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Racial disparity in oocyte donation outcome: a multiethnic, matched cohort study

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BACKGROUND: Race and ethnicity are one of the newly investigated patient-related prognostic factors that might affect the outcome of assisted reproduction techniques. To our knowledge no data currently are available on the effect of race on oocyte donation outcome.

MATERIALS: A retrospective, matched cohort study was performed in a private infertility centre evaluating 1012 Black, South-East Asian and Caucasian recipients undergoing their first oocyte donation cycles.

RESULTS: A significantly lower ongoing pregnancy rate (24.6 versus 36.8%, OR: 0.56 95% CI: 0.40–0.77, $P = 0.01$) was observed among Black recipients compared with their matched Caucasian counterparts. The prevalence of uterine fibroids (49.6 versus 17.1%, $P < 0.0001$) and previous history of tubal infertility (53.2 versus 16.5%, $P < 0.0001$) was significantly higher among Black women. Multiple logistic regression analysis showed that, after adjusting for confounding variables, Black race was an independent risk factor for not achieving an ongoing pregnancy (for ongoing pregnancy, adjusted OR: 0.62 95% CI: 0.43–0.89, $P = 0.009$). Ongoing pregnancy rate (37.2 versus 37.2%, OR: 1.0 95% CI: 0.49–2.04, $P = 1.0$) was not significantly different between South-East Asian and matched Caucasian patients.

CONCLUSIONS: Black race was an independent risk factor for not achieving an ongoing pregnancy after oocyte donation. Although yellow race does not seem to adversely affect oocyte donation, larger studies are still warranted to draw more solid conclusions. Race should be considered as an independent prognostic factor in oocyte donation.

Key words: Black women / South-East Asian women / racial disparity / oocyte donation / ART outcome

Introduction

Race and ethnicity are one of the recently investigated patient-related prognostic factors that might affect the outcome of assisted reproduction techniques. In the setting of *in-vitro* fertilization treatment some studies, all originating from the USA, have compared differences in outcome between African American and Caucasian patients. All (Sharara and McClamrock, 2000; Nichols *et al*., 2001; Bendikson *et al*., 2005; Feinberg *et al*., 2006; Dayal *et al*., 2009) were retrospective and compared a relatively small proportion of African-American patients with a larger group of control patients. In relation to yellow race even fewer studies exist and these focus mainly on British Asian ethnic groups or specific infertility diagnoses such as polycystic ovarian syndrome (Mahmud *et al*., 1995; Lashen *et al*., 1999; Palep-Singh *et al*., 2007). Although the above mentioned smaller studies have shown conflicting results, more recent larger registry-based series (Purcell *et al*., 2007; Fujimoto *et al*., 2008; Seifer *et al*., 2008, 2009) have provided more evidence on the existence of racial disparity in ART outcome. Seifer *et al*. (2008, 2009) demonstrated that Black race was an independent risk factor for not achieving live birth (OR: 0.76–0.82), whereas Purcell *et al*. (2007) found a decreased live birth rate (OR: 0.69) among Asian patients. Even more recently Fujimoto *et al*. (2008) demonstrated a decreased odds-ratio of live birth in the following ethnic groups: Asians (OR: 0.90), Hispanics (OR: 0.87) and Blacks (OR: 0.62), when compared with Caucasians.

To our knowledge to date, no large study has evaluated the effect of race in the context of oocyte donation. In addition to an already more challenging management of oocyte donation cycles due to specific donor requirements, it is also important to know whether recipient factors could have a negative impact. Therefore the aim of our research was to compare ongoing pregnancy rates among Black and South-East Asian recipients compared with matched Caucasian controls and to determine the impact of race as a possible prognostic factor in oocyte donation.

Materials and Methods

Study population

All first oocyte donation cycles involving fresh embryos performed in Black and East Asian recipients performed in a single infertility centre (Clínica EUGIN, Barcelona, Spain) between March 2003 and December 2008 were retrospectively analyzed. Race was determined by patient self-questionnaires and by taking into account the birthplace of recipients [African or Caribbean countries for Black recipients and countries from South-Eastern Asia (predominantly) and the Far East for East Asian recipients]. For Black recipients, a control group was created by matching the study patients with the two chronologically closest Caucasian recipients of the same age (1:2). Similarly South-East Asian recipients were matched with the three chronologically closest Caucasian recipients of the same age (1:3). The ratio of control to study patients was based on power efficiency criteria. Sample size calculations showed that for the Black-Caucasian comparison a 1:2 ratio ensured a power of 82%, whereas for the South-East Asian–Caucasian comparison a power of only 21% was reached. Only recipients having a fresh embryo transfer were taken into account. Recipients participated only once with their first oocyte donation cycle in either the study or the control groups.

Oocyte donation treatment

Before treatment, careful clinical assessment was carried out in oocyte recipient candidates including a general physical and gynaecological examination, blood tests (haematology, biochemistry and serology), a cervical smear and a pelvic ultrasound scan. The uterine cavity was assessed by either a hysterosalpingography or hysteroscopy. Submucosal uterine fibroids were resected systematically before the oocyte donation attempt. A history of tubal factor infertility was defined as a tubal obstruction diagnosed by hysterosalpingography and/or diagnostic laparoscopy or by the occurrence of a previous extrauterine pregnancy. In the case of hydrosalpinges visible on ultrasound, bilateral salpingectomy was systematically recommended. Oral estradiol valerate (Progynova®, Schering Spain, Madrid, Spain) was used in a constant dose regimen for the endometrial preparation. Patients on standby received up to 6 mg/day and the duration of the treatment varied in accordance with the availability of the oocytes. Endometrial thickness was not routinely measured during the whole study period. From the day of the oocyte retrieval from the donor, 800 mg/day of micronized vaginal progesterone (Utrogestan®, Laboratorio Seid, Barcelona, Spain) was added for the recipient.

Oocyte donation was performed according to the Spanish Act on Reproduction. Donation was anonymous and altruistic and donors were required to be between 18 and 35 years of age. A conventional clinical and psychological workup was performed, including karyotype. The ovarian stimulation protocols and laboratory procedures used have been described previously (Bodri *et al.*, 2009). The ICSI procedure was performed routinely in order to avoid immature oocytes being given to the recipients and to increase fertilization rate. Donor matching was performed with the phenotypically closest available donor and by taking into account the race of the recipient's male partner (mixed race couples were present in 46.1% of the cases for Black recipients and in 78% of the cases for South-East Asian patients).

Embryos were transferred into the uterine cavity typically 2 or 3 days after the ICSI procedure. The embryo transfer procedure was performed using abdominal ultrasound guidance. In case of pregnancy, hormonal replacement therapy was continued for 100 days following the embryo replacement. Each pregnancy with at least one intrauterine sac revealed by ultrasonography ~5 weeks after transfer was considered to be a clinical pregnancy, whereas ongoing pregnancy was defined as a viable pregnancy confirmed on an ultrasound scan performed at 12 weeks.

Statistical analysis

Values are expressed as mean ± SD. Metric variables were analyzed by the independent *t*-test or the Mann–Whitney *U*-test according to their distribution. Nominal variables were analyzed by the χ^2 test. $P < 0.05$ was considered statistically significant. Multivariate analysis was performed by logistic regression comparing outcome between Black and Caucasian recipients. A set of 14 potential confounders (for the recipient: race, age, BMI, previous live birth and pregnancy, history of tubal factor infertility, presence of uterine fibroids and male partner's age; for the oocyte donor: age, previous live birth and pregnancy; for cycle-related variables: duration of endometrial preparation, number of transferred embryos and embryo transfer day) were initially investigated with a univariate analysis. Those five variables that were significantly related to the achievement of an ongoing pregnancy (recipient race, history of tubal factor infertility, donor previous live birth, the duration of endometrial preparation and the number of transferred embryos) were included in the multiple logistic regression model with Bonferroni adjustment (the expected *P*-value to reach statistical significance was corrected by the number of variables included). The Hosmer–Lemeshow test showed no evidence of lack of fit between expected and observed frequencies (chi-square *P*-value:0.1).

Results

A total of 280 first oocyte donation cycles performed in 280 Black recipients were evaluated retrospectively. A control group (560 cycles) was created by matching each Black recipient with the two chronologically closest two Caucasian recipients of the same age. Recipient characteristics (age, BMI, previous live birth and pregnancy, history of tubal factor infertility, presence and number of uterine fibroids, previous abdominal myomectomy and different indications for oocyte donation) are summarized in Table I. With the exception of age, all recipient characteristics were significantly different between Black and Caucasian recipients. Cycle-related variables (duration of estrogen replacement, received cumulus-oocyte-complexes, mature oocytes, fertilized oocytes, number of transferred embryos and proportion of Day 2, Day 3 and Day 5 transfers) and outcome variables (clinical and ongoing pregnancy rates, implantation and miscarriage rates) are shown in Table II. The duration of endometrial preparation was longer for Black recipients and although they received more oocytes, the proportion of mature oocytes, fertilization rates and the number of transferred embryos were not significantly different. Data concerning the male partner's age and sperm parameters used for the fertilization by ICSI are shown in Table III. The Black recipients male partners were significantly older compared with the Caucasian control group. Multiple logistic regression analysis showed (Table IV) that after adjusting for the confounding variables, Black race was an independent risk factor for not achieving an ongoing pregnancy (adjusted OR: 0.62 95% CI: 0.43–0.89, $P = 0.009$).

Separately, a total of 43 first oocyte donation cycles performed in 43 South-East Asian recipients were also evaluated. A control group (129 cycles) was created by matching each South-East Asian recipient with the three chronologically closest Caucasian recipients of the same age. Recipient characteristics, cycle-related variables and outcome measures and the male partner's age and sperm parameters used for the fertilization by ICSI are summarized in Tables V, VI and VII, respectively. South-East Asian recipients had significantly lower BMI values, a longer duration of endometrial preparation and received

Table I Characteristics of Black and Caucasian recipients (and their oocyte donors)

	Black women	Caucasian women	P
Number of recipients	280	560	–
Age (years)	40.7 ± 4.8	40.7 ± 4.8	–
BMI (kg/m^2)	24.8 ± 4.1	22.6 ± 3.7	<0.0001[a]
Previous pregnancy, *n* (%)	155 (55.4)	222 (39.6)	0.004[b]
Previous live birth, *n* (%)	76 (27.1)	106 (18.9)	0.03[b]
History of tubal factor infertility, *n* (%)	149 (53.2)	92 (16.5)	<0.0001[b]
Presence of uterine fibroids, *n* (%)	139 (49.6)	95 (17.1)	<0.0001[b]
Number of uterine fibroids, *n*	2.4 ± 1.9	1.5 ± 0.9	<0.0001[a]
Previous abdominal myomectomy, *n* (%)	73 (26.2)	19 (3.4)	<0.0001[a]
Indication for oocyte donation			0.03[b]
Reduced ovarian reserve, *n* (%)	184 (66)	383 (68)	–
Early / natural menopause, *n* (%)	64 (23)	88 (16)	–
Previous IVF failures, *n* (%)	31 (11)	84 (15)	–
Other, *n* (%)	1 (0)	5 (1)	–
Number of donor cycles	280	560	–
Donor age (years)	25.4 ± 4.5	26.2 ± 4.1	0.012[a]
Previous donor live birth, *n* (%)	150 (53.6)	236 (42.1)	0.059[b]

Values are mean ± SD.
[a]Independent *t*-test, [b]χ^2 test.

slightly higher number mature oocytes. There were no differences in the outcome variables between South-East Asian and Caucasian women.

Discussion

This matched cohort study, which is to our knowledge the first one investigating the effect of race on the outcome of oocyte donation, found a significantly lower ongoing pregnancy rate among Black oocyte recipients compared with their Caucasian counterparts. For a smaller sample of South-East Asian recipients, the outcome was comparable with matched Caucasian controls. The difference in the prevalence of tubal factor infertility and uterine fibroids was highly significant between Black and Caucasian recipients. In addition some cycle-related variables (the duration of estradiol replacement and the number of received oocytes) were also different between the study and control groups. This is related to the different management (waiting list length and specific donor requirements) of oocyte donation cycles involving recipients of different ethnicities. After adjusting for several confounding variables, Black race was found to be an independent risk factor for not achieving an ongoing pregnancy after oocyte donation.

In recent years, several authors have investigated the effect of race on the outcome of IVF treatment particularly for Black (Wada *et al*., 1994) and Asian patients (Mahmud *et al*., 1995; Lashen *et al*., 1999; Palep-Singh *et al*., 2007; Purcell *et al*., 2007). Retrospective series from single centres that compared IVF outcome between African-American and Caucasian patients have shown conflicting results (Sharara and McClamrock, 2000; Nichols *et al*., 2001; Bendikson *et al*., 2005; Feinberg *et al*., 2006; Dayal *et al*., 2009). A common finding for all these series is a higher incidence of tubal infertility and greater BMI values among Black patients. Recently much larger registry-based studies have emerged and seem to corroborate previous smaller ones that have found a less favourable outcome in Black IVF patients. Seifer *et al*. (2008) evaluated data that were collected from the Society for Assisted Reproductive Technology (SART) registry over a 2-year period (1999–2000) resulting in a cohort over 80 000 analyzed IVF cycles. In that study, Black women underwent 4.6% of the total cycles. After controlling for confounding factors such as increased tubal and uterine factor infertility, Black race was found to be an independent factor for not achieving a live birth (adjusted RR: 1.21). The same authors in a follow-up study (Seifer *et al*., 2009) compared the results of the previous study with a more recent set of SART data (2004–2006) and found an even greater increased risk of not achieving live births among Black women (for live birth, adjusted OR: 0.75–0.76). Interestingly in cryopreserved embryo cycles (where no ovarian stimulation is required and the endometrial preparation is similar to that of an oocyte donation cycle) a similar albeit smaller risk was revealed (adjusted RR 1.10) for Black patients. The study of Fujimoto *et al*. (2008) using the same set of SART data from 2004 to 2006 corroborated the findings of the previously mentioned study. The odds of live birth were significantly reduced (adjusted OR: 0.62, 95% CI: 0.56–0.68) for Black IVF patients. Common drawbacks of these registry-based studies are the exclusion of many cycles because of missing data on race, the fact that women with more than one cycle were represented (first-cycle only inclusion was not respected) and the absence of data on many patient-related confounding factors. It must also be mentioned that in these large registry-based studies, only non-donor IVF cycles were included and oocyte donation cycles were excluded from analysis by definition.

Black race is a well-known risk factor for the presence of uterine fibroids (Payson *et al*., 2006). Nonetheless compared with the previously mentioned studies in our series, a much higher incidence of uterine fibroids was observed among Black recipients. This could be explained by the more advanced age of our study population. The effect on cycle outcome of fibroids not distorting the uterine cavity is controversial (Somigliana *et al*., 2007). The retrospective study of Klatsky *et al*. (2007) considered the effect of intramural/subserosal fibroids on 369 first oocyte donation cycles and concluded that it did not have any significant effect on clinical pregnancy and implantation rates. In a more recent study (Horcajadas *et al*., 2008), a large series of first oocyte donation cycles (807 cycles with fibroids) were evaluated and recipients were divided into four subgroups according to the size and the number of uterine leiomyomas. No differences were found in ongoing pregnancy and implantation rates

Table II Cycle-related and outcome data (Black and Caucasian recipients)

	Black women	Caucasian women	*P*
Number of recipients	280	560	–
Duration of estradiol replacement (days)	28.9 ± 9.8	25.2 ± 10	<0.0001[a]
Received COCs	9.2 ± 3.9	7.9 ± 2.7	<0.0001[a]
Mature (MII) oocytes	6.4 ± 1.8	5.6 ± 1.3	<0.0001[a]
Fertilized oocytes (2PN)	4.6 ± 1.8	4.1 ± 1.5	<0.0001[a]
Number of transferred embryos	2 ± 0.4	1.9 ± 0.4	0.1[a]
Single embryo transfer, *n* (%)	23 (8)	63 (11)	0.14[b]
Double embryo transfer, *n* (%)	246 (88)	485 (87)	–
Triple embryo transfer, *n* (%)	11 (4)	12 (2)	–
Day 2 embryo transfer, *n* (%)	151 (54)	291 (52)	0.77[b]
Day 3 embryo transfer, *n* (%)	125 (45)	258 (46)	–
Day 5 embryo transfer, *n* (%)	4 (1)	11 (2)	–
Clinical pregnancy rate	89/280 (31.7)	237/560 (42.3)	0.046[b]
Implantation rate	113/549 (20.5)	308/1069 (28.8)	0.005[b]
Ongoing pregnancy rate	69/280 (24.6)	206/560 (36.8)	0.01[b]
Miscarriage rate	20/89 (22.5)	31/237 (13.1)	0.08[b]

Values are mean ± SD.
[a]Mann–Whitney *U*-test, [b]χ^2 test.

Table III Male partners' age and sperm parameters (Black and Caucasian recipients)

	Black women	Caucasian women	*P*
Number of recipients' partners	260	520	–
Partner age (years)	43.4 ± 7.6	40.5 ± 6.5	<0.0001[b]
Patients with normozoospermia, *n* (%)	86 (31)	165 (30)	0.93[c]
Patients with abnormal sperm parameters[a], *n* (%)	174 (62)	355 (63)	–
Donor sperm, *n* (%)	20 (7)	40 (7)	–

[a]Oligo-, astheno-, teratospermia or combination of these anomalies, according to WHO 1999 Guidelines.
[b]Independent *t*-test, [c]χ^2 test.

compared with control groups, although it must be mentioned that race was not taken into account at all in this study.

An increased incidence of tubal infertility (between 46–62%) has been consistently demonstrated among African-American IVF patients in small retrospective studies and large registry-based series. A particularly high incidence of hysterosalpingographic tubal anomalies has been found by previous studies (De Muylder, 1995; Adesiyun *et al*., 2008) in infertile African Black women. As with non-donor IVF cycles (Ozmen *et al*., 2007), hydrosalpinges adversely affect implantation in oocyte donation cycles (Cohen *et al*., 1999), nonetheless in our study population the resection of ultrasound-detected hydrosalpinges was systematically recommended. In our study, BMI values were also significantly higher for the Black recipient group, however, in the context of oocyte donation this factor does not have a negative effect on implantation (Wattanakumtornkul *et al*., 2003; Styne-Gross *et al*., 2005).

In the present study, the age of the Black recipients' male partner was significantly higher compared with the control group. Recent studies (Campos *et al*., 2008; Girsh *et al*., 2008) have suggested that increasing male age might have a negative effect on pregnancy rates in oocyte donation cycles. Nonetheless in our study, male age was not associated with the achievement of an ongoing pregnancy. Furthermore ICSI procedure was systematically used in our program and resulted in no difference in fertilization rates among the two groups. A recent large-scale study (Soares *et al*., 2005) demonstrated a negative effect of female recipient age >45 years in oocyte donation cycles; however, this factor was controlled for in our study by matching study and control patients by their age.

The synchronization of donor and recipient cycles during oocyte donation is of paramount importance. The ideal duration of estrogen replacement has been investigated in several studies. Recently Soares *et al*. (2005) found that in a large series of oocyte recipients the success rate drops significantly from 7 weeks of hormonal substitution onwards. Although in the present study the duration of endometrial preparation was significantly longer for Black recipients, its effect on outcome was small.

Table IV Results of multiple logistic regression analysis with Bonferroni adjustment (Black and Caucasian comparison)[a,b]

	OR	95% CI	P[a]
Race (Black/White)	0.62	0.43–0.89	0.009
History of tubal factor infertility (yes/no)	0.72	0.50–1.04	0.08
Previous donor live birth (yes/no)	1.54	1.14–2.07	0.004
Duration of endometrial preparation (days)	0.98	0.96–0.99	0.017
Number of transferred embryos (2 versus 1 or 3)			–
Single embryo transfer	0.45	0.26–0.79	0.005
Triple embryo transfer	1.23	0.51–2.99	0.64

[a]After Bonferroni adjustment $P < 0.01$ was considered significant.
[b]Hosmer–Lemeshow goodness-of-fit test: $P = 0.1$.

Table V Recipient characteristics (South-East Asian and Caucasian recipients)

	South-East Asian women	Caucasian women	P
Number of recipients	43	129	–
Age (years)	41 ± 5.4	41 ± 5.4	–
BMI (kg/m^2)	20.5 ± 2.1	23.4 ± 4	<0.0001[a]
Previous pregnancy, *n* (%)	11 (25.5)	49 (37.9)	0.29[b]
Previous live birth, *n* (%)	10 (23.2)	19 (14.7)	0.28[b]
History of tubal factor infertility, *n* (%)	9 (20.9)	22 (17.1)	0.63[b]
Presence of uterine fibroids, *n* (%)	18 (41.9)	29 (22.5)	0.07[b]
Number of uterine fibroids, *n* (%)	1.5 ± 0.8	1.4 ± 0.7	0.65[b]
Previous abdominal myomectomy, *n* (%)	0 (0)	7 (5.4)	0.12[b]
Indication for oocyte donation			0.29[b]
Reduced ovarian reserve, *n* (%)	33 (77)	85 (66)	–
Early / natural menopause, *n* (%)	3 (7)	24 (19)	–
Previous IVF failures, *n* (%)	7 (16)	19 (14)	–
Other, *n* (%)	0 (0)	1 (1)	–

Values are mean ± SD.
[a]Independent *t*-test, [b]χ^2 test.

In our series according to the multiple logistic regression analysis, previous donor live birth (OR: 1.54) was found to be associated with a higher chance of ongoing pregnancy. It must be also mentioned, however, that this factor was in favour for the group with the less favourable outcome (i.e. donors for Black recipients were more parous compared with Caucasian donors). Whereas an early study (Faber *et al.*, 1997) did not find any impact of donor parity on oocyte donation, a more recent study (Harris *et al.*, 2002) using a robust statistical analysis confirmed that donors with a previous history of live birth were most likely to generate pregnancies in recipients. In our study, single embryo transfer considerably decreased the

Table VI Cycle-related data (South-East Asian and Caucasian recipients)

	South-East Asian women	Caucasian women	P
Number of recipients	43	129	–
Duration of estradiol replacement (days)	30.1 ± 11.9	24.8 ± 9.2	0.007[a]
Received COCs	8.5 ± 3.2	7.5 ± 2.5	0.06[a]
Mature (MII) oocytes	6.2 ± 2.1	5.4 ± 1.1	0.017[a]
Fertilized oocytes (2PN)	3.9 ± 2	3.7 ± 1.4	0.83[a]
Transferred embryos	1.8 ± 0.3	1.9 ± 0.3	0.63[a]
Day 2 embryo transfer, *n* (%)	22 (51)	76 (59)	0.39[b]
Day 3 embryo transfer, *n* (%)	19 (44)	51 (39)	–
Day 5 embryo transfer, *n* (%)	2 (5)	2 (2)	–
Clinical pregnancy rate	19/43 (44.1)	56/129 (43.4)	0.95[b]
Implantation rate	21/82 (25.6)	72/242 (29.7)	0.59[b]
Ongoing pregnancy rate	16/43 (37.2)	48/129 (37.2)	1.0[b]
Miscarriage rate	3/19 (15.7)	8/56 (14.2)	0.89[b]

Values are mean ± SD.
[a]Mann–Whitney *U*-test, [b]χ^2 test.

Table VII Male partners' age and sperm parameters (South-East Asian and Caucasian recipients)

	South-East Asian women	Caucasian women	P
Number of recipients' partners	42	124	–
Partner age (years)	39.3 ± 7.1	41 ± 7.1	0.19[b]
Patients with normozoospermia, *n* (%)	9 (21)	36 (27)	0.66[c]
Patients with abnormal sperm parameters,[a] *n* (%)	32 (74)	88 (69)	–
Donor sperm, *n* (%)	2 (5)	5 (4)	–

[a]Oligo-, astheno-, teratospermia or combination of these anomalies, according to WHO 1999 Guidelines.
[b]Independent *t*-test, [c]χ^2 test.

probability of ongoing pregnancy (OR: 0.45), which is in line with a conclusion of a recent meta-analysis performed in non-donor IVF patients (Baruffi *et al*., 2009). Nonetheless it was Caucasian patients who had had a slightly higher proportion (11 versus 8%) of single embryo transfers and not Black recipients.

In a recent study, Jain (2006) demonstrated that in the USA significant differences exist between various ethnic groups that seek infertility care. Infertile African-American women are more likely to have tubal factor infertility, a lower level of education and a lower household income compared with Caucasian women. As a limitation of our study, it must be pointed out that socioeconomic factors or educational levels were not evaluated. Lifestyle factors were also not investigated. Although some potential confounding factors (such as the longer duration of endometrial preparation, increased prevalence of tubal factor infertility or uterine fibroids, higher BMI and male partner's age) were not favourable for the study group, Black race remained an independent risk factor for not achieving an ongoing pregnancy after adjustment for confounding factors. Two of the clinically most plausible variables (tubal factor infertility and uterine fibroids) that might be responsible for decreased implantation rates were found to be not significantly associated with decreased pregnancy rates, although it is possible that they could become significant in a larger sample. Hence it can be hypothesized that other behavioural, environmental, genetic or other as yet unknown factors not investigated in our study have played a role in the less favourable outcome for Black women.

To date relatively few studies have investigated the effect of Yellow race on ART outcome (Mahmud *et al*., 1995; Lashen *et al*., 1999; Palep-Singh *et al*., 2007). Purcell *et al*. (2007) in a combined study examined data from the SART registry as well as from a single-centre with a relatively high proportion of Asian American patients. They demonstrated in both series that race was an independent risk factor for not achieving live birth (OR: 0.59–0.76). More recently Fujimoto *et al*. (2008) confirmed the same finding on a more recent set of SART data. Moreover in this study the Hispanic ethnic group was also shown to have a less favourable outcome compared with their Caucasian counterparts. To our knowledge, the only study (Gleicher *et al*., 2007) that has investigated the influence of race in the context of oocyte donation was performed on a small sample of Chinese oocyte donors. This study found a higher cycle cancellation rate compared with Caucasian donors but no differences in the number of retrieved oocytes or subsequent recipient pregnancy rates.

In conclusion, the present study found a less favourable outcome after oocyte donation for Black recipients compared with Caucasian recipients. This suggests that race should be considered an independent prognostic factor of oocyte donation outcome. Our study did not demonstrate a significant difference in a small sample of South-East Asian patients. Available data from large ART registries (such as the SART registry) where data on race and ethnicity is registered might be used to verify our findings on a larger sample of oocyte donation cycles.

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