73: CELL-FREE DNA CONTENT AND DIFFERENTIAL APOPTOTIC GENE EXPRESSION IN BLASTOCOEL FLUID BETWEEN EUPLOID AND ANEUPLOID EMBRYOS

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Objective
Selecting the best quality embryo for transfer is a demanding quest of ART, utilizing morphological assessments, embryo biomarkers or ploidy status. However, other determinants of embryo developmental potential may be employed. Apoptosis, a normal physiological process, plays a role in the correction mechanism for chromosomal abnormalities during preimplantation embryo development and leads to cell-free DNA (cfDNA) within blastocoel fluid. While blastocoel cfDNA has been used as a PGA-T source with minimal success, it may have potential as an indicator of embryonic quality. This study compared blastocoel fluid cfDNA content and apoptotic gene expression in euploid and aneuploid blastocysts.

Design
Retrospective analysis of day-5 blastocoel cfDNA content and apoptotic gene expression between euploid and aneuploid embryos.

Material and Methods
Blastocoel fluid-conditioned medium (25µL) was obtained following laser-assisted trophectoderm biopsy of ICSI-generated day-5 blastocysts. Biopsied trophectoderm were assessed via next-generation sequencing. Blastocoel fluid cfDNA was quantified via fluorospectrometry and gene expression was assessed by RT-PCR utilizing TaqMan array for human apoptosis genes (92 genes in total).

Results
Cell-free DNA was quantified in all blastocoel fluid-conditioned medium samples (35 embryos total), euploid embryos (43.15 ng/mL) had significantly ($P<0.05$) more (1.57X; or 56.5% greater) cfDNA than aneuploid (27.57 ng/mL) embryos. Apoptotic genes BAK1, BCL3 and IFT57 were expressed in aneuploid but not euploid blastocysts.

Conclusions
This study provides evidence that cfDNA positively correlates with embryonic ploidy status. Aneuploid, but not euploid, embryos differentially express the apoptotic genes BAK1 (BCL2 Antagonist Killer 1), BCL3 (B cell CLL/Lymphoma 3), and IFT57 (Intraflagellar Transport 57). Additional studies are warranted to further elucidate the mechanistic process by which embryos invoke apoptosis to self-correct for incidences of aneuploidy and to understand how some aneuploid embryos can implant successfully. Additionally, unique gene expression profiles may serve as biomarkers to assist in identifying the best euploid blastocyst for elective single embryo transfer.

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