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ONLINE ISSN : 1880-313X
PRINT ISSN : 0388-6107

Biomedical Research
Vol. 28 (2007) , No. 6 December pp.295-299

[PDF (646K)] [References]

AMP N_1-oxide potentiates astrogenesis by cultured neural stem/progenitor cells through STAT3 activation

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(Received July 26, 2007)
(Accepted September 23, 2007)

ABSTRACT

We earlier identified adenosine monophosphate (AMP) N_1-oxide as a unique compound of royal jelly (RJ) that induces neurite outgrowth from cultured rat pheochromocytoma PC12 cells. In the present study, the effects of AMP N_1-oxide on the proliferation and/or differentiation of cultured neural stem/progenitor cells (NSCs) were examined. As for cell proliferation, low micromolar concentrations of AMP N_1-oxide or its parent compound, AMP, similarly enhanced the NSC proliferation-inducing activity of basic fibroblast growth factor (FGF-2), although neither compound tested alone affected cell proliferation. Conversely, high concentrations of AMP N_1-oxide (over 20 μM) markedly suppressed cell growth even in the presence of FGF-2. However, this suppression was not observed with AMP. As for cell differentiation, AMP N_1-oxide, but not AMP, increased the generation of astrocytes in a dose-dependent manner when the cells were cultured in medium lacking FGF-2. The generation of neurons or oligodendrocytes was not influenced by AMP N_1-oxide. Furthermore, AMP N_1-oxide increased the phosphorylation of STAT3 (signal transducer and activator of transcription 3), a transcription factor that mediates the expression of astrocytespecific genes. These results suggest that AMP N_1-oxide is one of the components that facilitates astrogenesis by NSCs through activation of STAT3.

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Noriko HATTORI, Hiroshi NOMOTO, Hidefumi FUKUMITSU, Satoshi MISHIMA and Shoei FURUKAWA; “AMP N_1-oxide potentiates astrogenesis by cultured neural stem/progenitor cells through STAT3 activation”, *Biomedical Research*, Vol. **28**, pp.295-299 (2007) .

doi:10.2220/biomedres.28.295

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