EVALUATING DAY 5 VERSUS DAY 6 BLASTULATION RATES AMONG FRESH VERSUS FROZEN DONOR EGG CYCLES

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Background: Patients utilizing third party reproduction to achieve their family goals have the option to use fresh donor oocytes or previously frozen donor oocytes to create embryos for transfer. While studies have not detected a difference in clinical outcomes with the use of fresh vs. frozen donor oocytes, there remains limited data on the blastulation rate when comparing fresh vs. frozen donor oocytes (1-4). This question is of particular interest for fertility practices offering fresh embryo transfer - if there is a significant difference noted between groups, this could help further personalize embryo transfer protocols and optimize synchronization (e.g. offering fresh or frozen embryo transfer based on use of fresh or frozen donor oocytes if a difference in blastulation rate is present).

Objective: To determine if there is a difference in day 5 and day 6 blastulation rate per number of mature oocytes (M2s) and per number of zyogtes (2PNs) with the use of fresh versus frozen donor oocytes.

Materials and Methods: This was a retrospective cohort study including all IVF with ICSI cycles from January 2017 to July 2023 using fresh donor oocytes or previously frozen donor oocytes from an external egg bank. Cycles with and without preimplantation genetic testing for aneuploidy were included. The primary outcome was day 5 versus day 6 blastulation rate in fresh versus frozen donor egg cycles. Secondary outcomes included sustained implantation rate (SIR - ongoing pregnancy beyond 8 weeks gestational age) and live birth rate. Chi-square was used for comparison of categorical variables. T-test was used for comparison of continuous variables. Logistic regression analysis was performed after controlling baseline characteristics. $P < 0.05$ was considered statistically significant.

Results: 1,095 donor oocyte cycles were included in the analysis, 491 (44.8%) utilized fresh donor oocytes and 604 (55.2%) utilized frozen donor oocytes from an external egg bank. Baseline characteristics for fresh and frozen oocytes are described in Table 1. The blastulation rate per 2PN was significantly higher in the fresh donor oocyte cohort on both day 5 (24.8% vs. 17.3%, p = <0.001) and day 6 (36.4% vs. 32.7%, p = 0.010). Similarly the blastulation rate per M2 was also higher in the fresh donor oocyte cohort on both day 5 (20.6% vs. 14.2%, p = <0.001) and day 6 (30.3% vs 26.4%, p = 0.002). Across both fresh and frozen donor cycles, the blastulation rate was higher on day 6. The findings persisted after adjusting for differences in baseline characteristics. The SIR and LBR were not significantly different with the use of fresh vs. frozen oocytes (Table 2).

Conclusions: The use of fresh donor eggs resulted in a higher day 5 and day 6 blastulation rate in comparison to use of frozen donor eggs from an egg bank. Patients opting to do a fresh transfer on day 5 may be better suited to use fresh donor eggs due to the significantly higher blastulation rate on this day. Outcomes post-transfer including SIR and LBR were not significantly different between both groups.

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Table 1 – Baseline characteristics of fresh and frozen oocyte patients

Characteristics ***mean ± SD***	**Fresh donor oocytes**	**Frozen donor oocytes***	**P value (<0.05)**
Age in years	28.5 ± 4.3	-	
Male partner's age in years	42.2 ± 7.3	43.2 ± 6.6	0.036
Type of sperm utilized for ICSI Fresh ejaculated, N (%) Frozen ejaculated, N (%) Fresh surgical, N(%) Frozen surgical, N (%)	 214 (43.7%) 265 (54.1%) 2 (0.4%) 9 (1.8%)	 317 (52.9%) 262 (43.7%) 6 (1%) 14 (2.3%)	0.006
AMH (ng/mL)	5.0 ± 3.2	-	
D3 FSH (IU/mL)	7.6 ± 2.4	-	
BMI (kg/m^2)	24.7 ± 4.5	-	
Oocytes thawed	-	6.9 ± 1.9	
Ooocytes survived thaw	-	6.2 ± 2.0	
Oocytes retrieved	23.3 ± 12.3	-	

**frozen donor oocytes were obtained by patients from various outside egg banks (age, AMH, D3 FSH and BMI not available for these patients)*

Table 2 – Secondary outcomes comparing fresh vs. frozen donor cycles

	Fresh donor oocytes N=815	**Frozen donor oocytes N=645**	**P value (<0.05)**	**Adjusted OR (95% CI)**
Sustained implantation rate, N (%)	532 (65.3%)	390 (60.5%)	0.063	0.732 (0.533-1.006)
Live birth, N (%)	481 (59.0%)	348 (54.0%)	0.056	0.77 (0.566-1.048)

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