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The ginger product 6-shogaol shows promise in breast cancer treatment by inhibiting breast cancer cells and stem cell like spheroids

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Breast cancer therapy suffers serious obstacle for the presence of cancer stem cells in tumors as they can be responsible for poor prognosis and tumor relapse. Very few chemotherapeutic compounds shows promise to kill these cells. Dietary compounds are welcome options for human diseases due to their time-tested acceptability by human bodies. The ginger-derived compound 6-shogaol was effective in killing both breast cancer monolayer cells and cancer-stem cell-like spheroids at doses that were not toxic to noncancerous cells. Both hormone responsive and triple negative breast cancer cells were sensitive to the lethal action of 6-shogaol. 6-shogaol treatment induced autophagy in both monolayer and spheroid culture. Kinetic analysis revealed that the autophagic flux instigated cell death in 6-shogaol treated breast cancer cells. Very low level of apoptosis induction and drastic reduction of cell death by the inhibition of autophagy suggested that autophagy was the major mode of cell death induced by 6-shogaol in breast cancer cells. 6-shogaol reduced the expression levels of cleaved Notch1 and its target proteins Hes1 and cyclin D1 in spheroids, and the reduction was further pronounced in presence of a γ-secretase inhibitor. Secondary sphere formation in presence of the inhibitor was also further reduced by 6-shogaol. Together, these results indicate that the inhibitory action of 6-shogaol on spheroid growth and sustainability is conferred through γ-secretase mediated down-regulation of Notch signaling. The efficacy of 6-shogaol in monolayer and cancer stem cell-like spheroids raise hope for its therapeutic benefit in breast cancer treatment.

Biography

Suparna Sengupta has completed her PhD from Bose Institute, India and Post-doctoral research from University of Kansas, USA. Currently, she is a Senior Scientist in Rajiv Gandhi Centre for Biotechnology, India and her research interest includes "The role of cytoskeletal proteins on mitosis, apoptosis and drug development". She has published several papers in high impact journals and acted as reviewer in many national and international journals. Her awards include Indian Association for Cancer Research Award, National Woman Bio Scientist Award from Government of India. She is a Fellow of International Union against Cancer.

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