RE-BIOPSIED PGS EMBRYOS YIELD ACTIONABLE RESULTS

Dana Neitzel, Charlene Alouf, Kristina Robinson, Mei Zhu, Nicole E. Faulkner
Good Start Genetics Inc., Cambridge, MA

Background

Failure to obtain an actionable result (no-result) is one limitation of Preimplantation Genetic Screening (PGS) and appears to be independent of the stage of embryo development or testing platform used. Some failures may be attributed to the number of cells tubed, embryo quality, and even biopsy and/or tubing technique. Other causes may be degradation post-biopsy, storage and shipping, or technical amplification failure. Even under optimal conditions, embryo biopsies with no interpretable result continue to represent a challenge in a minority of cases.

An alternative to discarding or blindly transferring no-result PGS embryos is to re-biopsy for repeat analysis. There is a common misconception that most no-result biopsies occur on poor quality embryos that are unlikely to be suitable for transfer and unlikely to yield a result on re-biopsy. Here we report our experience with PGS re-biopsies yielding actionable results.

Objective

To determine the likelihood of obtaining PGS results from trophectoderm re-biopsies.

Materials & Methods

317 trophectoderm biopsies from previous no-result embryos from 46 IVF centers were submitted for analysis. Samples were analyzed using a targeted next-generation sequencing-based assay validated for whole chromosome and segmental (>10MB) aneuploidy detection. Variables such as biopsy technician, biopsy stage, and percent aneuploidy were analyzed.

Table 1: Summary of re-biopsy data from no-result embryos

Biopsy Day (initial)	Number of Re-biopsies	Average Egg Age	Aneuploid	Euploid	No Results
Day 5	242	35	109	124	9
Day 6	71	35	37	30	4
Day 7	4	33	2	2	0
Total	317	35	148	156	13

Figure 1: Breakdown of re-biopsy results

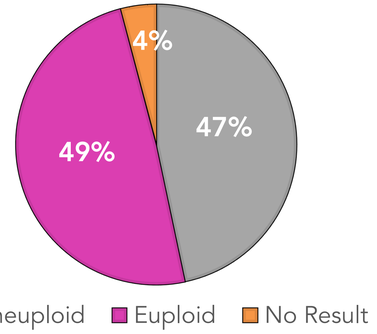
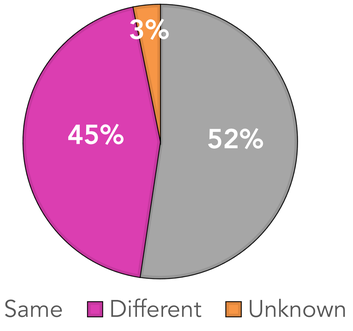


Figure 2: Breakdown of embryologist who performed both biopsies



Results

We have tested over 54,000 embryo biopsy samples, less than 3% of which had no result. We have received 317 re-biopsies. Results were obtained in ~96% of these re-biopsies (304 of 317). There was no significant difference in the ability to obtain results when broken down by biopsy day. Results were obtained in 96.3% of day 5 re-biopsies (233 of 242), 94.4% of day 6 re-biopsies (67 of 71) and 100% of day 7 re-biopsies (4 of 4).

Consistent with published euploid rates in PGS, 51% (156) of re-biopsies with results were euploid. Euploid rates ranged from 45% in day 6 embryos to 53% in day 5 embryos. Of the 148 aneuploidies, excluding sex chromosome abnormalities, 10 were potentially compatible with life (4 T21, 3 T18, 3 T13). If transferred, these embryos could have resulted in an affected livebirth.

Over half the time the same embryologist performed both the initial biopsy and re-biopsy (166 of 317; 52%), although occasionally, this information was not provided.

Conclusions

An inherent limitation of all PGS technologies is no-result embryos. In these situations, patients must decide to blindly transfer, discard, or to re-biopsy. While it is acknowledged that re-biopsy creates additional work and expense for the clinic, and may extend the time to transfer thus complicating the patient's decision, greater than 96% of re-biopsies yielded actionable results. Therefore, the effort may be worth the benefit of identifying a euploid embryo to transfer, decreasing the chance of miscarriage or delivering a child with a chromosome disorder. Given that >50% of re-biopsied no-result embryos are euploid, it is important that these embryos be identified as such, rather than be resulted as abnormal, to avoid discarding embryos that can lead to healthy babies.

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