Synopsis

Cancer is a disease caused by the uncontrolled proliferation of cells invading surrounding normal tissues and organs. There are different types of cancer depending upon the site of origin and the organs affected. Out of the several types of cancer, breast cancer is a major health concern worldwide. Breast cancer is a heterogeneous disease with different molecular classification and subtypes. These differences certainly make breast cancer treatment and chemotherapy difficult, despite of the several advances made in the past. Thus to design an efficient anticancer therapy for breast cancer, we need to explore the role of anticancer agents in inducing cell death pathways in different breast cancer cell lines.

Our study is based on the modulation of certain cell signalling networks and players by two entirely different anticancer agents. This modulation of signalling pathways eventually leads to induction of cell death in breast cancer cells. The first anticancer agent which we have studied was Piroxicam, a traditional NSAID, used for treating arthritis and inflammation. Although cytotoxic effects of piroxicam on breast cancer cells have been reported, the detailed cellular mechanism has not been studied so far. Hence, we explored the new function of this existing drug in inducing apoptosis. We have found that piroxicam caused ROS mediated apoptosis induction in MCF-7 cells but not in MDA-MB-231. The fact that piroxicam induced cell specific apoptosis via Akt activation was the novelty of our work. This novel pathway has been recently implicated in other cell lines as a cause for apoptosis.

The other anticancer agent used in our study was Resveratrol, a natural product which is as an effective chemopreventive and chemotherapeutic agent. We have studied the comparison between resveratrol and its novel analog C1 in inducing apoptosis and
autophagy in MCF-7 and MDA-MB-468 breast cancer cell lines. We found that resveratrol and its analog differ from each other in their potency and in utilizing the autophagic pathway to induce apoptosis. This was an interesting finding as the structural modifications of the analog certainly makes it more potent and induces apoptosis by a relatively novel pathway of autophagy inhibition.

Thus our study establishes the importance of different classes of anticancer agents (drugs and natural products), their cell specific effects and their novel role in inducing cell death in breast cancer cells.

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Graphical representation of the synopsis.