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FAVOURABLE ANTI-CANCER ACTIVITY OF FERMENTED WHEAT GERM FREEZE-DRIED EXTRACT (AVEMAR LYOPHILISATE)  
IN TRIPLE-NEGATIVE BREAST CANCER CELLS

## Favourable anti-cancer activity of fermented wheat germ freeze-dried extract (avemar lyophilisate) in triple-negative breast cancer cells

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#### Description

**Objective:** The fermented wheat germ extract, which is the active ingredient of nutraceuticals widely used by cancer patients in Europe, Korea and the United States, possesses cytotoxic and anti-metastatic effects in various human malignancies. In estrogen responsive MCF-7 breast cancer cells, it has been shown to potentiate the induction of apoptosis by tamoxifen. However, its effects in triple-negative and Her2-overexpressing breast cancer cells and interactions with chemotherapy have not been investigated until now.

**Methods:** Cytotoxicity of Avemar lyophilisate alone and in combination with docetaxel was assessed by MTT and clonogenic assays in MCF-7 estrogen responsive, HCC-38 triple-negative and SKBR-3 Her2/neu overexpressing cells. Cell cycle phase distribution was determined by FACS. Apoptosis-associated activation of caspase-3/7 was measured by Caspase-Glo Assay. Inhibition of tumor cell invasion was quantified using the ORIS Cell Invasion kit.

**Results:** Avemar lyophilisate exhibited highest cytotoxic activity against triple negative HCC-38 cells in MTT and clonogenic assays with IC50 values of 180 and 15 lg/ml, respectively, indicating likely clinical activity. In combination with docetaxel, additive and marginally synergistic effects were demonstrated in triple-negative HCC-38 and Her2/neu overexpressing SKBR-3 cells, whereas in the estrogen responsive MCF-7 cell line, cytotoxic activity of docetaxel was antagonized by Avemar lyophilisate. Perturbations in cell cycle phase distribution were differentially regulated by Avemar lyophilisate in estrogen receptor negative HCC-38, SKBR-3 and in estrogen receptor expressing MCF-7 cells, which was associated with altered activation of caspase-3/7. Invasive capacity of breast cancer cells was inhibited by Avemar lyophilisate in all three cancer cell lines investigated in a dose-independent manner.

**Conclusions:** Avemar lyophilisate exerts highest anti-cancer activity against triple negative HCC-38 human breast cancer cells. Due to its likely clinical activity against this human malignancy, further investigation of Avemar lyophilisate in triple-negative breast cancer is warranted.