

Bee venom exerts neuroprotective effects on neuronal cells and astrocytes under hypoxic conditions through MAPK signaling pathways

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Hypoxic-ischemic brain injuries influence the mechanisms of signal transduction, including mitogen-activated protein kinase (MAPK) that regulates gene expression through transcription factor activity. Several attempts have been made to use bee venom (BV) to treat neurological diseases. However, limited data are available for brain injuries such as neonatal hypoxic-ischemic encephalopathy (HIE) and neurodegenerative disorders. The purpose of this study was to investigate the neuroprotective effects by BV by determining the expression of activated MAPK pathways. We examined activation and cell viability in hypoxia (1% O₂, 5% CO₂, 94% N₂) in low glucose-treated (H+low G) neuronal cells and astrocytes in the presence and absence of BV. After they were subjected to hypoxic conditions and treated with low glucose, the cells were maintained for 0, 6, 15, and 24 hr under normoxic conditions. Extracellular-signal-regulated kinases 1/2 (ERK1/2), p38 MAPK, and stress activated protein kinase (SAPK)/Jun amino-terminal kinases (JNK) were activated in H+low G conditions. Particularly, phosphorylation of ERK1/2 was maximized 6 hrs after exposure to H+low G condition. BV specifically inhibited the phosphorylation of ERK1/2. However, BV had no effect on p38 MAPK or SAPK/JNK. In addition, BV improved neuronal cell and astrocytes viability following exposure to H+low G. ERK inactivation is known to mediate protective effects in hypoxic brain injury. Taken together, these results suggest that treatment with BV may be helpful in reducing hypoxic injury in neonatal HIE through the ERK signaling pathway.

Biography

Eun Joo Lee is a Clinical Professor at Kyungpook National University Children's Hospital in Neonatology department. She also has experience as Pediatric Neurologist for 10 years. She completed her Pediatrics Residency at Catholic University of Daegu Hospital. She earned her PhD Physiology at Kyungpook National University. She is interested in research involving neuroprotective mechanism in neonatal hypoxic-ischemic encephalopathy model

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