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• 中文摘要

本計畫旨在探討興奮性胺基酸受體在發育期大腦皮質神經元所調控的神經營養功能是透過何種信號路徑所達成。在先前的研究中，吾人已發現興奮性胺基酸中的紅藻胺酸(Kainic acid,簡稱 KA)能夠誘發神經生長因子受體 TrkA 的表現與磷酸化增加，且此一作用具有鈣離子依存性，因此本計畫中乃針對 KA 是否爲藉由活化鈣離子依存性激脢 calcium/calmodulindependent protein kinase(CaMK)調控 TrkA 表現加以研究，並探討此一調控爲透過影響 TrkA 的 transcription 或是 cytosol 與 membrane 之間的 translocation 所致。

• 英文摘要

In this project, we proposed that excitatory amino acids receptors, with specific focus on the AMPA/KA receptors, may exert its neurotrophic functions in developing neurons via induction of release of neurotrophic factors and activation of neurotrophic factor receptors through EAAmediated activation of calcium-dependent signal transduction cascades. We used primary neuronal cultures isolated from embryonic rat brain neocortex to apply various concentrations of AMPA and KA for the time-dependent and concentrationdependent inductions of TrkA and TrkB expressions. Furthermore, as we previously showed that the induction of TrkA expression is calcium dependent, the involvement of a calcium-dependent kinase calcium / calmodulin-dependent protein kinase (CaMK) was also examined. CaMK inhibitor KN93 at 20 mM significantly reduced the KA-increased TrkA expression. This result coincided with the finding that CaMKII-activated transcription factor cAMP-response element binding protein (CREB) can indeed increase its phosphorylation upon KA treatment. Therefore, our results leads to the hypothesis that the AMPA/KA receptors mediated increase of TrkA expression may come from the transcriptional activation of trkA gene promoted by CREB in a calcium-dependent manner.