

Biological Activities of Flaxseed Peptides (Linusorbs)

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Abstract : Flaxseed (*Linum usitatissimum* L.) is gaining popularity in the food industry as a superfood due to its health-promoting properties. The flax plant synthesizes an array of biologically active cyclic peptides or linusorbs (LOs, a.k.a. cyclolinopeptides) from three or more ribosome-derived precursors. [1-9-N α C]-linusorb B3 and [1-9-N α C]-linusorb B2, suppress immunity, induce apoptosis in human epithelial cancer cell line (Calu-3) cells, and inhibit T-cell proliferation, but the mechanism of LOs action is unknown. Using gene expression analysis in nematode cultures and human cancer cell lines, we have observed that LOs exert their activity, in part, through induction of apoptosis. Specific LOs' properties include: 1) distribution throughout the body after flaxseed consumption; 2) induce heat shock protein (HSP) 70A production as an indicator of stress and address the issue in *Caenorhabditis elegans* (exposure of nematode cultures to [1-9-N α C]-linusorb B3 induced a 30% increase in production of the HSP 70A protein); 3) induce apoptosis in Calu-3 cells; and 4) modulate regulatory genes in microarray analysis. These diverse activities indicate that LOs might induce apoptosis in cancer cells or act as versatile platforms to deliver a variety of biologically active molecules for cancer therapy.

Keywords : flaxseed, linusorb, cyclic peptide, orbitides, heat shock protein, apoptosis, anti-cancer

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