Role of the RING-finger protein BERP in neurite outgrowth of regenerating molluscan neurons and rat PC12 cells

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During development, the formation of neuronal networks is characterized by neurite outgrowth and selective innervation of target neurons in a specific temporal and spatial pattern. Thus far, the complete molecular mechanism responsible for neurite outgrowth remains to be elucidated. Here, we show that the protein BERP (Brain Expressed RING-finger Protein), is up-regulated during in vitro neurite outgrowth and in vivo regeneration of molluscan neurons and is highly homologues to mammalian BERP which affects neurite outgrowth of rat PC12 cells. BERP is a highly modular protein that contains, among others, two putative DNA and protein binding domains, e.g. a RBCC domain and beta-propeller. It has already been shown that the RBCC domain binds alpha-actinin4, and that the beta-propeller binds myosinV. To examine the function of BERP during neuite outgrowth in more detail, we investigated the effects of in vitro BERP knock-down on neurite outgrowth in Lymnaea neurons, the endogenous gene and protein expression levels of BERP during neurite outgrowth of PC-12 cells and sub-cellular localization in PC-12 cells. Taken together, our data suggest an essential and evolutionary conserved role in neurite outgrowth.

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