Molecular Mechanisms of Cardiotoxicity: A Review on The Major Side-effect of Doxorubicin

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Doxorubicin is among the most powerful drugs used for the treatment of both adult and child cancers. Doxorubicin is a major cause of chemotherapy-induced cardiotoxicity that is a restricting factor for an optimum dose of the drug for treatment of the cancer patients. Many studies have explored pathophysiology and mechanisms of doxorubicin-induced cardiotoxicity. Cellular and animal experiments proposed that doxorubicin-induced cardiotoxicity mechanism is multifactorial. Oxidative stress has been considered as the primary cause of cardiotoxicity. Although there is no effective treatment for doxorubicin-induced cardiotoxicity currently but many investigations are being done to discover prevention treatments whereas no specific treatment has been approved. Studies have shown that reactive oxygen species and topoisomerase 2b are molecular targets for cardioprotection. Therapeutic imaging methods and cardio-biomarkers may be helpful in the improvement of rapid detection of cardiac damage. In this review, effects of doxorubicin on DNA damage, free radical generation, mitochondrial damage, cell death, and other parameters have been studied.