

Title: "Regulated axon outgrowth as a mechanism for axon guidance"

Abstract: Commissural spinal axons extend away from the roof plate (RP) in response to a chemorepellent mediated by the Bone Morphogenetic Proteins (BMPs). Previous studies have focused on the ability of commissural axons to translate a spatial gradient of BMPs into directional information in vitro. However, a notable feature of this system in vivo is that the gradient of BMPs acts from behind the commissural cell bodies, making it possible for the BMPs to have a continued effect on commissural axons as they grow away from the RP. We have demonstrated that BMPs activate the cofilin regulator Limk1 to control the rate of commissural axon extension in the dorsal spinal cord. By modulating Limk1 activity in both rodent and chicken commissural neurons, the rate of axon growth can either be stalled or accelerated. Altering the activation state of Limk1 also influences subsequent guidance decisions: accelerated axons make rostrocaudal projection errors while navigating their intermediate target, the floor plate. These results suggest that a preceding guidance cue can specify information about the rate of growth, to ensure that axons reach subsequent signals either at particular times or speeds during development.