

Background

According to 2015 SART data, donor cycles accounted for ~9% of total cycles reported (5,982 fresh oocyte cycles, 3,215 frozen oocyte cycles, and 11,238 donor FETs). Although the majority of donor cycles involved fresh oocytes, the convenience, expanded selection, and success of vitrification from donor egg banks have overcome the inconvenience of donor/recipient synchronization and support the growing trend of intended parents selecting to conceive with frozen oocytes.

It has been shown that embryos generated from young donor oocytes demonstrate a significant rate of aneuploidy (1,2), therefore donor cycles can benefit from preimplantation genetic screening (PGS), increasing the likelihood of, and reducing the time to, a healthy ongoing pregnancy.

Objective

To compare aneuploidy rates between embryos generated from fresh donor versus frozen donor oocytes.

Materials & Methods

Trophectoderm biopsies from blastocyst-stage embryos from donor oocyte IVF cycles were analyzed using a targeted next-generation sequencing-based PGS assay for whole chromosome and segmental (>10MB) aneuploidy.

Using donor oocyte derived embryos for which fresh vs frozen information was provided, aneuploidy rates were calculated and compared based upon reported oocyte age and number of embryos tested. Statistical significance was determined by the t-test. Embryo quality, day of biopsy, and sperm quality were not assessed.

Table 1: Summary of Egg Donor Data

| | Fresh Donor | Frozen Donor | p-value |
|--------------------------------|----------------|----------------|---------|
| Number of cycles | 353 | 87 | |
| Total embryos | 2660 | 393 | |
| Embryos/patient (range) | 1-28 | 1-28 | |
| Oocyte age (range) | 18-42 | 21-39 | |
| Oocyte age (mean +/- SEM) | 25.85 +/- 0.20 | 26.55 +/- 0.39 | 0.116 |
| % Aneuploidy (range) | 0-100% | 0-100% | |
| Aneuploidy rate (mean +/- SEM) | 34.89 +/- 1.31 | 34.74 +/- 2.7 | 0.96 |

References

¹Munne, S., et. al. *Wide range of chromosome abnormalities in the embryos of young egg donors.* RBMOL, 2006, 12(3): p.340-346.
²Haddad, G., et. al. *Assessment of aneuploidy formation in human blastocysts resulting from donated eggs and the necessity of the embryos for aneuploidy screening.* J Assist Reprod Genet (2015) 32:999-1006.

Results

The data obtained from 19 clinics is summarized in Table 1. This dataset is comprised of 353 fresh donor and 87 frozen donor oocyte cycles, representing 2660 and 393 embryos respectively.

The range of embryo biopsies submitted for testing (per patient) in both groups was 1-28, with a mean of 7.6 embryos for fresh donor cycles and 4.5 from frozen donor cycles. The age range for oocyte donors was 18-42 for fresh and 21-39 for frozen cycles, with a mean 25.85 and 26.55, respectively (p = 0.116).

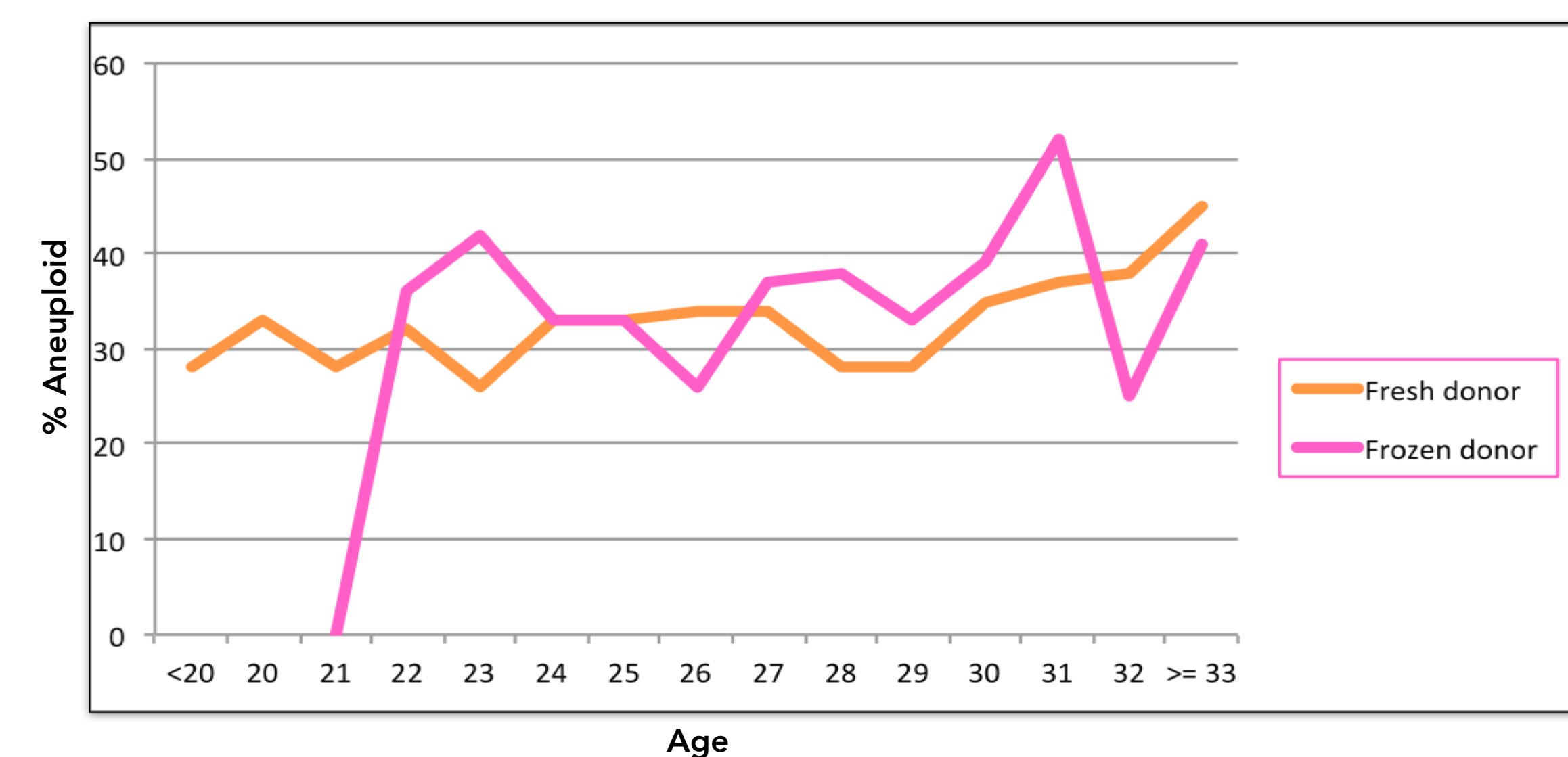
The aneuploidy rates for both groups ranged from 0-100%. Table 2 illustrates the percentage of cycles with various levels of aneuploidy broken down by oocyte type. For fresh donors, 13% of cycles had a 100% euploid rate vs 22% for frozen oocytes. Of those cycles that were 100% euploid, the mean number of embryos sent per patient was 3.83 for the fresh oocyte group and 2.47 for the frozen oocyte group.

There was no significant difference in the aneuploidy rates from either group of donor oocyte-derived embryos (fresh, 34.89 vs. frozen, 34.74; p = 0.96). Figure 1 shows the observed aneuploidy rates by donor age for both groups.

Table 2: Cycle Result Breakdown

| Cycle Results | % of Cycles from Fresh Oocytes | % of Cycles from Frozen Oocytes |
|---------------|--------------------------------|---------------------------------|
| 100% Euploid | 13% | 22% |
| ≥75% Euploid | 38% | 35% |
| ≥50% Euploid | 81% | 84% |

Figure 1: Donor age vs. Aneuploidy



Conclusions

Surveillance data suggests that the use of anonymous and directed donor oocytes in ART has increased annually. Although the number of fresh oocyte donor cycles still outnumber the number of frozen oocyte cycles, there appears to be a growing trend in IVF for patients to select frozen oocytes from an egg bank. Both options serve as a viable alternative for not only patients with compromised oocyte/embryo number or quality, including genetic abnormalities, but also for gay couples and single men.

Improvements in technology have streamlined the laboratory process making PGS more affordable. Therefore, more patients are choosing to screen their embryos regardless of oocyte source, reducing the time to pregnancy and livebirth compared to transfer based solely on blastocyst morphology.

In this cohort, there was no significant difference in the mean aneuploidy rates between fresh and frozen oocyte cycles, regardless of donor age or number of embryos tested. The aneuploidy rates were consistent with the literature regarding donor oocytes (1,2). Of interest, frozen oocyte derived embryos had a higher proportion of cycles with 100% euploid than those cycle from the fresh donors.

Given these findings, the use of frozen donor oocytes can be encouraged as the vitrification/warming process appears to have no impact on the rate of aneuploidy. Intended parents can avoid the variables and inconvenience of fresh oocyte donation and expand the selection of donors through the use of donor oocyte banks. Since approximately one third of embryos were abnormal, routine PGS on oocyte donor embryos can be beneficial.