Sperm Binding to Oviduct Epithelial Cells Enhances TGFB1 and IL10 Expressions in Epithelial Cells as Well as Neutrophils In Vitro: Prostaglandin E2 As a Main Regulator of AntiInflammatory Response in the Bovine Oviduc

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Abstract:

Sperm are allogenic to the female genital tract; however, oviducts provide optimal conditions for survival and capacitation of these non-self cells until fertilization. Recently, we showed that oviduct-conditioned media and prostaglandinE2 (PGE2) suppress sperm phagocytosis by polymorphonuclear neutrophils (PMNs) under physiological conditions. We hypothesized that sperm binding to bovine oviduct epithelial cells (BOECs) could change the local innate immunity via PGE2. As the first step to obtain basic information, sub-confluent BOEC monolayers were co-cultured with swim-up sperm for 2 h. BOECs with viable bound sperm were cultured for an additional 3, 6, 12, or 24 h. Then, we confirmed the impact of the sperm-BOEC binding on both BOECs and PMN gene expression. Immunohistochemistry revealed that BOECs strongly express TGFB1 and IL10 in the oviduct. Sperm binding to BOECs in culture induced the antiinflammatory cytokines (TGFB1 and IL10) and PGE2 production by BOECs. Exogenous PGE2 in vitro suppressed pro-inflammatory cytokine expression (TNF and IL1B) in BOECs. Moreover, pre-exposure of PMNs to BOEC-conditioned media suppressed the TNF expression, but the BOEC media co-cultured with sperm stimulated PMNs to express TGFB1 and IL10, with increasing PGE2 secretion. Of note, exogenous PGE2 led PMNs in vitro to decrease their TNF expression and increase anti-inflammatory cytokines expression. Our findings strongly suggest that BOECs provide an anti-inflammatory environment under physiological conditions and the sperm-BOEC binding further strengthens this milieu thus suppresses PMNs in the bovine oviduct. PGE2 is likely to drive this stable anti-inflammatory environment in the oviduct.

Keywords:

Sperm Binding, bovine Oviduct Epithelial Cells, TGFB1, IL10, Prostaglandin E2, AntiInflammatory

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