

## SELECTED ORAL COMMUNICATIONS

## SESSION 73: EMBRYO CULTURE AND DEVELOPMENT

01 July 2021

Stream 4

10:00 - 11:30

**O-213 Slow day 5 development affects implantation potential of fresh transferred embryos but not birthweight once pregnancy occurs: A multi-center retrospective cohort study****K. Watson<sup>1</sup>, K. Ong<sup>2</sup>, I. Korman<sup>2</sup>, R. Turner<sup>3</sup>, B. Vollenhoven<sup>4</sup>, D. Zander-Fox<sup>5</sup>, Y. Liu<sup>6</sup>**<sup>1</sup>Monash IVF Group, Embryology, Southport, Australia ;<sup>2</sup>Monash IVF Gold Coast, Clinical, Southport, Australia ;<sup>3</sup>Monash IVF Auchenflower, Clinical, Brisbane, Australia ;<sup>4</sup>Monash University, Department of Obstetrics and Gynaecology, Melbourne, Australia ;<sup>5</sup>Monash University, Department of Obstetrics & Gynaecology, Melbourne, Australia ;<sup>6</sup>Monash IVF Gold Coast, Embryology, Southport, Australia**Study question:** Does slow development of fresh transferred day 5 embryos lead to decreased implantation potential and birthweight?**Summary answer:** Slow day 5 development was associated with reduced implantation potential when transferred fresh but the subsequent birthweight of the resulting baby was not impacted.**What is known already:** Slow development of *in vitro* cultured cleavage stage embryos is associated with reduced blastocyst development and implantation rates. There is no current consensus regarding whether to transfer fresh slow developing day 5 embryos or to extend culture for a subsequent day with potential for cryopreservation. It is therefore important to understand the true prognosis of fresh transferred day 5 embryos at less advanced developmental stages. This would provide evidence based guidelines for the decision making process in regard to embryo transfer.**Study design, size, duration:** This is a retrospective multi-center cohort study, including 1213 consecutive patients undergoing autologous oocyte *in vitro* fertilization (IVF) treatment during 2016-2019, with fresh transfer of a single day 5 embryo (selection based on developmental stage and inner cell mass and trophectoderm morphology if blastocyst was at the  $\geq$ expanding stage). Cycle data were collected from 4 associated private clinics, with repeat cycles of same patients excluded to avoid clustering effect at statistical analysis.**Participants/materials, setting, methods:** Live birth and birthweight were followed up in all 1213 fresh day 5 SETs. Multiple regression (logistic or linear) was performed to investigate association between slow day 5 development (defined as  $\leq$  early blastocyst) and (a) live birth, (b) birthweight, and (c) gestation-adjusted birthweight (Z score) to account for gestational age, gender and

compared to embryos at  $\geq$  expanded stage. Results were expressed as adjusted odds ratio (aOR) with 95% confidence interval (CI) or coefficients ( $\beta$ ).

**Main results and the role of chance:** No implantation was achieved following single fresh transfer of day 5 embryos that failed to reach early blastocyst stage ( $n=76$ ) and were transferred as  $\leq$  morula stage. Live birth rate was significantly lower following single day 5 fresh transfer of an early blastocyst ( $n=237$ , 16%), in comparison to expanding ( $n=329$ , 27%,  $P=0.001$ ), expanded ( $n=392$ , 41%,  $P=0.000$ ), and hatching/hatched blastocysts ( $n=169$ , 44%,  $P=0.000$ ). After adjusting for potential confounding factors including; maternal age, hours post insemination at day 5 assessment, number of oocytes collected, number of 2PN embryos, and number of embryos frozen; multiple logistic regression showed significantly reduced likelihood of live birth resulting from early blastocysts in reference to those at the expanding (aOR=0.584, 0.371-0.917,  $P=0.020$ ), expanded (aOR=0.322, 0.208-0.501,  $P=0.000$ ), or hatching/hatched stages (aOR=0.255, 0.147-0.443,  $P=0.000$ ). However, multivariate linear regression indicated that early blastocysts resulting in a live birth ( $n=39$ ) did not lead to altered birthweight ( $\beta=-9.091$ ,  $P=0.904$ ;  $\beta=-34.960$ ,  $P=0.343$ ;  $\beta=-26.074$ ,  $P=0.414$ ; respectively) or Z score ( $\beta=0.045$ ,  $P=0.706$ ;  $\beta=-0.051$ ,  $P=0.426$ ;  $\beta=-0.028$ ,  $P=0.506$ ; respectively) in reference to the expanding ( $n=90$ ), expanded ( $n=160$ ), or hatching/hatched stages ( $n=75$ ).

**Limitations, reasons for caution:** The retrospective nature of this study does not allow controlling of unknown confounders. The 4 participating clinics are associated within the same network with shared protocols, therefore, results may not be generalized to other clinics with different settings.

**Wider implications of the findings:** The findings suggest no clinical value of fresh day 5 transfer of embryos  $\leq$  morula stage. Although early blastocysts implant at reduced rate, assuring birthweight outcomes suggest clinical value. Future studies intend to investigate slow growing day 5 fresh transfers versus embryos that were slow growing but transferred after day 6.

**Trial registration number:** NA