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Flax lignan and its mammalian lignans for breast cancer prevention, and adjunct therapy to halt metastasis

Some cells in our body, under extreme distress condition, somehow, manage to defeat universal law of entropy, and attain a state of permanent order to escape death and become immortal that we call cancer. Life is order and disorder leads to disease and death. With the excessive production of free radicals, multiple damage to the DNA, the cell may develop a mechanism of escaping death by becoming cancerous, a state of immortality. Cancer cells grow very fast. They manage to keep their cells in ever reducing condition and evade telomere shortening, thereby defeat entropy in much more efficient manner, than normal cell to attain, a no death situation. When the place of their origin also becomes not conducive for faster growth they metastasize to find a new home. Breast cancer is the most common malignant disease in women and the majority of deaths from breast cancer are due to the metastasis to other organs in the body. About 20% of breast cancer patients are diagnosed with a subtype of breast cancer known as triple negative breast cancer (TNBC). Due to lack of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor-2 (HER2) and significant heterogeneity, among TNBC, no approved targeted therapies are available. There is a strong epidemiological evidence that flax lignan provides protection against breast cancer. The Secoisolaricinol Diglycoside (SDG), a phytoestrogen, found in flax seed coat is a very strong antioxidant activity, has cardioprotective and its mammalian lignan, enterolactone (EL), and has anti-breast cancer and anti-

metastatic activities. Some previous studies have shown that flaxseed can inhibit the spontaneous metastasis of the estrogen receptor negative (ER-) human breast cancer MDA-MB-435 cells in nude mice and the experimental lung metastasis of murine melanoma B16BL6 cells in mice. Lignans and tamoxifen (TAM), in combination can inhibit the steps involved in the metastasis cascade. We have shown that EL exerts its anti-metastatic activity by inhibiting uPA-plamin MMP's induced ECM remodelling and also by preventing TGF β induced EMT by blocking ERK/NF κ B/snail signalling pathway(9). Our results reaffirm the potential of both SDG and its derived mammalian lignan EL for both anti-breast cancer as well as anti-metastatic activities. In several human cell culture studies, EL was found to exhibit a host of activities including chemopreventive, antiproliferative, apoptotic, antimetastatic, immunomodulatory, chemosensitizing and radiosensitizing in breast cancer cell lines Therefore, SDG concentrate obtainable from our Flax Bio-village concept, can be a very useful to serve as adjunct nutritional therapy, after chemo/radio therapy to prevent metastasis and / or recurrence of breast cancer.



Biography

Mahabaleshwar Hegde retired as Professor of Biochemistry, with 33 years of teaching MSc, guiding MPhil, PhD students at Pune University, and later, MPharm, MD, MS, PhD students at Bharati Vidyapeeth (Deemed to be University) Pune. Previously in his career, he took training in Molecular Biology, at Albert Einstein College of Medicine New York and appointed as Visiting Scientist at Memorial Sloan Kettering Cancer Centre at New York. In order to attain much needed omega-3 nutritional security, he developed "Flax Bio-Village Concept" for promoting flax agriculture in the country, for enriching commonly consumed food egg, milk, chicken etc with omega-3 fatty acids. In order to add further value to flax seed, he has also focused his research and development activities on isolation of flax lignan, for its cardioprotective, anti-breast cancer, anti-metastatic activities.

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