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Saline containing phosphatidylcholine liposomes possess the ability to restore endothelial function damaged resulting from gamma-irradiation.

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Abstract

The protective action of passive saline filled ("empty") phosphatidylcholine liposomes (PCL) on endothelial function was examined in thoracic aortas obtained from gamma irradiated (6 Gy) Chinchilla rabbits, and then verified in experiments on non-anesthetized and anesthetized rats. Acetylcholine (ACh)-induced vascular relaxant responses in isolated vascular tissues rats were used as the test of endothelial integrity and its functional ability. It was shown that when added to the bath solution (100 microg/ml), PCL effectively restored endothelium-dependent ACh relaxations of isolated vascular rings damaged resulting from gamma-irradiation but had no effect on endothelium-independent vascular responses to therapeutic nitric oxide (NO) donors. The liposomes were also without protective effect when injected to the rabbits intraperitoneally (30 mg/kg) 1 hour before irradiation. In contrast, PCL, being injected at the same dose 1 hour after radiation impact, promote normalization of both endothelium-dependent vascular responses to ACh and nitric oxide (NO) donors. PCL restored also the sensitivity of vascular tissues to authentic NO (aqueous NO solution) that was surprisingly increased after irradiation, and normalized relationship between ACh-stimulated NO release and relaxant response amplitudes in irradiated aortas. Experiments on non-anesthetized and anesthetized rats demonstrated that irradiation led to significant elevation in the level of arterial blood pressure without any changes in cardiac contractility. PCL administration (25 mg/kg, i.v.) effectively normalized an increased arterial blood pressure in irradiated animals. In conclusion, it appears that PCL due to its ability to normalize NO-dependent vascular tone control mechanisms might be worthwhile therapeutic approach in case of ionizing irradiation accident. These result support the concept that the depression of endothelium-dependent vascular responses after irradiation may be result of decreased NO bioavailability due to its conversion to less potent vasodilators during irradiation-induced oxidative attack.

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