ABSTRACT

MECHANISM OF LOW DOSE RADIATION STIMULATION ON RADIOADAPTATION RESPONS OF PAROTID SALIVARY GLAND ACINAR CELLS EXPOSED TO CHALLENGE RADIATION WITH INDICATORS OF Hsp70, SOD2, MDA and Caspase-3 (Experimental Laboratory Study at Rattus norvegicus)

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Background: The radioadaptation response was cell stimulation with very low doses radiation, and then the cells have increased resistance against to the following radiation challenge. Radioadaptation response can be an alternative to normal cell or tissue protection from the side effects of radiotherapy, ie the incidence of hyposalivation that occurs due to radiation also exposed to salivary gland cells. The purpose of this study was to explain the radioadaptation response mechanism of parotid salivary gland acinar cells with the indicators : SOD2, Hsp70, Caspase-3 and MDA.
Method: This study used the randomized postest-only control group design. There were 36 male Rattus norvegicus that divided into 6 groups: group 1(control), group-2 (challenge radiation), group-3: adaptation-1(50 mGy), group-4(repeated 3-time of adaptation-1), group-5: adaptation 2(100 mGy), and group-6(repeated 3-time of adaptation-2). The animals were immobilized without anesthetic. The radiation exposure using a Cobalt-60 teletherapy unit that directed at dorsal of animal's head. The challenge radiation was exposed 5 hours after radiation adaptation. Parotid tissue was collected 24 hours after challenge exposure, and then was processed to histopathological speciment. The variables were measured through Immunohistochemical (IHC) technique. The data were analyzed by one way ANOVA and Pathway-test ($\alpha = 0,05$).
Results: the expressions of Hsp70 and SOD2 were higher, while the expression of Caspase-3 and MDA metabolit were lower in all groups exposed to radiation adaptation compared to groups without radiation adaptation. There were no difference of SOD2, Hsp70, Caspase-3 expressions and MDA metabolit between groups exposed to radiation adaptation at a dose of 50 mGy and 100 mGy. Repeated radiation adaptation 3 times had higher expression of Hsp70 and SOD2, and lower expression of Caspase-3 and MDA metabolit than single exposure. There were significant differences in variable relationship (radiation adaptation-SOD2-MDA metabolit; and radiation adaptation-Hsp70-Caspase-3) between groups that were only exposed to radiation challenge and the group exposed to radiation adaptation, but there were no differences between groups exposed to adaptation radiation.
Conclusion: the low dose radiation as radiation adaptation can stimulate a radioadaptation response of parotid salivary gland acinar cells. Repeated of the radiation adaptation showed the radioadaptation response stimulation better than single exposure. The radioadaptatin response of the parotid salivary gland acinar cells was mediated by SOD2 and Hsp70. There was no difference the radioadaptation response mechanism between doses of 50 mGy and 100 mGy; also between single and repetition radiation adaptation exposure.

Key words: low dose radiation, radioadaptation respons, acinar cell, Hsp70, SOD2, MDA, Caspase-3.