ONLINE ISSN : 1880-1404
PRINT ISSN : 0916-717X

Biomedical Research on Trace Elements
Vol. 19 (2008) , No. 1 76-79

[PDF (803K)] [References]

Functional Analysis of Two Homologous Mouse Selenophosphate Synthetases

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(Received: August 28, 2007)
(Accepted: October 22, 2007)

Abstract:
Selenophosphate, a key intermediate in selenium metabolism, is synthesized from selenide and ATP by selenophosphate synthetase(SPS). Mammals have two SPS isozymes known as SPS1 and SPS2. Mouse SPS2 contains a catalytically important selenocysteine residue at position 63 of the polypeptide chain. In contrast, SPS1 has a Thr-29 in the position that corresponds to Sec-63 of SPS2. SPS1 and Sec63Cys mutant SPS2 were purified to homogeneity and characterized. SPS2(Sec63Cys)catalyzed the selenide-dependent synthesis of selenophosphate, but SPS1 showed no activity. However, the Thr29Cys mutant of SPS1 exhibited SPS activity. These findings raise the intriguing possibility that SPS1 may exert its catalytic function in the presence of thiols in the vicinity of position 29.

Key words: selenium, selenophosphate, selenoprotein, selenophosphate synthetase, mouse

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To cite this article:
Katsumasa Abe, Hisaaki Mihara, Yoshihito Nishijima, Suguru Kurokawa and Nobuyoshi

Esaki, “Functional Analysis of Two Homologous Mouse Selenophosphate Synthetases”, Biomedical Research on Trace Elements, Vol. **19**, pp.76-79 (2008) .

JOI JST.JSTAGE/brte/19.76