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Induction of a *noggin*-Like Gene by Ectopic DV Interaction during Planarian RegenerationKazuya Ogawa^a ... Kiyokazu Agata^{b, c, 1}

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Abstract

In previous studies, we have shown that dorsoventral (DV) interaction evokes not only blastema formation, but also morphogenetic events similar to those that occur in regeneration. However, it is still unclear what kinds of signal molecules are involved in the DV interaction. To investigate the signal systems involved in the DV interaction, we focused on a *noggin*-like gene (*Djnl**g*) identified by the planarian EST project. *Djnl**g* is the first *noggin* homologue isolated from an invertebrate. In DjNLG, the positions of nine cysteine residues which may be essential for dimer formation were well conserved, but overall, the amino acid sequence of DjNLG did not show high similarity to the sequences of vertebrate Noggins. Expression of *Djnl**g* was observed only in the proximal region of the branch structures in the brain of intact planarians, suggesting that *Djnl**g* may have a role in pattern formation in the brain. Interestingly, transient strong expression of *Djnl**g* was observed in the amputated region of regenerating planarians. *Djnl**g*-expressing cells were detected beneath the muscle 9 h after amputation and were then detected in the ventral subepidermal region of the blastema. The induction of *Djnl**g* expression by amputation was not affected by X-ray irradiation, even though the stem cells were completely eliminated, implying the existence of signal-producing cells which may provide a positional cue to the stem cells. In DV reversed grafting, expression of *Djnl**g* was strongly induced in the DV boundary between the host and donor. These results suggest that ectopic DV interaction may induce expression of *Djnl**g* in the positional cue-producing cells, and that it might be involved in stimulation of blastema formation as well as DV patterning of the body.

Keywords




planarian; noggin; regeneration; dorsoventral patterning; brain; BMP signal





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