

## Combined anticancer effects of capsaicin and sodium selenite on PI3K/AKT/mTOR signaling pathway in MDA-MB-231 and L929 cell lines

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Capsaicin (CAP), a toxic alkaloid found in chili peppers, exhibits anticancer potential by inducing apoptosis in cancer cells, thereby inhibiting tumor growth. CAP exerts its effects through mechanisms such as increasing reactive oxygen species (ROS) production, preventing metastasis, and enhancing the efficacy of chemotherapeutic agents. Sodium selenite (SS), a widely used selenium compound, plays a crucial role in neutralizing hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) and lipid hydroperoxides, which can damage DNA. This study investigated their effects on MDA-MB-231 and L929 cell lines using MTT, Comet, apoptosis, malondialdehyde (MDA), and antioxidant enzyme activity assays. The LD<sub>50</sub> value of CAP was determined to be 50 µM, with cytotoxicity analyses revealing a dose-dependent decrease in cell viability. Comet assay confirmed DNA damage, while the highest apoptotic cell count was observed at the combined concentration of 50 µM CAP and 5 nM SS. Immunohistochemical analysis identified the involvement of the PI3K/AKT/mTOR signaling pathway. Additionally, increased MDA levels and decreased antioxidant enzyme activity were observed. CAP and SS exhibited a synergistic effect, reducing proliferation rates in both cell lines, highlighting their potential as a therapeutic strategy in cancer treatment.

**Keywords:** Oxidative Stress, PI3K/AKT/mTOR, Apoptosis, Antioxidant enzyme activities, Apoptotic effect, Comet test, Immunohistochemical test