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Biochanin A: An isoflavone with anti-cancer and anti-invasive properties

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Some flavonoids are known to exert anti-cancer effects by inhibiting cancer cell progression. Genistein, an isoflavone is bioactive and is present in plant products like soy. Epidemiological studies indicate geographic areas where there is increased human consumption of soy products have a lower incidence of cancer. Although not fully understood, there is some evidence isoflavones target tyrosine phosphorylation, topoisomerases and drug transporters. Our studies have therefore the goal of elucidating the molecular mechanisms underlying the putative anti-cancer effect of Biochanin A (5,7-Dihydroxy-4'-methoxyisoflavone, BioA), which is an isoflavone present in red clover, chick peas, soy, peanuts and many legumes. We noted BioA blocked the proliferation of glioblastoma, breast, pancreatic and oral squamous cancer cells. We observed BioA inhibited cell signaling pathways (e.g., MAP kinase, PI3kinase and mTOR) involved in tumor progression and matrix-metalloproteases, resulting in blocking invasion of the cancer cells. Angiogenesis is necessary for the progression of cancer cells to form tumors: Thus, tumors release angiogenic factors to stimulate the growth of capillaries that supply nutrients and oxygen to them. Consistent with the latter generation is our observation that chemical induced hypoxia increased expression of hypoxia-inducible factor and VEGF in C6 rat glioma cells: BioA blocked this effect and the proliferation and migration of bEnd.3 endothelial cells. BioA also sensitized glioma cells to tamador, a drug for treating glioblastoma. Our findings strongly suggest BioA present in the diet may suppress tumor growth and be used in prevention and combination chemotherapy that would lead to a better outcome of cancer treatment.

Biography

Alok Bhushan received his PhD degree in Biochemistry in 1981 from Punjab Agricultural University. He did his Post-doctorate from Johns Hopkins University, Medical University of South Carolina and University of Vermont in USA. Following that, he joined Idaho State University in 1998 as a faculty member and during his tenure there, he served as Assistant Professor, Associate Professor, Professor and the Assistant Chair of the Department of Pharmaceutical Sciences. Currently he is Chair and Professor of the Department of Pharmaceutical Sciences at Jefferson School of Pharmacy in Thomas Jefferson University. He has over 70 publications.

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