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HUMAN CHORIONIC GONADOTROPIN'S ROLE AS A NEUROPROTECTANT: EXPLORING THE PATHWAYS BY WHICH hCG PROVIDES NEUROPROTECTIVE EFFECTS TO INJURED NEONATAL HYPOXIA-ISCHEMIC CELLS

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Human Chorionic Gonadotropin (hCG) acts as a neuroprotectant against the neurodegenerative effects of injured developing neurons in a mouse and in vitro model of neonatal cerebral hypoxia-ischemia. In gonads, hCG-mediated signaling involves the binding of hCG to Luteinizing Hormone Receptors (LHR) and subsequent phosphorylation of ERK1/2 (extracellular signal-regulated kinases 1 and 2) signaling. However, it is not known whether hCG activates the LHR-ERK1/2 cascade in brain or whether hCG-mediated neuroprotection involves this cellular signaling pathway.

We set out to answer the above hypothesis by using neurons, MA-10 cells (mouse testicular cancer cells) as a model for gonad cells, and Y79 cells (human retinoblastoma cells) as a model for neural derived cells. We compared the effects of hCG exposure between these three cell lines to see if the effects were similar across the different types of cells and if they operated under similar pathways. Since ERK1/2 is a known downstream kinase in the LH receptor activation pathway, we used ERK1/2 phosphorylation as a measure of hCG-LHR activation; Via western blot procedure, we compared the activation of LHRs following hCG exposure. To examine the downstream effects of LHR-ERK1/2 signaling and its potential role in neuroprotection, we studied the relative expression of 3 known neuroprotective genes following hCG exposure utilizing real-time quantitative PCR: EGR1 (early growth response 1), VEGF (vascular endothelial growth factor), and LIF1 (leukemia inhibitory factor).

We found that hCG in neurons acts under the LH receptor activation pathway, and that this effect can be modulated pharmacologically with deglycosylated-hCG (dg-hCG). hCG-LHR signaling may involve an increase in the expression of VEGF, EGR-1, and LIF-1. Our results also suggest that there is some endogenous activation of this pathway in normal growing cells, which hints towards its role in the healthy growth and protection of cells naturally.