Mol Nutr Food Res. 2010 Apr 27. [Epub ahead of print]

Flaxseed oil reduces the growth of human breast tumors (MCF-7) at high levels of circulating estrogen.

Truan JS, Chen JM, Thompson LU.

Department of Nutritional Sciences, University of Toronto, Toronto, ON, Canada.

Abstract

Flaxseed (FS) has been shown to attenuate mammary tumorigenesis, possibly due to its high alpha-linolenic acid (ALA)-rich oil (FSO) content. This study determined the effect of FSO on the growth of estrogen receptor-positive human breast tumors (MCF-7) in ovariectomized athymic mice at high premenopausal-like estrogen (E2) levels. Mice with established MCF-7 tumors were fed basal diet (control) or basal diet supplemented with FSO (40 g/kg) for 8 wks. Compared with control, FSO reduced tumor size (33%, $p<0.05$) and tumor cell proliferation (38%, $p<0.05$) and increased apoptosis (110%, $p<0.001$). FSO also reduced human epidermal growth factor receptor-2 (79%, $p<0.05$) and epidermal growth factor receptor (57%, $p=0.057$) expression, which then may have led to a reduction in Akt (54%, $p<0.05$) and phosphorylation of mitogen-activated protein kinase (MAPK) to phosphorylated MAPK (pMAPK, 28%, $p<0.05$). Insulin-like growth factor-1 receptor, vascular endothelial growth factor receptor, MAPK and phosphorylated Akt were not affected. FSO increased ($p<0.001$) serum ALA, eicosapentaenoic acid and docosahexaenoic acid and, in vitro, ALA reduced MCF-7 cell proliferation (33%, $p<0.001$). Thus, FSO regressed estrogen receptor-positive human breast tumorigenesis at high E2 levels via downregulation of the growth factor mediated pathway, likely through its ALA content, and may explain the anti-tumorigenicity of FS.

PMID: 20425756 [PubMed - as supplied by publisher]