The Involvement of Phosphatidylinositol-3 Kinase Signaling in Neurogenesis During Xenopus Embryonic Development

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Objective: Phosphatidylinositol 3-kinase (PI3K) is a signaling molecule with a demonstrated role in numerous cellular activities. In *Xenopus* embryogenesis, PI3K acts in mesoderm induction and in dorsoventral patterning. To investigate the involvement of the PI3K subunits and PI3K signaling pathway in neural development during *Xenopus* embryogenesis, we report the outcome of experiments using loss-or-gain-of-function. **Methods and Results**: The P110α and ΔP85 are two subunits of PI3K, and Akt is downstream of PI3K in the signaling pathway. We show that overexpression of a constitutively active form of the catalytic subunit P110α of PI3K, or a constitutively active form of Akt, produces double heads and axes and induces neural markers: NACM, Otx2, and Hoxb9 expression; whereas overexpression of ΔP85, a truncated form of P85, or DN-Akt or GSK-3β, produces a ventral phenotype and induces ventral markers: Xvent1, Xvent2, BMP-4, and Xmsx1 expression. It has been demonstrated that GSK-3β antagonized Akt signaling. Furthermore, We has shown that ΔP85 blacked P110α activity, whereas DN-Akt and GSk-3β inhibited both P110α and Akt activities. **Conclusion**: These results demonstrate that PI3K and the PI3k signaling pathway are involved in neural development during Xenopus embryogenesis, and that Akt is a downstream target of PI3K in this signaling pathway during neurogenesis.