In vitro Evaluation of the Antioxidant Potential and Differential Effects of Punicalagin in Normal and Breast Cancer Cells

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A growing area of research is focused on identifying drugs that have differential cytotoxic effects on normal and cancer cells. Pomegranate polyphenols are potent antioxidants and has anticancer properties. Punicalagin, the major bioactive polyphenol has been reported to act as a tumor suppressor. This study was aimed to evaluate the differential effects of punicalagin on the cellular processes in normal and breast cancer cells. The effects punicalagin (25 μM and 50 μM, 24 h) on antioxidant activity, protein expression of antioxidant enzymes and the transcription factor Nrf2, and TBHP-induced intra cellular reactive oxygen species (ROS) in normal cells (WI38) was measured by DPPH assay, western blotting and H2DCFDA assay. Anticancer effect, cell morphology and intra cellular ROS levels after punicalagin pretreatment (50 μM and 100 μM, 48 h) in breast cancer cells (MCF7 & MDA-MB231) were studied by MTT assay, light microscopy and H2DCFDA assay. Punicalagin exhibited a dose dependent free radical scavenging activity. Pretreatment with punicalagin in normal cells showed significant elevation in the protein expression of antioxidant enzymes and Nrf2, and a significant decrease in the TBHP-induced intracellular ROS levels. On the other hand, punicalagin significantly decreased cell viability and increased intracellular ROS production in breast cancer cells but not in normal cells. In conclusion, punicalagin demonstrated potent antioxidant capacity in normal cells. The ability to produce a differential response in the cytotoxic effects and intracellular ROS generation in normal and cancer cells provide preliminary evidences that PN may be considered as a safe and effective anticancer drug.

Awards Won:
Second Award of $2,000