

LUTEINIZING HORMONE STIMULATES ANGIOTENSIN II BIOSYNTHESIS AND SECRETION BY THE COW OVIDUCT

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Angiotensin II (Ang II), is the major bioactive peptide of renin-angiotensin system, is secreted by the cow oviduct. Ang II in the oviduct collaborates with Luteinizing Hormone (LH) and ovarian steroids in the regulation of the peak oviductal contraction. However, the role of LH and ovarian steroids in regulating oviductal secretion of Ang II is not known. Thus, in the present study, we investigated the effect of LH and ovarian steroids on the biosynthesis and secretion of Ang II by the cow oviduct using novel micro dialysis system (MDS) and bovine oviductal epithelial cell (BOEC) culture system .

In the first experiment, the lumen of a 10 cm long portion of each oviductal segment was implanted with a dialysis capillary membrane and LH (1 µg/ml), estradiol 17-β (E2) (100 ng/ml) or a cocktail of LH + E2 + P4 (Progesterone) (100 ng/ml) was infused from 4th hr to 8th hr during the 16-h of total incubation period. In the second experiment, BOEC in the second passage were cultured with LH (10 ng/ml), E2 (1 ng/ml) and/or P4 (1 ng/ml) and the mRNA expressions for angiotensin converting enzyme-1 (ACE-1) in the BOEC was investigated using real-time RT-PCR. The levels of Ang II in the (MDS) fractions and the medium were measured using second antibody enzymeimmunoassay (EIA).

In MDS oviducts collected during the follicular phase, LH alone significantly increased the Ang II release whereas the combined infusion of LH+E2+P4 caused acute and continuous increase in Ang II release. However, the infusion of E2 did not show any significant effect of Ang II release. None of the treatments used stimulated Ang II release during the luteal stage. A 24 h culture of BOEC with LH increased the Ang II release into the medium and up regulated the mRNA expression for ACE in the cells. Adding of ovarian steroid into the medium enhanced the up regulatory effect of LH on Ang II release and ACE mRNA expression; however, adding of E2 alone did not show any effect.

The results of the present study provide the first direct evidence that LH upregulates the mRNA expression for ACE and release of Ang II in the bovine oviduct. Moreover, ovarian steroids synergistically enhance the stimulatory effect of LH on ACE mRNA and Ang II release. In conclusion, the active oviductal Ang II system that exists during the periovulatory period may be involved in the regulation of oviductal contraction, and thus, rapid transport of gametes to the fertilization site.

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