Journal of
Cardiology & Cardiovascular Therapy
ISSN: 2474-7580

Juniper Publishers
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Opinion
Volume 7 Issue 2 – August 2017
DOI: 10.19080/JOCCT.2017.07.555710

J Cardiol & Cardiovasc Ther

Statins: Promising Protective Shield against Doxorubicin Cardiotoxicity

Ali Shalizar Jalali*

Department of Basic Sciences, Urmia University, Iran

Submission: August 14, 2017; **Published:** August 28, 2017

***Corresponding author:** Ali Shalizar Jalali, VMD, PhD, Histology and Embryology Research Laboratories, Department of Basic Sciences, Faculty of Veterinary Medicine, Urmia University, Urmia, Iran, Fax: 00984432771926; Tel: 00984431942593;
Email: ali_shalizar@yahoo.com/a.shalizar@urmia.ac.ir

Opinion

Doxorubicin (DOX) as a 40 year-old anthracycline antibiotic is a potent antineoplastic agent extensively used in the treatment of several malignancies [1]. Nevertheless, its clinical application carries the risk of serious non-target tissues toxicities, in particular cardiomyopathy, which manifests as life-threatening congestive heart failure [2]. It has been suggested that several mechanisms including reactive oxygen species over-generation, cardiomyocytes apoptosis, membrane-associated ion pumps dysfunction and topoisomerase II isoforms inhibition may be involved in DOX-induced cardiotoxicity [3-5].

To date, many studies have been carried out using adjunctive therapy to counteract DOX-evoked cardiac damages and it has been proposed that development of alternative cardioprotective strategies for management of DOX-related cardiotoxicity is inevitable [6-8]. However, only few therapeutic regimens have been proven to be useful in clinical practices.

Statins (STNs) as 3-hydroxy-3-methylglutaryl-CoA-reductase inhibitors are first-line cholesterol-lowering agents with pleiotropic biological activities including antioxidant, anti-inflammatory, anti-apoptotic and cytoprotective properties [9-13]. Accordingly, there is a growing body of evidence indicating that STNs as potent cardioprotective agents can protect cardiac tissue against DOX-induced damages along with potentiation of DOX-associated chemotherapies [14-16]. Recently, it has been reported that simvastatin can exert significant cardioprotective effects against DOX-related cardio toxicity through suppression of endoplasmic reticulum stress and activation of Akt signaling and its administration has been suggested as an encouraging approach to manage DOX cardiotoxicity [17].

As a final point, it seems that STNs could serve as safe and promising agents to prevent unfavorable cardiac complications in DOX therapies. Obviously, comprehensive retrospective and prospective clinical trials are needed to confirm the efficacy of STNs in improvement of DOX therapeutic utilities.

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DOI: 10.19080/JOCCT.2017.07.555710

How to cite this article: Ali S J. Statins: Promising Protective Shield against Doxorubicin Cardiotoxicity. J Cardiol & Cardiovasc Ther 2017; 7(2): 555710. DOI: 10.19080/JOCCT.2017.07.555710.