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Royal jelly and its unique fatty acid, 10-hydroxy-trans-2-decenoic acid, promote neurogenesis by neural stem/progenitor cells *in vitro*

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ABSTRACT

Neural stem/progenitor cells (NSCs) proliferate vigorously as neurospheres in medium containing basic fibroblast growth factor (FGF-2), but start differentiating into neurons, astrocytes or oligodendrocytes in FGF-2-free medium. An extract of royal jelly (RJ) significantly increased the percentage in the total cell population of not only neurons immunoreactive for class III β-tubulin (Tuj1) but also astrocytes immunoreactive for glial fibrillary acidic protein (GFAP), and oligodendrocytes immunoreactive for 2',3'-cyclic nucleotide 3'-phosphodiesterase (CNPase) generated from NSCs, but decreased that of nestin-positive NSCs. These results highlight a novel and outstanding property of the RJ, *i.e.*, that it facilitates the differentiation of all types of brain cells (neurons, astrocytes, and oligodendrocytes). On the other hand, 10-hydroxy-trans-2-decenoic acid (HDEA), an unsaturated fatty acid characteristic of RJ, increased the generation of neurons and decreased that of astrocytes from NSCs. These observations suggest that RJ contains plural components that differently influence neuronal and/or glial lineages and that HDEA is one of such components of RJ that facilitates neurogenesis by NSCs.

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