

## **Neuroprotective effects of biochanin A against glutamate-induced cytotoxicity in PC12 cells via apoptosis inhibition**

### **ABSTRACT**

l-Glutamate plays a crucial role in neuronal cell death, which is known to be associated with various neurodegenerative diseases, such as Alzheimer's, Parkinson's, and Huntington's diseases. In this study, we investigated the protective effects of biochanin A, a phytoestrogen compound found mainly in *Trifolium pratense*, against l-glutamate-induced cytotoxicity in a PC12 cell line. Exposure of the cells to 10 mM l-glutamate was found to significantly increase cell viability loss and apoptosis, whereas pretreatment with various concentrations of biochanin A attenuated the cytotoxic effects of l-glutamate. Specifically, the pretreatment led to not only decreases in the release of lactate dehydrogenase, the number of apoptotic cells, and the activity of caspase-3 but also an increase in the total glutathione level in the l-glutamate-treated PC12 cells. These results indicate that biochanin A may be able to exert neuroprotective effects against l-glutamate-induced cytotoxicity. Furthermore, our findings also imply that biochanin A may act as an antiapoptotic agent in order to perform its protective function.

**Keyword:** Apoptosis; Biochanin A; l-glutamate; PC12 cells