

DNA topoisomerase 2-alpha is an enzyme that in humans is encoded by the TOP2A gene. This gene encodes a DNA topoisomerase, an enzyme that controls and alters the topologic states of DNA during transcription. This nuclear enzyme is involved in processes such as chromosome condensation, chromatid separation, and the relief of torsional stress that occurs during DNA transcription and replication. It catalyzes the transient breaking and rejoining of two strands of duplex DNA which allows the strands to pass through one another, thus altering the topology of DNA. The gene encoding this enzyme functions as the target for several anticancer agents and a variety of mutations in this gene have been associated with the development of drug resistance.

The proliferative state of tumor cells is an important determinant of sensitivity to TOP2A inhibitors, and a correlation exists between proliferation, cell cycle stage and cytotoxicity. Inhibitors of TOP2A are clinically effective in the management of hematological malignancies and solid tumors. TOP2A expression is a determinant of response to anthracycline containing therapy. Patients with advanced breast cancer displaying higher TOP2A expression levels responded better to treatment with doxorubicin ([Durbecq](#) et al., 2004, Burgess et al., 2008).

