Ciliary neurotrophic factor and fibroblast growth factor increase the speed and number of regenerating axons after optic nerve injury in adult Rana pipiens. [1]

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Title	Ciliary neurotrophic factor and fibroblast growth factor increase the speed and number of regenerating axons after optic nerve injury in adult Rana pipiens.
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Abstract	Neurotrophins such as ciliary neurotrophic factor (CNTF) and brain-derived neurotrophic factor (BDNF) and growth factors such as fibroblast growth factor (FGF-2) play important roles in neuronal survival and in axonal outgrowth during development. However, whether they can modulate regeneration after optic nerve injury in the adult animal is less clear. The present study investigates the effects of application of these neurotrophic factors on the speed, number, and distribution of regenerating axons in the frog Rana pipiens after optic nerve crush. Optic nerves were crushed and the factors, or phosphate-buffered saline, were applied to the stump or intraocularly. The nerves were examined at different times after axotomy, using anterograde labeling with biotin dextran amine and antibody against growth-associated protein 43. We measured the length, number, and distribution of axons projecting beyond the lesion site. Untreated regenerating axons show an increase in elongation rate over 3 weeks. CNTF more than doubles this rate, FGF-2 increases it, and BDNF has little effect. In contrast, the numbers of regenerating axons that have reached 200 ?m at 2 weeks were more than doubled by FGF-2, increased by CNTF, and barely affected by BDNF. The regenerating axons were preferentially distributed in the periphery of the nerve; although the numbers of axons were increased by neurotrophic factor application, this overall distribution was substantially unaffected.
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