Comparative of morphokinetics bovine embryo development between time-lapse monitoring in microwells and conventional droplets in vitro culture

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Background

Currently, bovine embryo selection is based on morphological evaluation (shape, color and texture). However, this method is subjective and results in unreliable embryo selection. Nowadays, time-lapse monitoring in microwells is a non-invasive method that follows individual kinetics development allowing the evaluation of embryo morphology and development quality. This method offers the opportunity to explore an improved method for embryo selection.

Aim

The aim was to compare the morphokinetics of bovine embryo development in microwell with time-lapse monitoring and the conventional droplet culture system.

Methods

Cumulus-oocyte complexes surrounded by more than three layers of cumulus cells were selected for in vitro maturation and fertilization (IVF). At approximately 18 hours post-fertilization, presumptive zygotes (n=1214) were randomized into two groups: i) conventional droplet (n=926 in 19 replicates; 10 embryos/70 µL) and ii) time-lapse monitoring in microwell (n=288 in 18 replicates; one embryo/microwell). Both groups were cultured in an incubator at 38°C in a humidified atmosphere of 6% CO2 for seven days. Embryonic development evaluation was performed at three moments post IVF (IVF=Day 0): cleavage (day 3), morulae (day 5) and blastocyst rate (day 7). In addition, the time-lapse monitoring in microwell and a computer software was used to calculate the timing of following events: 2, 3, 4, 5, 8 cells (t2, t3, t4, t5, t8) and when the embryo formed into a morula and all cell boundaries are unobvious (tM) and, start of a cavity forming (tSB). Statistical analyses were performed using Statgraphics Centurion. The embryonic development was evaluated by analysis of variance (ANOVA). Statistically significant at P<0.05.

Results

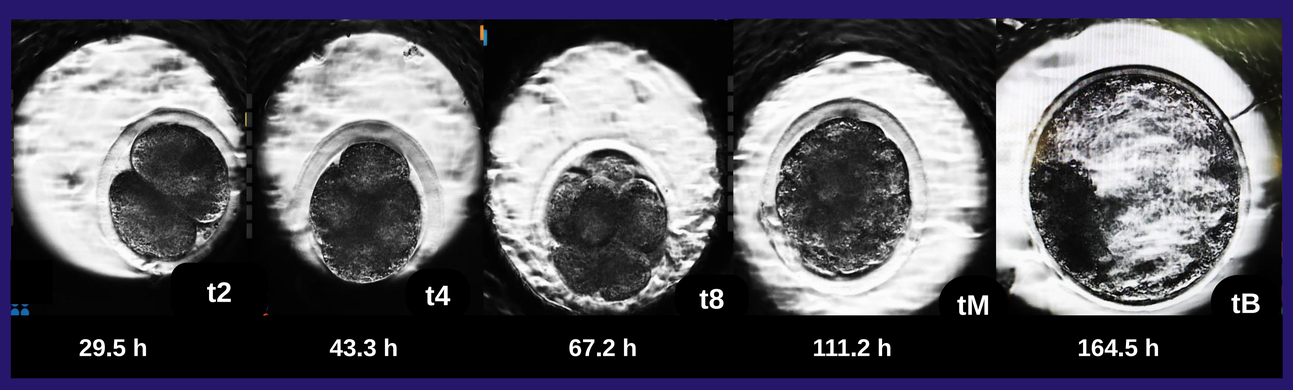

Fig. 1. Morphokinetics of bovine embryonic development in microwell culture system and monitored with a time-lapse system. The average times for: t2 (29.5 ± 3.2 h); t4 (43.3 ± 6.9 h); t8 (67.2 ± 11.2 h); tM (111.2 ± 9.6 h) and tB (164.5 ± 10.7 h).

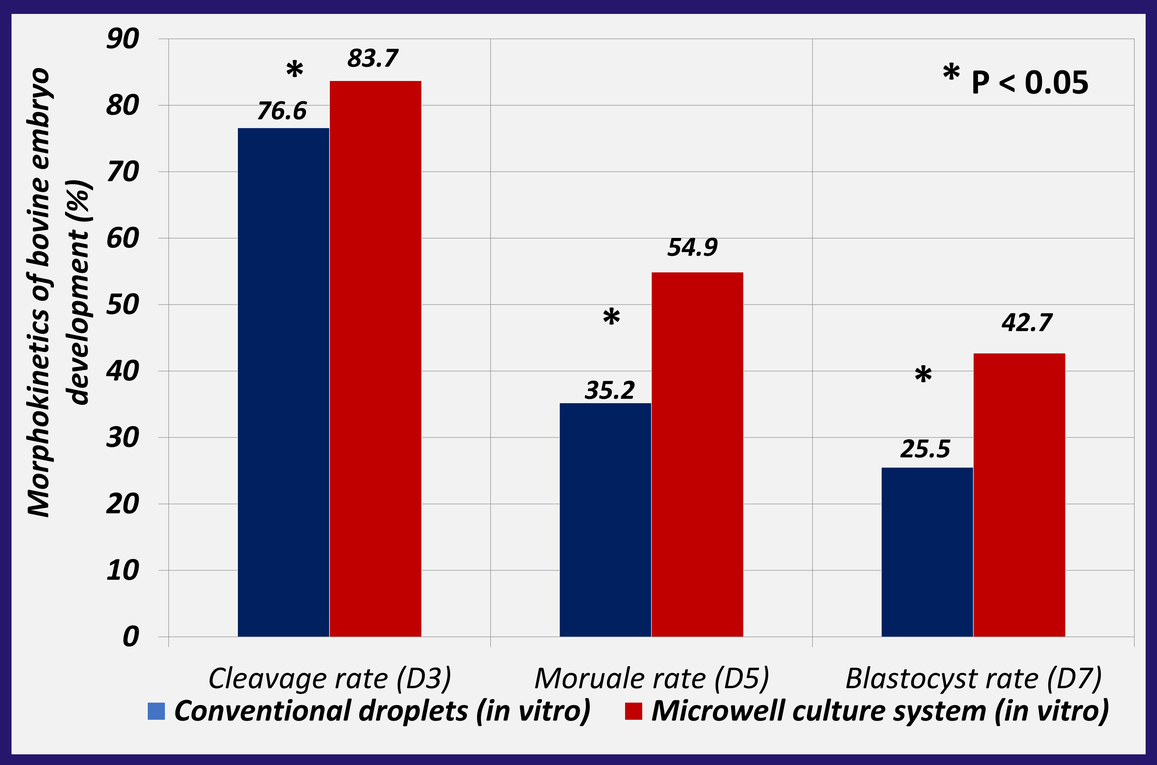

Fig. 2. Bovine embryo development in microwell with time-lapse monitoring and the conventional droplet culture system.

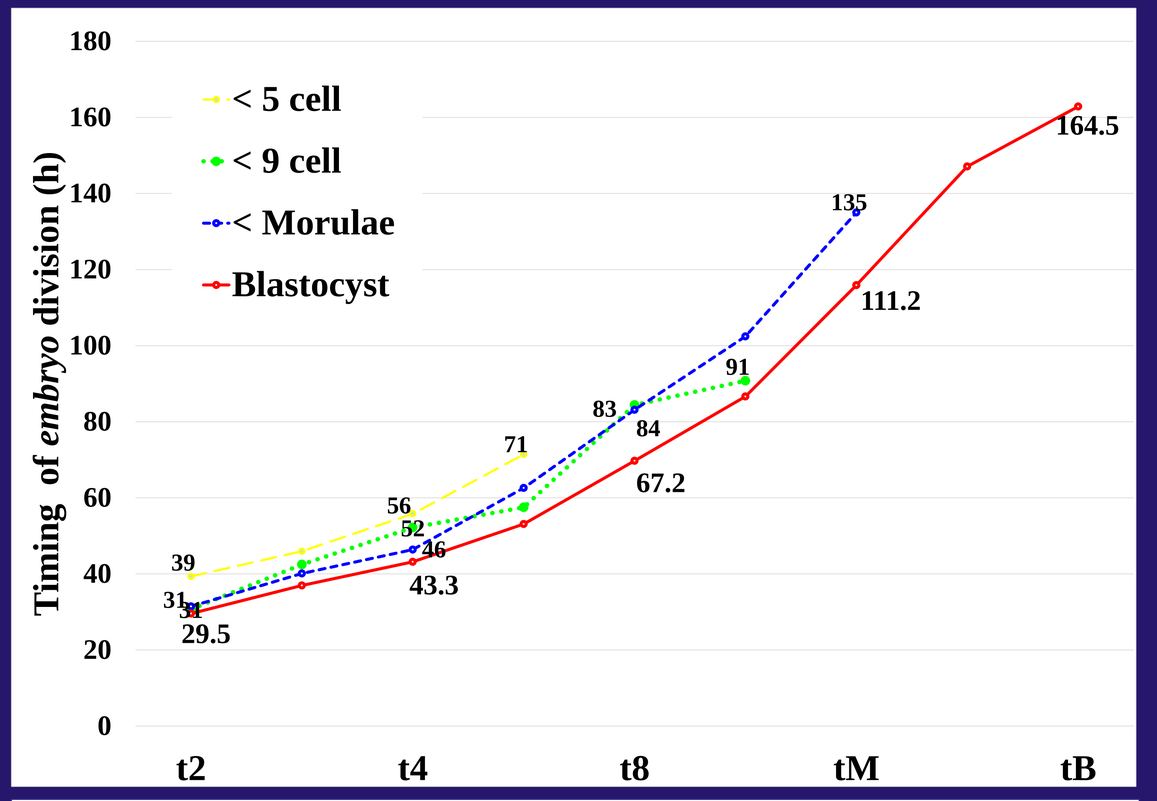

Fig. 3. Means (h) of the morphokinetics of bovine embryonic development in the microwell culture system reaching the blastocyst stage.

Conclusion

In conclusion, in vitro embryo culture with time-lapse monitoring in microwell showed a better rate of blastocyst and allowed an objective, constant and non-invasive embryo assessment, which also could help discriminate competent embryos.

Acknowledgement

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