TUMOR NECROSIS FACTOR α AND INTERLEUKIN-1β IN OVIDUCTAL CONTRACTION: POSSIBLE INVOLVEMENT OF GAMETE/EMBRYO TRANSPORT

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Tumor necrosis factor α (TNFα) and interleukin -1β (IL-1β) are important mediators of cell signaling. The existence of the bioactive form of cytokines as well as their binding sites in the various reproductive tissues has been reported and interaction with other substances in the control of reproductive functions has been postulated. Thus, the effect of cytokines in the regulation of biosynthesis and secretion of oviduct motility related substances in the cow oviduct were investigated. The study was further extended to examine the possible autonomous TNFα/ IL-1β systems.

In vitro microdialysis system (MDS) was utilized to observe real time effect of TNFα and IL-1 β on the prostaglandin E2 (PGE2), prostaglandin F2α (PGF2α), endothelin-1 (ET-1) and angiotensin II (Ang II) secretion by the cow oviduct. The lumen of 10 cm long portion of each oviductal segment was implanted with a MDS system and TNFα (100 ng) or IL-1α (10 ng) was infused. After extraction, levels of Prostaglandins (PG), ET-1 and Ang II were measured using second antibody enzymeimmunoassay (EIA). Bovine oviductal epithelial cells (BOEC) were collected from non-pregnant Holstein cows during the follicular phase and cultured in M199 under standard culture conditions until monolayer formation. Cells in second passage were incubated for 24 h with TNFα (10 ng) or IL-1α (1 ng). The mRNA expressions of BOEC for enzymes involved in PG biosynthesis (COX-2, PGFS, PGES) ET-1 biosynthesis (ECE-1, ET-1), and Ang II biosynthesis (ACE-1) were evaluated using real-time reverse transcription-polymerase chain reaction (real-time RT-PCR). The quantification of mRNA expression was done using LightCycler® Software.

Four hour infusion of TNFα and IL-1β stimulates the oviductal secretion of PG, ET-1 and Ang II. Treatments with TNFα and IL-1β resulted in significant elevation of mRNA expressions for COX-2, PGES, PGFS, ET-1, ECE-1 and ACE-1.The results reveal that TNFα and IL-1β increase the PGE2, PGF2α, ET-1 and Ang II biosynthesis and secretion in the bovine oviduct. The increased levels of these bioactive substances in the oviducts may actively participate in the control of oviductal contraction-relaxation.

It can be concluded that TNFα and IL-1β increase the biosynthesis and release of PGE2, PGF2α ET-1 and Ang II and thus, may actively participate in oviductal contraction -relaxation to regulate the trans-oviductal transport of the gamete/embryo.