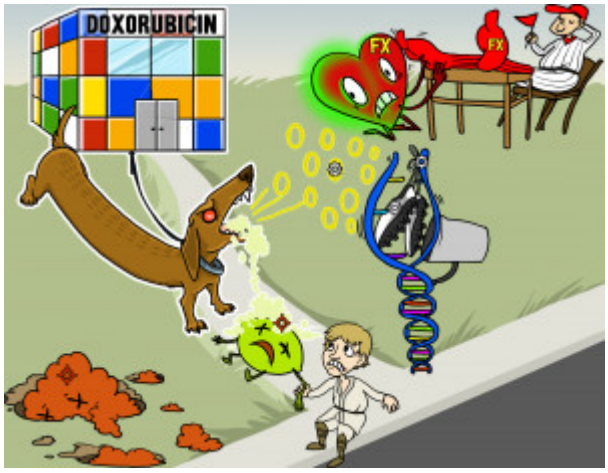
Doxorubicin (Adriamycin)

Doxorubicin, or adriamycin, is an anthracycline antibiotic used in cancer therapy. It works by intercalating DNA, preventing new cell growth in tumors, but leads to heart damage. This cardiotoxic side effect can be decreased with dexrazoxane administration.



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Indications

Solid Tumors
Tumor-guy
Doxorubicin is used to treat solid tumors; meaning it is useful against cancers of the bladder, breast, stomach, ovaries, lungs, thyroids, and soft-tissue sarcomas.

Lymphomas and Leukemias
Lime-foam and Leukemia-Luke
This drug is used most commonly to treat leukemias and Hodgkin's lymphoma.

Mechanism

Free Radical Production
Free Radicals
Doxorubicin increases free radical production in tumor cells, leading to cytotoxicity.

Intercalates DNA
Inner-cleats DNA
This medication inhibits biosynthesis of new cells, as it intercalates DNA. Once helicase has split the DNA to be replicated, doxorubicin intercalates the DNA (gets in between the two DNA strands), preventing the double helix from being resealed. Thus, it stops the process of replication.

Prevents Double Helix from Sealing
Preventing the Double Helix from Closing
After the DNA double helix is split, Doxorubicin intercalates the two strands. This mechanical obstruction prevents the DNA double helix from resealing.

Side Effect

Cardiotoxicity
Heart with Toxic-green-glow
Doxorubicin is a cardiotoxic drug, and it can lead to congestive heart failure. Mechanisms for how this dose-dependant toxicity occurs include myocardial apoptosis, downregulation of contractile proteins and oxidative stress on myocardial cells.

Dexrazoxane Decreases Toxicity
Desk-red-socks-fan removing Toxic-green-glow
Dexrazoxane is a cardioprotective agent used to protect the heart from chemotherapeutic drugs, like doxorubicin. It works by chelating iron ions, decreasing the amount of superoxide radicals that can harm the heart.

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