

Background

Aneuploidy is a common cause of early pregnancy loss and is known to increase with maternal (oocyte) age. An aneuploid embryo may fail to implant, result in miscarriage, or lead to the birth of a child with a genetic disorder. Preimplantation genetic screening (PGS) can reduce the chance of transferring an aneuploid embryo by identifying chromosomally normal (euploid) blastocysts prior to transfer. Transferring a euploid embryo increases the likelihood of a healthy, ongoing pregnancy.

Blastocyst biopsy for PGS testing is typically done on day 5; however, biopsy may be done on day 6 or later depending on embryo development. There is limited data about whether aneuploidy rates differ based on day of development. Here we analyze PGS results from various fertility clinics to determine whether aneuploidy rates differ by biopsy day.

Objective

To determine whether aneuploidy rates differ between biopsies performed on day 5 vs day 6 blastocysts.

Materials & Methods

PGS was performed on blastocyst-stage trophectoderm biopsies from clinics across the country. Samples were analyzed using a targeted next-generation sequencing-based assay validated for whole chromosome and segmental (>10MB) aneuploidy detection. Only biopsies which occurred on day 5 or day 6 were included in this dataset and samples in which no results were obtained, or egg age was unknown, were excluded from this analysis. Aneuploidy rates were compared based on oocyte age and reported day of biopsy.

Table 1: Breakdown of Aneuploid Results by Egg Age and Biopsy Day

Egg Age	Percent Aneuploid Day 5	Percent Aneuploidy Day 6
<30	29% (1981/6850)	36% (1019/3000)
30-34	34% (3644/10873)	41% (1690/5334)
35-37	44% (3338/7648)	50% (1490/4828)
38-40	57% (3947/6867)	65% (1720/2633)
41-42	76% (2118/2792)	80% (740/927)
>42	83% (1040/1252)	88% (322/367)
Overall	44% (16068/36282)	51% (6981/13830)

Results

Of the 50,112 biopsies analyzed in this study, 72% (36,282) were from day 5 blastocysts and 28% (13,830) were from day 6 blastocysts. In this dataset, the average egg age of all biopsies was 34, and did not differ for day 5 vs day 6 biopsies. The rate of aneuploidy for all samples, regardless of biopsy date, ranged from 31% (< 30 years) to 84% (> 42).

Table 1 shows the age versus aneuploidy percentages broken down by age and biopsy day. Day 5 biopsy aneuploidy rates were comparable to the overall rates. However, the aneuploidy rate of day 6 samples was higher than day 5 samples, both overall (50.5% vs 44.3%) and for each individual age group (Figure 1).

Conclusions

Biopsies of day 5 embryos show a similar aneuploidy rate to published literature, likely due to the fact that most blastocyst biopsies are performed on day 5. The rate of aneuploidy in day 6 biopsies is higher than day 5 biopsies despite similar average egg ages. Since 49.5% of the day 6 biopsies were euploid and therefore have the potential for a healthy pregnancy, our data supports continuing to biopsy slower developing embryos. Further research is needed to determine the cause for the increased rate of aneuploidy on day 6 as it appears independent of egg age.

Figure 1: Aneuploidy Rate by Age and Biopsy Day

