

## **Abstract**

The MAPK/ERK cascade is highly conserved signalling pathway regulating cellular processes which are necessary for cell life, such as proliferation, differentiation, apoptosis or cell migration. All these cellular responses are the result of the processing of extracellular signals through three-tier ERK cascade consisting of protein kinases Raf, MEK and ERK. The signal is transmitted by sequential phosphorylation where RAF phosphorylates MEK and MEK phosphorylates and activates ERK. Protein kinase ERK then phosphorylates and regulates a wide range of substrates at different locations in the cell. This affects the cellular response to the extracellular signal. Regulation of this pathway on every level is very important and is modulated by interaction partners and adaptor proteins. Deregulation of the pathway as well as mutations of individual protein kinases can lead to severe pathological consequences.

At the level of ERK, there are two isoforms, ERK1 and ERK2, which are more than 80 % identical at the amino acid level. Their high sequence similarity has triggered the interest of many authors for more detailed examination of both isoforms in respect of their evolutionary conservation and whether they are functionally redundant or whether they have specific functions. The aim of this work is to summarize the knowledge about differences in the structure and function of ERK1 and ERK2 isoforms in the MAPK/ERK signalling pathway.

**Key words:** signal transduction, protein kinase, phosphorylation, Raf, MEK, ERK1, ERK2, gene expression, cell proliferation, cell migration, cell invasion