Growth inhibition, cell-cycle arrest and apoptosis in SH-SY5Y human neuroblastoma cells by moringin derived from Moringa oleifera seeds

1)Cirmi S. 2)Ferlazzo N. 3)Maugeri A. 4)Lombardo GE. 5)Bramanti P. 6)Navarra M.

Dept. CHIBIOFARAM and Prof.Antonio Imbesi Foundation

In the last decades, glucosinolates (GLs), precursors of isothiocyanates (ITCs), have been studied mostly for their chemopreventive and chemotherapeutics properties.

The aim of our experimental research was to study the antiproliferative effect of 4-(α-L-rhamnopyranosyloxy) benzyl glucosinolate (glucomoringin; GMG) bioactivated by myrosinase enzyme to form the corresponding isothiocyanate 4-(α-L-rhamnopyranosyloxy) benzyl C (moringin) in SH-SY5Y human neuroblastoma cells.

We found that moringin reduced SH-SY5Y cell growth in a time and concentration-dependent manner through a mechanism involving the activation of apoptotic machinery. In addition, it altered the normal progression of cells through the cell cycle, increasing cell population in both G2 and S phases as well as decreasing that in G1 phase. Studying the drug mechanism of action, we found that moringin was able to increase expression of p53, p21 and Bax at both protein and transcriptional level. Moreover, exposure of SH-SY5Y cells to moringin significantly increased the gene expression of both caspase 3 and 9 and enhanced their cleavage, thereby initiating the intrinsic apoptotic cascade. Finally, moringin inhibited nuclear translocation of NF-κB.

Our study demonstrates the ability of moringin in reducing growth of SH-SY5Y cells and reveals its mechanism of action, suggesting its promising role as anticancer drugs.

Key words: moringin, isothiocyanates (ITCs), antiproliferative, SH-SY5Y cells, apoptosis, Moringa oleifera seeds