P.C., Abington; Infertility Solutions, P.C., Allentown;

Lehigh Valley Hospital Section of Reproductive Endocrinology and Infertility, Allentown; Reprotect, Inc., Allentown; Family Fertility Center, Bethlehem; Main Line Fertility and Reproductive Medicine, Ltd., Byrn Mawr; Geisinger Medical Center Fertility Program, Danville; Milton S. Hershey Medical Center, Hershey; Jenkintown Reproductive Endocrine and Gynecology Associates, P.C., Jenkintown; Northern Fertility and Reproductive Associates P.C., Meadow Brook; Pennsylvania Reproductive Associates Women's Institute for Fertility, Endocrinology, and Menopause, Philadelphia; Thomas Jefferson IVF Program, Philadelphia; University of Pennsylvania, Philadelphia; Allegheny General Hospital—IVF Program, Pittsburgh; University of Pittsburgh Physicians, Pittsburgh; Reproductive Endocrinology and Fertility Center, Upland; Reproductive Science Institute of Greater Philadelphia, Wayne; Women's Clinic, Ltd., West Reading; Fertility and Gynecology Associates, Willow Grove.

Puerto Rico: Dr. Pedro J. Beauchamp, M.D., Bayamon; Centro de Fertilidad del Caribe, Rio Piedras; GREFI/Gynecology, Reproductive Endocrinology and Fertility Institute, Santurce.

Rhode Island: Women and Infants' IVF Program, Providence.

South Carolina: Reproductive Endocrinology and Infertility, Greenville; Southeastern Fertility Center, P.A., Mount Pleasant.

South Dakota: University Physicians Fertility Specialists, Sioux Falls.

Tennessee: Center for Reproductive Medicine and Fertility, Chattanooga; Appalachian Fertility and Endocrinology Center, Kingsport; East Tennessee IVF, Fertility and Andrology Center, Knoxville; Nashville Fertility Center, Nashville; The Center for Reproductive Health, Nashville.

Texas: Dr. Harold Brumley, M.D., Austin; Dr. Jeffrey Youngkin/Austin Fertility Center, Austin; Texas Fertility Center/Drs. Vaughn, Silverberg, and Hansard, Austin; Center for Assisted Reproduction, Bedford; Trinity In Vitro Fertilization Program, Carrollton; Baylor Center for Reproductive Health, Dallas; Dallas In Vitro Associates, Dallas; National Fertility Center of Texas, P.A., Dallas; University of Texas, Southwestern Fertility Associates, Dallas; Baylor Assisted Reproductive Technology, Houston; Center for Women's Health, Houston; Cooper Institute for Advanced Reproductive Medicine, Houston; North Houston Center for Reproductive Medicine, P.A., Houston; Obstetrical and Gynecological Associates, Houston; University of Texas Women's Center, Houston; Advanced Reproductive Care Center of Irving, Irving; Wilford Hall Medical Center, Lackland Air Force Base; Centre for Reproductive Medicine, Lubbock; Texas Tech University Health Science Center—IVF Program, Lubbock; Fertility Center of San Antonio, San Antonio; Fertility Concepts, San Antonio; Institute for Women's

Health Advanced Fertility Laboratory, San Antonio; South Texas Fertility Center/University of Texas Health Science Center, San Antonio, San Antonio; Center of Reproductive Medicine, Webster.

Utah: Reproductive Care Center, Salt Lake City; Utah Center for Reproductive Medicine, Salt Lake City.

Virginia: Fertility and Reproductive Health Center, Annandale; Dominion Fertility and Endocrinology, Arlington; University of Virginia ART Program, Charlottesville; Jones Institute for Reproductive Medicine, Norfolk; Fertility Institute of Virginia, Richmond; LifeSource Fertility Center, Richmond; Medical College of Virginia/Virginia Commonwealth University IVF/GIFT, Richmond; The Richmond Center for Fertility and Endocrinology, Ltd., Richmond; The New Hope Center for Reproductive Medicine, Virginia Beach.

Vermont: University of Vermont–IVF Program, Burlington.

Washington: Washington Center for Reproductive Medicine, Bellevue; Olympia Women's Health, Olympia; Pacific Gynecology Specialists, Seattle; University of Washington, Fertility and Endocrine Center, Seattle; Virginia Mason Center for Fertility and Reproductive Endocrinology, Seattle; The Center for Reproductive Endocrinology and Fertility, Spokane; GYFT Clinic, PLLC, Tacoma.

Wisconsin: Family Fertility Program/Appleton Medical Center, Appleton; Gundersen/Lutheran Medical Center, LaCrosse; University of Wisconsin–Madison/Women's Endocrine Services, Madison; Advanced Institute of Fertility, Milwaukee; Medical College of Wisconsin/Department of OB/GYN, Milwaukee; Reproductive Specialty Center IVF Columbia, Milwaukee; Women's Health Care, S.C., Waukesha; Womenscare, Waukesha; Clinic of Obstetrics and Gynecology, Ltd., West Allis.

West Virginia: Center for Reproductive Medicine/West Virginia University Health Science Center, Charleston.