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BOOK OF ABSTRACTS

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Protective effects of N-acetylcysteine on acute radiotherapy-induced cardiotoxicity in rats: An electrophysiological evaluation

Songül Barlaz Us[1], Özden Vezir[2], Ülkü Çömelekoğlu[3]

1 Mersin University, Faculty of Medicine, Department of Radiation Oncology, Mersin, Turkey
2 Mersin City Hospital, Department of Cardiovascular Surgery, Mersin, Turkey
3 Mersin University, Faculty of Medicine, Department of Biophysics, Mersin, Turkey

Radiotherapy (RT) is one of the commonly used methods of cancer treatment. During the RT treatment of malignant tumors found in thoracic cavity, mainly lung and breast, the heart is exposed to ionizing radiation. The risk of death increases in patients due to the emergence of diseases such as acute pericarditis, myocarditis, congestive heart failure, mitral and aortic valve insufficiency, fibrosis and rhythm disturbances in the communication system after irradiation due to ionizing radiation effect. These diseases are largely related to the increase of free radical production and the deterioration of the antioxidant defense system by the effect of ionizing radiation. Therefore, the use of antioxidant, anti-inflammatory agents may be important before or during treatment to reduce tissue and organ damage caused by radiotherapy. N-acetylcysteine (NAC) is an acetyl compound of L-cysteine with an active mercapto group. More recently, studies have demonstrated that N-acetylcysteine prevents oxidative damage, improves immunity, inhibits apoptosis and the inflammatory response and promotes the synthesis of glutathione in cells. This study aimed to investigate the protective effect of N-Acetylcysteine (NAC) on radiotherapy-induced cardiotoxicity in rats.

Thirty female Wistar Albino rats were used in the study. Rats were divided into four groups. Group I: Control group (n = 6), the rats in this group were injected (i.p.) with saline for 7 days. Group 2: NAC group (n = 8), the rats in this group were injected NAC at a daily dose of 240 mg / kg for 7 days. Group 3: RT group (n = 8), the rats in this group were injected with saline for 7 days and RT (20 Gy) was irradiated 1 hour after the last injection. Group 4: RT + NAC group (n = 8), the rats in this group were injected with NAC for 7 days and RT were irradiated 1 hour after the last NAC dose. To determine the acute effects of radiation on the heart 24 hours after RT, the electrical activity of heart was recorded using lead I. The signals were digitized with a 16-bit analog-to-digital converter at a sampling rate of 500 samples/s. Heart rate, QT interval and T wave amplitude were measured from ECG recordings.

Rats of the RT group presented significant decreased heart rate ($p<0.05$), but in the heart rate value, there were no significant differences in the NAC and RT+NAC groups compared with those of the control group ($p>0.05$). There were no significantly differences between control group and experimental groups for the QT interval ($p>0.05$). In the RT group, amplitude of T wave was significantly higher than the control, NAC and RT+NAC groups. These results can be indicator cardiotoxic damage.

The results of the present study showed protective effect for NAC on the heart. Further studies are needed to determine the mechanisms of this effect.

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