

News & Comments

Progesterone and Heparin Work Together to Increase the Success Rate of Bovine Sperm In Vitro Fertilization

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The sperm must navigate a variety of physiological barriers before it can engage in fertilization with the oocyte. Sperm waves that make it to the isthmus are expected to have a higher proportion of normal morphology and zona pellucida binding capacity than sperm waves that are unable to enter the oviduct. Studies conducted in vitro have shown that both oviductal cells and fluid, most likely through providing glycolyzable substrates, preserve sperm viability in cattle. The current study sought to investigate the in-vitro fertilization potential of sperm co-incubated with cell aggregates from the isthmus, namely the infundibulum, ampulla, and isthmus, as well as the impact of heparin and/or progesterone (P4) on this potential.

Numerous studies demonstrated that spermatozoa's attachment to oviduct epithelial cells increases sperm longevity, fertilizing ability, zona binding potential, and maintained survival. To prevent chromatin alterations, the oviductal sperm reservoir only keeps incapacitated, morphologically healthy sperm. Except where otherwise noted, all chemicals and reagents for oviductal explants were purchased from Sigma Aldrich (St. Louis, MO, USA). 663 oocytes in total were used in this experiment. To create aggregates, the epithelial cell sheets from the infundibulum, ampulla, and isthmus of the oviduct were gathered and subsequently treated in dmTALP medium.

Authors created four treatment groups to test the impact of pre-incubating sperm with various oviduct sections on the success of IVF. The second group contained aggregates of sperm and cells from the infundibulum, the third group had aggregates of sperm and cells from the ampulla, and the fourth group contained clumps of sperm and cells from the isthmus. These studies examined the ability of sperm to fertilize cell aggregates from different oviduct sections (infundibulum-ampulla-isthmus) in the presence or absence of progesterone at an 80 nanomolar concentration and/or heparin at a 40-g/mL concentration. In accordance with Timothy, binding to cell aggregates from the isthmus may also reduce polyspermy while buffering the number of free sperm.

Oviduct cells had been cultivated for several days when compared to the cell aggregation model, and they exhibited a more flattened and fibroblast-like appearance. Additionally, during cultures that lasted longer than a few days, the way in which they bound sperm changed. According to the findings, pre-treating mature COCs with progesterone at an 80 nanomolar concentration or heparin at a 40-g/mL concentration considerably increases the percentage of IVF after permitting the sperm to bind cell



aggregates exclusively from the isthmus. On the other hand, even with the addition of P4 or heparin separately, the percentage of the IVF did not increase in the absence of cell aggregates from the isthmus. Heparin's importance for capacitation and its promotion of sperm release from cell aggregates may be the cause of the increased IVF success rate.

Source: [Veterinary Sciences](#)

KEYWORDS

Bovine, oviduct, cell aggregates, fertilization, heparin, progesterone

