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The effect of mesenchymal stem cells as co-culture in in vitro nuclear maturation of ovine oocytes

Samira Asgharzadeh1,2, Pezhman Mirshokraei3 , Hossein Hassanpour1,*, Ebrahim Ahmadi1 , Hassan Nazari1
Research Institute of Animal Embryo Technology, Shahrekord University, Shahrekord, Iran 2 Department of Molecular Medicine, School of Advanced Medical Technologies, Tehran University of Medical Science, Tehran, Iran 3 Department of Clinical Science, School of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

Abstarc :

This study compared the effects of ovine mesenchymal stem cells (MSCs) and ovine oviductal epithelial cells (OECs) as feeder cells in cell free culture systems (HEPES-modified tissue culture medium, TCM199) supplemented with polyvinyl alcohol (PVA) or fetal calf serum (FCS) on in vitro oocyte maturation and subsequent embryo development (IVM/IVC). Cumulus-oocyte complexes (COCs) were harvested from ovine ovaries and subjected to IVM in the above-mentioned culture media. After culture for 24 h, nuclear maturation of the oocytes was evaluated by 4, 6-diamino- 2-phenylindole (DAPI) staining. After fertilization the presumptive zygotes were cultured under identical culture conditions and embryo development was evaluated. The percentage of oocytes at nuclear maturation (metaphase II) cultured in the MSC group was higher than for the IVM medium + PVA group ($P<0.05$), while between MSCs, OECs and IVM medium + FCS it was non-significant. The rates (%) of cleavage and the percentage of total blastocysts in MSCs and the IVM medium + FCS group were higher than for OECs and the IVM medium + PVA group ($P<0.05$). These rates were non-significant between MSCs and the IVM medium + FCS group or between OECs and the IVM medium + PVA group. The percentage of hatched blastocysts (%) was significantly increased in MSCs and the IVM medium + FCS group when compared to OECs and the IVM medium + PVA group ($P<0.05$). In conclusion, the effects of mesenchymal stem cells as co-culture on oocyte maturation and the successive embryo development in vitro are similar to those in the medium supplemented with FCS. This study suggests that co-culturing with mesenchymal stem cells may be a promising alternative to FCS-medium.

Key Word :
mesenchymal stem cell / oviduct / fetal calf serum / ovine oocyte

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