ENMOTION (EMBRYO'S NATURAL MOTION): A PAIRED RANDOMIZED CONTROLLED TRIAL DEMONSTRATING PREGNANCY RATES ARE EQUIVALENT BETWEEN STATIC AND DYNAMIC CULTURE SYSTEMS.

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OBJECTIVE: A major consideration in assisted reproduction is providing a laboratory environment that is as similar to in vivo conditions as possible. Laboratories worldwide typically use static culture systems; however, a dynamic system may more closely mimic in vivo conditions. Reported benefits to dynamic culture include improved blastulation and pregnancy rates (1,2) however these studies included a small number of patients and cited their unpaired design as a limitation to their findings. This study seeks to determine if dynamic embryo culture impacts the reproductive potential of human embryos resulting from IVF.

DESIGN: Paired randomized controlled trial (RCT)

MATERIALS AND METHODS: IVF patients with normal ovarian reserve were recruited for participation at a single center from June 2015 to March 2017. IVF care was routine until fertilization was confirmed. 2-pronuclei (2PN) were then randomized, and half of each patient's 2PN were cultured in static culture and half in dynamic culture. The dynamic platform utilized was the NSSB-300 (Nepagene, Ichikawa, Japan). All usable blastocysts underwent preimplantation genetic screening (PGS) which also provided residual embryonic DNA to allow for fingerprinting. The best euploid blastocyst from each culture system was selected and patients underwent a frozen 2-embryo transfer (DET). If a singleton gestation resulted, DNA-fingerprinting was used to determine which of the two blastocysts implanted. Outcomes including usable blastulation rate and sustained implantation rate (SIR) were analyzed in a paired fashion using a Wilcoxon signed-rank test and McNemar's test respectively.

RESULTS: 103 patients were enrolled. 100 participants completed vaginal oocyte retrieval and blastocyst vitrification for future transfer. Patients were 35.0 $\pm$ 3.7 years of age. The median number of metaphase II oocytes retrieved was 13.0 (8.0-18.0) oocytes and the average rate of fertilization was 84.4$\pm$ 1.4%. 615 static 2PN and 609 dynamic 2PN were followed. 333 blastocysts developed in static culture and 304 blastocysts developed in dynamic culture. In this paired analysis, the usable blastulation rate was not different between static culture (57.1%) and dynamic culture (58.3%), p=0.47. There was also no difference in the rate of aneuploidy between culture systems (33.3% v. 20.0%, p=0.20). DNA fingerprinting was utilized in 14 patients following DET that resulted in a singleton gestation. There was no difference in SIR between embryos cultured in static culture vs. dynamic culture in this analysis, p=0.47.

CONCLUSIONS: In this paired RCT, dynamic culture did not improve the usable blastulation rate or sustained implantation rate which is contrary to previously published data. Further investigation including evaluation of alternative dynamic platforms may show benefit; however these data fail to demonstrate any impact on reproductive potential using this microvibration platform.