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Curcumin and paclitaxel induce cell death in breast cancer cell lines.

Gloria M. Calaf, Richard Ponce-Cusi, Flavio Carrión.

Abstract

Breast cancer is one of the major health issues confronting women; however, treatment with conventional chemotherapeutic drugs is limited. Currently, paclitaxel is used as a therapeutic clinical agent to treat breast cancer that exerts antitumor activity in numerous types of cancer cell. Curcumin (diferuloylmethane), a polyphenol derived from turmeric (Curcuma longa), possesses several properties that could enable it to exert an anticancer effect. Previous reports have demonstrated the synergistic effects of several chemotherapeutic drugs in combination with curcumin. Therefore, the aim of the current study was to evaluate cell death induced by curcumin and paclitaxel alone and in combination in human breast cancer cell lines: MCF7, an epithelial and luminal-like adenocarcinoma cell line triple positive for estrogen and progesterone receptor, and MDA-MB-234, a metastatic human breast cancer cell line triple negative for such receptors, as well as MCF-10F as a normal breast cell line. The results indicated that curcumin and paclitaxel induced apoptosis and necrosis, which was demonstrated through multiple methods, including assays of caspase-3/7 activity, Annexin V, poly(ADP-ribose) polymerase-1 activation and protein expression of caspase-3, nuclear factor (NF)-κB transcription factor and proliferating cell nuclear antigen. The results identified that the combination of curcumin and paclitaxel had a decreased effect on apoptosis in the malignant MDA-MB-231 cell line compared with in MCF7 or MCF-10F. It was demonstrated that the combined treatment with curcumin and paclitaxel resulted in a higher level of apoptosis compared with either substance alone in breast cancer cell lines. Therefore, breast cancer treatment may benefit from the use of a combination of drugs in chemotherapy.