MAP ERK pathway

The MAPK/ERK pathway (also known as the Ras-Raf-MEK-ERK pathway) is a chain of proteins in the cell that communicates a signal from a receptor on the surface of the cell to the DNA in the nucleus of the cell.

The signal starts when a signaling molecule binds to the receptor on the cell surface and ends when the DNA in the nucleus expresses a protein and produces some change in the cell, such as cell division. The pathway includes many proteins, including MAPK (mitogen-activated protein kinases, originally called ERK, extracellular signal-regulated kinases), which communicate by adding phosphate groups to a neighboring protein, which acts as an “on” or “off” switch.

When one of the proteins in the pathway is mutated, it can become stuck in the “on” or “off” position, which is a necessary step in the development of many cancers. Components of the MAPK/ERK pathway were discovered when they were found in cancer cells. Drugs that reverse the “on” or “off” switch are being investigated as cancer treatments.

The expression levels of Ras, Ras-GAP, c-Raf, MEK, ERK, phosphorylated (p)-ERK, endothelial nitric oxide synthase (eNOS) and actin were examined by western blot analysis; the expression of p-ERK was also examined by immunohistochemistry. Ras, Ras-GAP, c-Raf, MEK, ERK and eNOS were detected in all cases. In addition, the expression of p-ERK was confirmed in all cases, and p-ERK was localized to the endothelial cells of the vessels in chronic subdural hematoma (CSDH) outer membranes. These findings indicated that Ras/MEK/ERK signaling is activated in the CSDH outer membranes and suggested the possibility that the Ras/MEK/ERK pathway might be activated by VEGF and play a critical role in the angiogenesis of CSDHs [1)].

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Osuka K, Watanabe Y, Usuda N, Atsuzawa K, Aoyama M, Niwa A, Nakura T, Takayasu M. Activation of Ras/MEK/ERK signaling in chronic subdural hematoma outer membranes. Brain Res. 2012 Dec 13;1489:98-103. doi: 10.1016/j.brainres.2012.10.013. Epub 2012 Oct 12. PubMed PMID: 23063714.