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Late-Breaking Poster Presentations - Preclinical Prevention Studies

Abstract LB-183: Identification of anti-cancer activity in structural components of ancestral wheat

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In 2009 the average American consumed 134.9 lbs of wheat, making this staple crop a primary source of calories, fiber, and nutrients in the human diet; however little is known about the anti-cancer activity of small molecules present in wheat. In this study, more than 75 wild and less domesticated wheat varieties were extracted using a modified Bligh Dyer technique for in vitro screening. Dried extracts were dissolved in DMSO, diluted with cell culture medium, and evaluated for anticancer activity against MDA-MB-468 (ER- & PR-) and T47D (ER+ & PR+) human breast cancer cell lines in 96-well plate format as assessed by crystal violet staining. The results showed that diploid species of Middle Eastern origin, where human cultivation of wheat began 9000 years ago, have a remarkable ability to inhibit the proliferation of breast cancer cells compared to the domesticated species of tetraploid and hexaploid wheat, which have little or no effect. Furthermore, this anti-cancer activity resides exclusively in the straw-like fibrous hull surrounding the wheat seed, which is not consumed by humans. Principal components analysis of wheat metabolites, analyzed via UPLC-TOF-MS, demonstrated that wheat varieties capable of inhibiting the growth of human breast cancer cells in vitro are chemically distinct from the varieties that do not have inhibitory capability, suggesting that small molecules may be associated with the inhibitory effect. Taken together, these data suggest that ancestral diploid wheat, which is now rarely grown and even more rarely consumed, may possess significant anti-cancer potential in the hulls, and that this anti-cancer potential is an opportunity for advancement of breast cancer prevention through identification of bioactive components and wheat varieties.
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