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Radiopharmaceutical model using ^{99m}Tc-MIBI to evaluate amifostine protection against doxorubicin cardiotoxicity in rats

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The aim of our study was to use an *in vivo* radiopharmaceutical model to investigate the cytoprotective effect of amifostine against doxorubicin-induced cardiotoxicity. Male Wistar rats were randomly divided into four groups (n = 6): 1) Saline (control); 2) Doxorubicin (DOX; 10 mg/kg^{-1} intraperitoneally); 3) Amifostine (AMI; 200 mg/kg^{-1} intraperitoneally); 4) Doxorubicin plus amifostine (DOX + AMI). Amifostine was injected 30 minutes before doxorubicin in Group 4. ^{99m}Tc-MIBI, 20 MBq/0.2 ml^{-1}, was injected through the tail vein 72 hours after the drug administration. Rats were killed and samples of myocardium were removed by dissection 60 minutes after the injection of radiopharmaceutical. Radioactivity in each organ sample was counted using a Cd(Te) detector equipped with RAD 501 single-channel analyzer. The percent radioactivity was expressed as a percentage of the injected dose per gram of tissue (%ID/g^{-1}). The %ID/g^{-1} activity was calculated by dividing the activity in each sample by the total activity injected and mass of each organ. ^{99m}Tc-MIBI uptake as %ID/g^{-1} was 1.194 ± 0.502 and 0.980 ± 0.199 in the control and AMI groups, respectively. Doxorubicin administration resulted in a significant increase in %ID/g^{-1} (3.285 ± 0.839) ($p < 0.05$). Amifostine administration 30 minutes before doxorubicin injection resulted a significant decrease in %ID/g^{-1} (2.160 ± 0.791) ($p < 0.05$) compared with doxorubicin alone. The results showed that amifostine significantly attenuated doxorubicin-induced cardiotoxicity.

Key words: radiopharmaceutical, ^{99m}Tc-MIBI, amifostine, doxorubicin, cardiotoxicity