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Oral Presentations

O-56
In vitro implantation of euploid and aneuploid embryos

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Background: Although embryo selection for transfer is usually based on morphology, 70% of embryos with high morphological quality have chromosomal abnormalities. The results of implantation and pregnancy rate assessments following preimplantation genetic screening (PGS) are controversial. There is still no in vitro study to compare the implantation of human euploid and aneuploid embryos.

Objective: This study was designed to compare the ability of aneuploid embryos to attach to endometrial cells with euploid embryos by simulating the human endometrium using a three-dimensional scaffold.

Materials and Methods: After informed consent, 10 endometrial biopsies were taken from fertile women. Endometrial cells were isolated and expanded in 2D cultures to achieve enough cells. The fibrin-agarose scaffold was made and stromal cells were cultured into the scaffold, after 24 hr, the epithelial cells were seeded on the scaffold. Cell culture continued for 5 days to reach the appropriate confluence. Then, cell proliferation was assessed by MTT assay. The simulated endometrial construct was confirmed by H&E and immunohistochemistry (IHC). The embryos were also examined by performing PGS following conventional comparative genomic hybridization array. 10 euploid and 10 aneuploid blastocysts were selected for co-culturing. Partial hatching of blastocysts was performed using a laser system. Blastocysts were co-cultured with the 3D structure of human endometrial cells for 72 hr. The blastocyst's attachment to the endometrial-like structure was examined under a phase-contrast microscope and scanning electron microscopy.

Results: The MTT OD of scaffolds increased during 5 days of cell culture ($p < 0.05$). The histological evaluation of the co-culture systems was done under light microscopy by H&E staining. On the top of the 3D culture system, epithelial cells shaped a constricted cell monolayer. Stromal cells combined with the fibrin-agarose scaffold got lengthened and expanded, displaying that the 3D culture systems supplied a suitable environment for the growth of endometrial cells. In the 3D culture, the origins and locations of epithelial and stromal cells were defined by cytokeratin and vimentin immunostaining, respectively. IHC for cytokeratin was only positive for epithelial cells in the surface epithelium. IHC for the vimentin was positive for the stromal cells located in the 3D matrix. These results showed that fibrin-agarose scaffold could simulate the human endometrial structure. Using scanning electron microscopy and phase-contrast microscopy, it was found that only euploid embryos were able to attach to the endometrial construct while aneuploid embryos weren't.

Conclusion: Our findings determined that PGS allows us to transfer top-quality embryos with higher implantation potential. It improves implantation and pregnancy rate during assisted reproductive technologies cycles, especially in patients with recurrent implantation failure.

Key words: *Three-dimensional culture, Implantation, Human endometrial cells, Aneuploid and euploid embryos, CGH array.*