

Evening Primrose (*Oenothera paradoxa*) defatted seed extract induces apoptosis and downregulates thymidylate synthase in mesothelioma cancer

Chmielewska-Kassassir M, Woźniak LA., Poland

Abstract

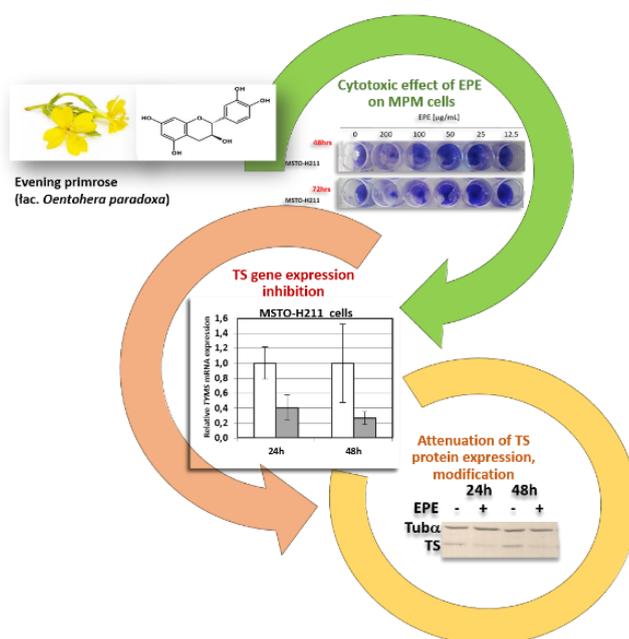
Introduction: Malignant pleural mesothelioma (MPM), highly aggressive tumor of pleura, is characterized by widespread resistance to conventional chemotherapy. Thymidylate synthase (TS) is a key enzyme in DNA synthesis that is overexpressed in various cancer types, including MPM. Evening primrose (*Oenothera paradoxa*) seeds are an important source of not only edible oil containing a high concentration of gamma-linolenic acid (the precursor of prostaglandin E1 and its derivatives), but also polyphenols which can be obtained from the biomass remaining after oil pressing. Accumulating evidence indicates that a polyphenol extract from defatted seeds of *Oenothera* sp. has anticancer potential. The present study aimed to identify the antitumor effects of Evening primrose defatted seed extract (EPE) on mesothelioma cancer cells, with a special focus on TS expression.

Methodology: Propanolic EPE was obtained by the Soxhlet extraction method. The quantitative and qualitative analyses of the extract were performed using microLC-Q TOF-MS. To assess the effect of evening primrose extract on the cell viability of human MPM cell lines (NCI-H28, MSTO-H211 and JU77), crystal violet staining assay was used. Apoptosis in MPM cells was detected by flow cytometry. TS expression in MPM cells was measured by Real-Time PCR and immunoblotting.

Findings: microLC-MS analyses revealed large variety of polyphenolic compounds in the extract from the defatted seeds of *Oenothera paradoxa* such as the gallic acid, catechin, epicatechin, epicatechin gallate, ellagic acid, quercetin, caffeic acid, penta-O-galloyl- β -D-glucose (PGG), and methyl gallate. This polyphenol-rich extract significantly decreased cell viability and induced apoptosis in all the MPM cell lines tested in a dose- and time-dependent manner. Furthermore, application of EPE significantly reduced TS protein and mRNA expression levels in these cells.

Conclusion: The results suggest that Evening primrose defatted seed extract displays beneficial effects on MPM at least in part via downregulation of TS expression.

Image



Biography

Małgorzata Chmielewska-Kassassir has an experience in conducting molecular biology research studies (including cell lines culturing, gene and protein expression analysis, metabolome profiling). She is conducting *in vitro* studies on the effects of natural compounds present in Evening primrose seeds in treatment of MPM cancer. As a biotechnologist she is looking for a potential application of plant extracts in tumor cells therapy. Her doctoral dissertation is devoted to explaining the mechanisms of polyphenol compounds present in the extract of Evening primrose seeds in directing MPM tumor cells to the apoptosis.

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