Does Lipopolysaccharide Influence Bovine Endometrial Response to Interferon Tau?

Anup K. Talukder; John A. Browne; P. Lonergan
School of Agriculture and Food Science, University College Dublin, Belfield, Dublin 4, Ireland.

The uterine environment during the peri-implantation period is crucial for conceptus growth, elongation and attachment leading to a successful pregnancy establishment in cattle. Postpartum uterine disease is a major factor affecting fertility in high-producing dairy cows through disruption of ovarian and uterine function. Lipopolysaccharide (LPS), a well-known endotoxin and the major component of the outer membrane of Gram-negative bacteria, causes poor uterine receptivity by inducing excessive inflammation at the maternal-fetal interface. We aimed to investigate the effect of interferon tau (IFNT), the conceptus-derived maternal recognition signal, on bovine endometrial gene expression in the absence or presence of LPS. Endometrial explants were collected at a local abattoir from Holstein Friesian cows (n=4) during the mid-luteal stage of the oestrous cycle, and cultured in RPMI medium supplemented with 5% fetal calf serum without (control), or with IFNT (100 ng/mL), LPS (1 μg/mL), or both IFNT and LPS for 24 h in 5% CO_2 in humidified air. Gene expression was analysed by RT-qPCR. Treatment effects were considered significant at $P<0.05$. Incubation with IFNT upregulated ($P<0.05$) the well-known classical interferon-stimulated genes (ISGs: *ISG15*, *OAS1*, *MX1* and *MX2*) as well as selected ISGs (*CMPK2*, *IFI35*, *TRIM38*, *TNFSF10*) from our previous study (Talukder et al., 2023 doi: 10.1016/j.theriogenology.2023.07.033) and downregulated expression of *IL1B* in endometrial explants. Incubation with LPS increased ($P<0.05$) expression of inflammation-related genes (*TNFA*, *IL6*, and *IL1B*) as well as *ISG15* and *MX1* in endometrial explants but did not alter endometrial response to IFNT in terms of the studied ISGs. These results suggest that the expression of ISGs, upregulated by conceptus-derived IFNT, is not altered in the endometrium in the presence of LPS; however, the increased expression of inflammation-related genes induced by LPS indicate an altered endometrial immune response that may be associated with compromised pregnancy establishment.

The work was funded by the Irish Research Council (GOIPD/2021/46).