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— From Innovation to Impact —

Session PO3-11c - Reproductive Biology III

Add To Itinerary

S-257 - Biomimetic Coatings from Decellularized Rabbit Endometrium Influence the *In Vitro* Development of Pre-Implantation Embryos.

March 16, 2019, 8:00 AM - 10:00 AM | Hall Maillot

Categories
+11.8 - Basic Reproductive Biology: Regenerative Medicine

Keywords
Tissue Engineering,Endometrium,Embryo Culture

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Abstract

Introduction: Bioengineered tissue-specific approaches hold much promise to revolutionize reproductive medicine. Here, we created coatings and hydrogels made from non-synchronous (NS, no ovulation was inducted) and synchronous (S, 72h post ovulation) endometrium obtained from decellularized rabbit uteri. The extracellular matrix (ECM) coatings were compared to current standard rabbit embryo culture conditions.

Methods: An optimized decellularization (DC) protocol for whole rabbit uteri was established. DC efficiency was tested by histology (H&E, Masson's trichrome and DAPI), DNA and protein quantification. The acellular endometrial tissue was separated, milled, solubilized with pepsin and the resulting hydrogel was characterized by electron microscopy and proteomic analysis. 72h after artificial insemination, rabbit embryos were cultured for 48h in five culture conditions: NS, S and Matrigel (M) coatings made via non-specific adsorption and two uncoated controls (C+ and C-, using culture medium with and without fetal bovine serum respectively). Blastocyst hatching/hatched rates, morphometry and mRNA expression of three core pluripotency factors (OCT4, Nanog and Sox2) were performed. Differences were estimated using Bayesian inference ($P \geq 0.8$).

Results: Histology showed full DC and intact ECM, this was corroborated by a significant drop of DNA and protein content ($P<0.05$), with no difference between NS and S uteri. After processing, nanofibrous hydrogels formed when incubated for 30min at 37°C. Bayesian inference showed no difference in embryo hatching rates, but S and C+ yielded comparable embryo diameters that were higher to those in NS, M and C- conditions ($P \geq 0.8$). Additionally, OCT4, Nanog and Sox2 expression in the S-coating group are consistent with the optimal condition (C+) which is also different to the others. Thus, S-coating is proposed as an appropriate biological support to improve embryo development.

Conclusion: A DC protocol for whole rabbit uteri was established and endometrial ECM hydrogels were obtained. For the first time, we demonstrated that coatings from synchronous DC endometrium act as a biomimetic support for embryo development and is comparable to optimal protocols, possibly because of the slow release of synchronous-specific endometrial proteins.

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