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Increasing the Efficacy of Doxorubicin Against Breast Cancer

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Abstract

In the United States, breast cancer accounts for one in three cancer diagnoses in women, making it the most common type of cancer in women. One important chemotherapeutic agent used to treat breast cancer is doxorubicin, an anthracycline compound that causes cell death by damaging DNA in addition to producing reactive oxygen species. Previously, the Berdis lab developed an artificial nucleoside analog designated 5-NIdR that improves the efficacy of DNA damaging agents used against brain cancer. This nucleoside works by inhibiting the replication of damaged DNA created by certain chemotherapeutic agents. In this project, we tested the ability of 5-NIdR to increase the efficacy of doxorubicin in the treatment of breast cancer. This was accomplished by comparing the effects of doxorubicin in the absence and presence of 5-NIdR using MCF-7 breast cancer cells and non-cancerous fibroblasts as models. Our studies show that breast cancer cells are highly resistant to doxorubicin, displaying an LD_{50} value of 840 nM which is 8-fold higher than that measured against non-cancerous fibroblasts (LD_{50} = 105 nM). Combining 5-NIdR with doxorubicin kills more cells compared to treatment with either doxorubicin or 5-NIdR used alone.

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