K252a Disrupts DRG Axon Outgrowth in the E5 Chicken Embryo

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Dorsal root ganglia (DRG) are neural crest derived structures responsible for transmitting sensory information to the central nervous system via the spinal cord. During neural development, DRG sensory axons extend into the spinal cord at the dorsal root entry zone, then branch to grow along the rostral-caudal axis and finally grow into the grey matter. Our laboratory is interested in the regulation of longitudinal growth of sensory axons in the spinal cord. The current experiments are designed to test the hypothesis that Tyrosine kinase receptor B (TrkB), the high affinity receptor for brain derived neurotrophic factor (BDNF), plays a role in the rostro-caudal extension of sensory afferents.

Immunohistochemistry was used to determine whether TrkB is present; we demonstrated transient expression of TrkB from embryonic day 4 (E4) to E8 in the thoracic spinal cord and DRG. To determine whether TrkB is functionally involved in sensory afferent growth, thoracic level 4 (T4) DRG of 100-hour chicken embryos (stage-25) were micro-injected with DiI in an in vitro preparation of the ganglia and spinal cord, which was then cultured for 5-hours in the presence of a TrkB inhibitor, K252a, or DMSO control. Significant truncation ($P<0.001$) of extending axons was observed in K252a treated embryos as compared to control conditions. Collectively these data suggest a role for TrkB in axon outgrowth in sensory afferent development. Future experiments will explore a possible relationship between TrkB receptors and B_1-integrin receptors and myosin motor proteins, both of which regulate sensory afferent growth in the developing spinal cord.