

2nd International Conference on **Endocrinology**

October 20-22, 2014 DoubleTree by Hilton Hotel Chicago-North Shore, USA

Epidermal Growth Factor (EGF) promotes ovarian steroidogenesis and Epidermal Growth Factor Receptor (EGFR) signaling is required for Gonadotropin-induced steroid production in common carp, *Cyprinus carpio*

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Epidermal growth factor (EGF) is well known for its activities in the ovary and initiate signal transduction by binding to Epidermal growth factor receptor (EGFR) across vertebrates from fish to human. Using common carp as the model, we demonstrated in the present study that recombinant human EGF significantly enhanced steroidogenesis of intact vitellogenic follicles and isolated follicle cells *in vitro* in clear time- and dose-dependent manner. Steroidogenic potency of EGF in such follicles was little less than the potency of gonadotropin. EGF-mediated steroid production required an active EGFR, because the specific EGFR kinase inhibitor AG1478 abrogated EGF-induced steroid secretion in intact follicles and isolated follicle cells. Both intact follicles and isolated follicle cells expressed EGFR and this expression was EGF-dependent. The effect of EGF was additive to that of HCG at low concentrations, but additivity diminished when concentration increased. We designed experiments to determine whether EGFR-mediated signaling is critical for normal gonadotropin-induced steroidogenesis in these follicles. Our results showed that inhibition of EGFR kinase by AG1478 blocked both EGF-, and HCG-induced steroidogenesis. Interestingly, inhibition of matrix metalloproteinase (MMP)-mediated cleavage of membrane-bound EGF moieties with MMP inhibitor abrogated HCG-induced steroidogenesis implicating MMPs and membrane-bound EGFs as important regulators of gonadotropin-induced steroidogenesis in fish ovary. EGF increased the expression of StAR gene and activity of StAR protein. EGF increased 17 β -estradiol secretion by enhancing the expression of P450 mRNA and activity of aromatase both in intact follicles and isolated granulosa cells. Together, these results indicate that EGF-mediated steroid production required an active EGFR and EGFR-mediated signaling is critical for normal gonadotropin-induced steroidogenesis in fish ovarian follicles.

Biography

Dilip Mukherjee has completed his PhD at the age of 28 from Visva -Vharati University, Santiniketan, India and post doctoral studies from Hormone Research Centre, Chonnam National University, Kwanjoo, Korea. He is the Professor of Zoology, in the department of Zoology, University of Kalyani since 1981-till date. He has published more 60 than papers in peer reviewed international journals and three books. 14 students have been awarded PhD degree under his direct supervision on hormonal regulation of fish ovarian steroidogenesis and oocyte maturation, hormonal regulation of calcium ion metabolism in fish and gonadotropin regulation of uterine functions in mammals.

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