
Oocyte donation in Israel: a study of 1001 initiated treatment cycles

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There are numerous studies concerning pregnancy rates in oocyte donation, yet only a handful report the obstetric outcome in such pregnancies. The purpose of this study was to assess factors that influence pregnancy rates, to determine the incidence of complications, and to evaluate obstetric outcome in pregnancies resulting from oocyte donation. This study included 423 oocyte recipients who underwent 1001 oocyte donation cycles at the Oocyte Donation Programme, In-Vitro Fertilization (IVF)–Embryo Transfer Unit, Herzlia Medical Center, Israel. Donors were all healthy women <34 years old who underwent IVF themselves. In 873 cycles, fertilization occurred and embryo transfer was performed, resulting in 194 clinical pregnancies. Pregnancy rates (PR) significantly declined with the increase in number of previous attempts, and with increasing age of recipient (36.8%/embryo transfer in patients ≤30 compared to 17.8% in patients >40 years old). A significant increment in PR was noted with the increasing number of embryos transferred. The overall PR was 22.2%/embryo transfer. However, in young amenorrhoeic patients with normal karyotypes undergoing their first cycle, PR was 52.2%; the ‘take home baby’ rate was 38.3% per patient undergoing embryo transfer and 17.8% per embryo transfer cycle. A significant increase in the incidence of pregnancy-induced hypertension and a higher proportion of abortions were noted in older patients. A significantly higher incidence of prematurity and low birthweight was observed in multiple pregnancies.

Key words: ageing/embryo transfer/IVF/oocyte donation/pregnancy complication

Introduction

More than a decade ago Lutjen et al. (1984) reported the first birth after embryo donation. However, the first pregnancy achieved after oocyte donation was reported a year earlier by Trounson et al. (1983); alas this pregnancy resulted in a miscarriage. Since then, oocyte donation has been widely used to alleviate infertility. Initially, this treatment was intended for women with ovarian failure (Lutjen et al., 1984; Devroey et al., 1988; Cornet et al., 1990). After the establishment of adequate protocols for endometrial preparation, early studies were highly optimistic, with reported pregnancy rates (PR) approaching 56–67% in young amenorrhoeic patients (Paulson et al., 1990; Navot et al., 1991). Subsequently, oocyte donation has been extended to other forms of infertility including menopausal women (Antinori et al., 1993). Patients with preserved ovarian function who have repeated in-vitro fertilization IVF failures (Formigli et al., 1989; Yaron et al., 1993; Pados et al., 1994), or patients with a genetic trait precluding use of their own oocytes (Yaron et al., 1993; Pados et al., 1994). These larger, more recent series have reported PR as low as 20% per embryo transfer (Levran et al., 1991; Meldrum, 1993; Pados et al., 1994; Yaron et al., 1994). This apparent discrepancy is most likely the result of variable patient-selection criteria. Thus our first objective was to evaluate the factors that influence PR in oocyte donation.

The majority of publications that deal with oocyte donation focus on PR per embryo transfer as the main outcome measure. Notwithstanding the merit of this information, more relevant outcome measures may include pregnancy complications including miscarriage rates and obstetric outcome including ‘take home baby rate’. Accordingly, our second objective was to evaluate the course, rate of complications, and outcome of pregnancies resulting from oocyte donation.

Materials and methods

Patients

Ovum donors

According to the regulations of the Israeli Ministry of Health, oocytes may only be donated anonymously by patients undergoing IVF themselves. Oocyte donors were therefore young (age ≤34 years), healthy women, undergoing IVF for a variety of causes including mechanical and male factor infertility. All had at least one previous IVF cycle in which fertilization of >50% of oocytes occurred. These patients were thoroughly counselled and gave their informed consent to donate any excess oocytes. All donors underwent screening for infectious disease including human immunodeficiency virus (HIV) and hepatitis B, and a thorough evaluation of any family history of birth defects or inherited disorders was carried out.

Ovum recipients

The study included 423 patients treated by oocyte donation at the IVF–Embryo Transfer Unit, Herzlia Medical Center over a 6 year period. Prior to treatment, all applicants were interviewed, physically examined and underwent a battery of tests that included electrocardiogram, chest X-ray, complete blood count, urea, creatinine, aspartate
secondary ovarian failure as assessed by menstrual history and serum prolactin, thyroid function tests, hysterosalpingogram, hysteroscopy and semen analysis. Patients were counselled regarding the expected success rates and outcomes based on our previous experience, and gave their informed consent.

Group A (ovarian failure) included 172 patients with primary or secondary ovarian failure as assessed by menstrual history and serum follicle stimulating hormone (FSH) concentrations >20 IU/l. These included 42 patients with primary ovarian failure and 130 patients with secondary ovarian failure resulting from surgical oophorectomy, and premature or timely menopause. Group B (functional ovaries) comprised 251 patients with retained ovarian function as manifested by menstrual periods of varying regularity, and FSH concentrations within the normal range for the reproductive period. These included 114 patients with poor response to menotrophins, 87 patients with repeated failures in standard IVF, 39 women ≤44 years of age whose chance of pregnancy in standard IVF was considered extremely low (Yaron et al., 1995), and 11 patients with a genetic trait precluding use of their own oocytes. Patients’ age ranged from 21 to 54 years.

Treatment protocols

Donors
Ovulation induction was performed using a routine protocol of human menopausal gonadotrophin (HMG) alone or in combination with a gonadotrophin-releasing hormone analogue (GnRHa). Treatment protocols were individualized with regards to the recorded response to previous ovulation induction cycles, the occurrence of premature luteinization, and physician preference. Patients given a GnRHa/HMG protocol received 900 µg/day of buserelin nasal spray [d-Ser(TBU)6-ethylamide-luteinizing hormone-releasing hormone, Suprefact; Hoechst AG, Frankfurt, Germany] beginning on the first day of the menstrual cycle. Regardless of whether GnRHa was used, all patients were given 3 ampoules/day of HMG (Pergonal; Teva Pharmaceutical Industries Limited, Petah-Tikva, Israel) starting on day 3 of the cycle. Thereafter, the daily dose of HMG was modified according to serial oestradiol measurements and transvaginal sonography of the developing ovarian follicles. This protocol was continued until follicles reached a mean diameter of 17 mm and the serum oestradiol concentration was ≥800 pg/ml (conversion factor to SI unit, 3.671). At this stage, 10 000 IU human chorionic gonadotrophin (HCG, Chorigon; Teva Pharmaceutical Industries Limited) was administered. Oocyte retrieval was performed 35 h later using an ultrasound-guided transvaginal approach.

Ovum recipients
Patients on standby to receive donated ova, regardless of ovarian function, were treated with 2 mg oestradiol valerate three times a day for endometrial preparation (Progynon; Schering AG, Berlin, Germany). Ovulating patients were started on oestradiol valerate on day 3 of the cycle. The duration of the treatment with oestradiol valerate varied in accordance with the availability of the oocytes, ranging from 5 to 50 days. Beginning on the day when oocytes for donation were aspirated, a daily dose of 100 mg progesterone in oil (Gestone; Paines and Byrne Limited, Greenford, Middlesex, UK) was added.

Insemination and embryo transfer
Oocytes were distributed randomly between the donor and one or more recipients. Each patient received three to five oocytes. Oocytes were inseminated and cultured in Ham’s F-10 medium (Flow Laboratories, Irvine, UK), supplemented with 10–20% heat-inactivated patients’ serum. Semen was analysed according to World Health Organization criteria (1983). Cases with subfertile spermatozoa where micromanipulation (e.g. intracytoplasmic sperm injection) was used, were not included in the study. The criteria for embryo grading were based on the gross morphological appearance as assessed by light microscopy (Veeck, 1989). Embryos that contained intact and symmetrical blastomeres with no cytoplasmic fragments or minor fragments were scored as good quality embryos (Scott et al., 1991), while those with only one intact blastomere, or that were completely fragmented with no cells, were graded as poor-quality embryos. Those of intermediate quality were graded as moderate-quality embryos. Only good- or moderate-quality embryos were transferred. Oocyte distribution among the recipients was performed at random. Embryo transfer was performed 48–72 h following retrieval. Twelve days later, the serum concentration of the β-subunit of HCG was determined and, if pregnancy was confirmed, the daily doses of oestradiol valerate and progesterone were continued until 12–14 weeks of gestation. Ultrasound was performed at 6 and 8 weeks gestation to confirm clinical pregnancy.

Statistical analysis

Inter-group comparisons were analysed using BMDP statistical software package (BMDP Statistical Software, Inc., Release 7.0, 1992) and StatView 4.01 for Macintosh. Dichotomous variables were analysed by Pearson χ² for ordered categories with test of linear trend. Continuous data were subjected to analysis of variance (ANOVA). P ≤ 0.05 was considered to indicate statistical significance. Results are presented as mean ± SD.

Results
A total of 423 patients underwent 1001 oocyte donation cycles over a 6 year period. The mean number of treatment cycles per patient was 2.4 ± 1.3 (range 1–11). In 128 cycles (12.8%) no fertilization occurred, whereas in 873 cycles fertilization of at least one oocyte occurred and embryo transfer was performed. In 34 cycles, only biochemical pregnancies were noted (3.9% per embryo transfer), which were not included in the statistical analysis. A total of 194 clinical pregnancies occurred (22.2% per embryo transfer). As noted in Figure 1, PR significantly declined with the increasing number of attempts required for conception (P < 0.0001), being 35.1% for patients on their first attempt compared to only 11.6% for patients on their ≥6th attempt. As presented in Figure 2, a significant decrease in PR was noted with increasing recipient age

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The negative correlation between recipients’ age and PRs was still maintained when data were stratified according to the indication for treatment (data not shown). The relationship between the number of embryos transferred and the associated PR, multiple pregnancy and triplet rates is presented in Figure 3. A significant increase in PR was noted with the greater number of embryos transferred ($P < 0.001$). Furthermore, the increase in the number of embryos transferred was associated with a significant increase in multiple pregnancy rates ($P < 0.001$), and a sharp elevation in the risk of triplet pregnancies ($P = 0.013$). Pregnancy rates according to the indications for oocyte donation treatment are presented in Table I. There was a trend towards higher PR in patients with ovarian failure (group A) compared to those with functioning ovaries (group B), but this was not statistically significant (24.9% versus 20.1%, $P = 0.09$). Among the 23 young, amenorrhoeic patients with normal karyotypes, undergoing their first oocyte donation cycle, PR was 52.2%. No significant changes in PR were noted for different durations of oestradiol treatment ranging from 7 to 35 days, with respective PR ranging from 19 to 25.7%. The small number of patients receiving oestradiol for >35 days precluded statistical analysis. Further stratification according to age or the indication for treatment yielded similar results. The overall PR among the donors was 25.3% per embryo transfer. No difference in PR was noted among either donors or recipients with regard to different ovulation induction protocols. There were no differences in mean oocyte or embryo morphology grade among the different recipient groups.

Pregnancy outcomes according to ovarian function and recipient’s age are presented in Table II. No significant trends were noted for early and late abortions, ectopic pregnancies, preterm deliveries, stillbirths, gestational diabetes, and bleeding episodes in pregnancy. The incidence of pregnancy-induced hypertension in patients >40 years old was 2-fold higher than in patients ≤40 years old (22.6% versus 10.8%, $P = 0.046$). There were no statistically significant differences in the incidence of hypertension when stratified according to the number of fetuses, due to the relatively small number of cases in each category. The high proportion of preterm deliveries (18.5% overall) may be attributed to the high incidence of preterm deliveries among multiple pregnancies (46.5% and 75% for twin and triplet pregnancies, respectively). Indeed, the proportion of preterm deliveries for singletons was 10.6% which is comparable to that of our general obstetric population. There also appeared to be a higher risk of abortion and preterm delivery with increasing maternal age, but these were not statistically significant. Table III describes the outcomes for singletons, twins and triplets. A significant stepwise decrease in mean birthweight was noted for twins and triplets, compared to singletons ($P < 0.0001$). Likewise, a significant increase in the incidence of intrauterine growth restriction (IUGR) and preterm deliveries was noted for twins and triplets ($P < 0.0001$).

The great majority of the pregnancies were delivered by Caesarean section (76.1%), compared to ~12% for our general obstetric population. Even for singleton pregnancies the proportion of Caesarean sections was 71.2%. This was even more apparent in twin (83.7%) and in triplet pregnancies (100%). The overall ‘take home baby’ rate was 36.6% per patient, 15.5% per treatment cycle, 38.3% per patient undergoing embryo transfer and 17.8% per embryo transfer cycle. An interesting observation was the high female/male ratio among the newborns (1.19). No fetal malformations have been reported thus far.

**Discussion**

This study evaluates the results of 1001 oocyte donation cycles performed in an oocyte donation programme over a 6 year period. In 87.2% of the initiated cycles fertilization occurred and embryo transfer was performed. This rate is comparable to the transfer rate of 81.5% in a series of 412 initiated cycles reported by Pados et al. (1994). A total of 194 clinical pregnancies resulted yielding an overall clinical PR of 22.2% per embryo transfer. Some oocyte donation programmes have reported PR as high as 56% (Navot et al., 1991) and 67% (Paulson et al., 1990). These series, however, were comparatively small, and included predominantly young amenorrhoeic patients. Subsequent studies that included older patients were somewhat less successful, with PR of 39% as reported by
Table I. Pregnancy rates according to the indications for oocyte donation

<table>
<thead>
<tr>
<th>Indication for oocyte donation</th>
<th>No. of women</th>
<th>Donation cycles</th>
<th>Embryo transfer cycles</th>
<th>Pregnancies (rate/embryo transfer)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ovarian failure (group A)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary ovarian failure (OF)</td>
<td>23</td>
<td>60</td>
<td>50</td>
<td>18 (36.0)</td>
</tr>
<tr>
<td>Normal karyotype</td>
<td>19</td>
<td>58</td>
<td>51</td>
<td>12 (23.5)</td>
</tr>
<tr>
<td>Abnormal karyotype</td>
<td>12</td>
<td>30</td>
<td>26</td>
<td>6 (23.1)</td>
</tr>
<tr>
<td>Postsurgical OF</td>
<td>74</td>
<td>209</td>
<td>183</td>
<td>48 (26.2)</td>
</tr>
<tr>
<td>Menopause</td>
<td>44</td>
<td>100</td>
<td>13</td>
<td>16.3 (26.2)</td>
</tr>
<tr>
<td>Subtotal for group A</td>
<td>172</td>
<td>457</td>
<td>390</td>
<td>97 (24.9)</td>
</tr>
<tr>
<td><strong>Functional ovaries (group B)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor responders</td>
<td>114</td>
<td>255</td>
<td>222</td>
<td>40 (18.0)</td>
</tr>
<tr>
<td>Failed previous IVF</td>
<td>87</td>
<td>191</td>
<td>172</td>
<td>44 (25.6)</td>
</tr>
<tr>
<td>Age ≥44 years</td>
<td>39</td>
<td>83</td>
<td>75</td>
<td>10 (13.3)</td>
</tr>
<tr>
<td>Genetic trait</td>
<td>11</td>
<td>15</td>
<td>14</td>
<td>3 (21.4)</td>
</tr>
<tr>
<td>Subtotal for group B</td>
<td>251</td>
<td>544</td>
<td>483</td>
<td>97 (20.1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>423</td>
<td>1001</td>
<td>873</td>
<td>194 (22.2)</td>
</tr>
</tbody>
</table>

IVF = in-vitro fertilization.

Table II. Pregnancy outcomes according to ovarian function and recipient age

<table>
<thead>
<tr>
<th>Ovarian failure (group A)</th>
<th>Functioning ovaries (group B)</th>
<th>Outcome according to age of recipient (years)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancies</td>
<td></td>
<td>&lt;30</td>
<td>194.0</td>
</tr>
<tr>
<td>Early abortion&lt;sup&gt;a&lt;/sup&gt;</td>
<td>12 (12.4)</td>
<td>12 (15.0)</td>
<td>28 (14.4)</td>
</tr>
<tr>
<td>Late abortion&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1 (1.0)</td>
<td>1 (1.3)</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Ectopic pregnancy&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1 (1.0)</td>
<td>1 (2.5)</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Total deliveries&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3 (3.1)</td>
<td>0 (0.0)</td>
<td>6 (3.1)</td>
</tr>
<tr>
<td>Preterm delivery&lt;sup&gt;b&lt;/sup&gt;</td>
<td>18 (22.5)</td>
<td>15 (23.4)</td>
<td>36 (22.5)</td>
</tr>
<tr>
<td>Term delivery&lt;sup&gt;b&lt;/sup&gt;</td>
<td>62 (77.5)</td>
<td>49 (61.2)</td>
<td>119 (61.3)</td>
</tr>
<tr>
<td>Multifetal deliveries&lt;sup&gt;b&lt;/sup&gt;</td>
<td>23 (28.8)</td>
<td>24 (35.7)</td>
<td>51 (32.9)</td>
</tr>
<tr>
<td>IUFD&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2 (2.5)</td>
<td>3 (3.1)</td>
<td>3 (1.9)</td>
</tr>
<tr>
<td>PIH&lt;sup&gt;b&lt;/sup&gt;</td>
<td>11 (13.8)</td>
<td>7 (10.9)</td>
<td>24 (15.5)</td>
</tr>
<tr>
<td>GDM&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2 (2.5)</td>
<td>3 (4.7)</td>
<td>4 (2.6)</td>
</tr>
<tr>
<td>Bleeding&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3 (3.8)</td>
<td>2 (3.1)</td>
<td>9 (5.8)</td>
</tr>
</tbody>
</table>

Values in parentheses are percentages.

<sup>a</sup> As a percentage of number of pregnancies.
<sup>b</sup> As a percentage of number of deliveries.

IUFD = intrauterine fetal death; PIH = pregnancy-induced hypertension; GDM = gestational diabetes mellitus.

Table III. Neonatal outcome for singleton, twin and triplet deliveries

<table>
<thead>
<tr>
<th>Gestational age at delivery (weeks)</th>
<th>Preterm delivery (% of total)</th>
<th>Singleton (&lt;i&gt;n&lt;/i&gt; = 104)</th>
<th>Twin (&lt;i&gt;n&lt;/i&gt; = 86)</th>
<th>Triplet (&lt;i&gt;n&lt;/i&gt; = 24)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>11 (10.6)</td>
<td>40 (46.5)</td>
<td>18 (75)</td>
</tr>
<tr>
<td></td>
<td>IUFD</td>
<td>0</td>
<td>1 (1.2)</td>
<td>2 (8.3)</td>
</tr>
<tr>
<td>IUFR (% of total)</td>
<td>2 (2.0)</td>
<td>13 (15.1)</td>
<td>10 (41.7)</td>
<td></td>
</tr>
<tr>
<td>Birthweight (g)</td>
<td>3022 ± 587</td>
<td>2291 ± 658</td>
<td>2079 ± 353</td>
<td></td>
</tr>
</tbody>
</table>

IUFD = intrauterine fetal death; IUFR = intrauterine growth restriction.

Antinori et al. (1993). One of the more recent and larger series reported PR as low as 20% per embryo transfer (Pados et al., 1994). Our overall results concur with the latter. Our extensive experience suggests that this relatively low PR is unlikely to be due to incompetence. It is rather, we believe, the result of certain factors regarding patient selection: (i) the heterogeneity of the population which includes patients who may have decreased endometrial receptivity including those of advanced age (Levran et al., 1991; Meldrum, 1993; Yaron et al., 1993, 1995), and patients with an abnormal karyotype (Yaron et al., 1996); (ii) the inclusion of a greater proportion of patients who have repeatedly failed previous embryo transfer cycles; and (iii) the use of anonymous donors only, undergoing IVF themselves, in accordance with the regulations of the Israeli Ministry of Health. Such donors are, in fact, ‘subfertile’.

Pregnancy rates significantly declined with the increased number of previously failed embryo transfers attempted. This may be explained by the fact that a population of patients who have repeatedly failed to conceive may have a greater proportion of those with some, as yet undetected, uterine factor, not amenable to oocyte donation treatment. Nevertheless, as we have previously shown for standard IVF, even with repeated...
failures, PR are certainly not negligible (Yovel et al., 1994). The results of this study suggest that the same would also apply to oocyte donation.

Thus, if our data were limited to young, amenorrhoeic patients, with normal karyotypes, PR would be as high as 36% per cycle, even if we included patients with previous failed embryo transfers following oocyte donation. Likewise, if the data were confined to patients undergoing their first oocyte donation cycle, PR would be as high as 35.1%, regardless of the indication for treatment. Finally, if the results were limited to young, amenorrhoeic patients, with normal karyotypes, undergoing their first oocyte donation cycle, PR would be as high as 52.2% (12/23). When counselling patients about prospective success rates, it is important to outline the expected results based on the patients’ history and indication for treatment.

Demographic changes, coupled with the need to postpone childbearing in favour of pursuing a career, contribute to the increasing number of women wishing to conceive towards the end of their reproductive period. Unfortunately, such aspirations are often met with disappointment due to the natural decline in PR with age. The effects of ageing on fertility have, therefore, become an important issue. The question of whether the age of the recipient has any effect on success rates in oocyte donation is highly controversial. Some authors claim that the age-related decline in PR is exclusively attributable to the ageing oocytes (Navot et al., 1991). Sauer et al. (1990, 1992) found no difference in conception rates after oocyte donation in women <40 years old (32.6% per embryo transfer) compared with those >40 years old (34.5% per embryo transfer). They too inferred that the underlying problem with pregnancy establishment in older women was related to the ageing oocyte rather than to age-related endometrial changes. Furthermore, Guanes et al. (1996) performed a prospective study to assess the effects of age on uterine perfusion, using oocyte donation as a model. Patients with singleton pregnancies were followed during the first trimester by Doppler ultrasonography of the uterine arteries. No age-related influence on uterine perfusion was noted. They concluded that ‘the increased incidence of early pregnancy losses observed in patients >40 years old cannot be attributed to defective response of uterine vasculature to exogenous hormone replacement. Thus, uterine ageing does not appear to be a factor influencing the poor reproductive performance of women with advancing age.’ (Guanes et al., 1996). Paulson et al. (1997) retrospectively analysed the outcome of 418 consecutive embryo transfer cycles among 276 recipients of oocyte donation and did not find an age-related decrease in PR. Similar conclusions were reached by Abdalla et al. (1997) in a study of 104 cycles of oocyte donation.

Conversely, others believe that an age-related decline in endometrial receptivity may also play an important role in the decrease in implantation rates with age. Such age-related changes may be attributed to a decrease in uterine perfusion (Goswamy et al., 1988), the presence of fewer oestriadiol receptors on the endometrial cell surface (Han et al., 1989), an increase in collagen content, and a reduced number of stromal cells in the endometrium (Craig and Jollie, 1985). Moreover, clinical studies comparing oocyte donation in younger and older women have also indicated that there is an age-related decline in PR (Levran et al., 1991; Yaron et al., 1993, 1995; Meldrum, 1993; Cano et al., 1996). Since donated oocytes are obtained from young patients, the age-related decline in PR with oocyte donation cannot be attributed to oocyte quality. The results of this study lend further support to the contention that there is an age-related decrease in endometrial receptivity which also contributes to the higher rate of implantation failure in older women. Our analysis shows a significant age-related decrease in PR (P = 0.001). Further stratification according to indication for oocyte donation treatment yielded similar results.

Another possible explanation for the decreased PR with advanced age is embryo quality. Oocyte quality cannot account for this since oocytes are donated by young patients undergoing IVF, and are randomly distributed to the recipients. Advanced paternal age, however, may provide a possible, though hypothetical, explanation. It is known that new dominant mutations, many of which are embryologically lethal, are more common in men of advanced age. It would therefore seem reasonable to assume that recipients of advanced age are more likely to have older male partners in whom such new dominant mutations could account for decreased embryo quality. Unfortunately, it would be difficult to confirm this hypothesis.

In oocyte donation programmes that use designated donors, there is a need to synchronize the recipient’s cycle with that of the donor. Conversely, in anonymous donation programmes, prospective recipients may be given oestrogen until oocytes become available. Progesterone is then added to the regimen and both hormones are administered until the placenta produces sufficient amounts of hormones for maintenance of pregnancy. The question is: how long can endometrial preparation with oestrogen be continued without a detrimental effect on PR? Morphological studies performed by Navot et al. (1989) have demonstrated that varying the duration of oestradiol stimulation in women with ovarian failure did not adversely affect the developmental capacity of the endometrium. They concluded that either a very short or a prolonged exposure of the human endometrium to oestradiol stimulation allows normal endometrial maturation following the addition of progesterone. Conversely, Younis et al. (1992) concluded that oestrogen stimulation of 12–19 days yields optimal results in oocyte donation. They also concluded that, unlike endometrial morphology, which seems to be tolerant of extreme durations of oestrogen stimulation, functional receptivity is less permissive and is adversely affected by such manipulations. Our results show that the endometrium is indeed tolerant to varying durations of oestriadiol stimulation with regard to clinical outcome following oocyte donation, and that there is no significant effect on PR caused by varying the durations of oestriadiol treatment for as long as 5 weeks.

We have recently reported that in patients with ovarian failure undergoing oocyte donation there is a significant increase in PR with the increasing number of embryos transferred, and that the overall rate of multiple pregnancies, especially of triplets, dramatically increased as more embryos were transferred (Yaron et al., 1997). Similar results were
obtained in this study that also included patients with functioning ovaries.

Obstetric outcome in pregnancies resulting from oocyte donation was generally favourable. The indication for oocyte donation treatment had no significant effects on pregnancy outcomes. Advanced recipient age, however, was found to correlate with increased risks of early abortions and pregnancy-induced hypertension. Generally, the age-related increase in abortion rate has been attributed to chromosomal anomalies in the ageing oocyte. This is obviated in ovum donation by the use of oocytes from young donors. None the less, it has previously been suggested that uterine senescence may also predispose to early pregnancy loss (Cano et al., 1995). Though not statistically significant, our data support this hypothesis, with abortion rates 3-fold higher in patients >40 as compared with those ≤30 years of age. Further, there was a significant increase in the risk of pregnancy-induced hypertension in patients >40 years of age, despite a thorough pretreatment screening. In a series of patients ≥50 years of age undergoing oocyte donation, Sauer et al. (1995) reported an even higher incidence of gestational hypertension (41%). This underscores the need for adequate patient screening and selection, especially with the worldwide trend of offering oocyte donation to menopausal patients. No significant age-associated trends were noted for other pregnancy complications including gestational diabetes mellitus, bleeding or preterm deliveries. The high proportion of Caesarean sections may only partially be explained by advanced maternal age and multiple gestations. Undoubtedly, patient and physician preferences for elective Caesarean section are also involved. Prematurity has played a significant role in neonatal morbidity and mortality. All cases of stillbirth were associated with preterm deliveries in multifetal pregnancies. Likewise, low birthweights and IUGR have been more common in multifetal pregnancies than in singletons.

In conclusion, pregnancy outcome is generally favourable but a higher incidence of hypertension and abortion may be expected in patients of advanced age. These underscore the need for adequate patient selection.

References

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