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Alteration in Sphingomyelin: Phosphatidylcholin Ratio in Rat Liver Cells Nuclear Preparations After the Cisplatin and Estradiol Separate and Combined Exposure

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ABSTRACT

It is well known, that the nuclear lipid component is present in various subnuclear compartments playing different regulatory roles. Nuclear lipids form microdomains that are composed of high levels of phosphatidylcholine, sphingomyelin and cholesterol. This lipids in the microdomains are present in a specific ratio that equals to approximately 1:1:1. The alteration of phosphatidylcholine/sphingomyelin ratio during the cell cycle was clearly demonstrated. The possible participation of quantitative alterations of nuclear lipids in the molecular mechanisms of cisplatin and estradiol action is not excluded. The content of sphingomyelin and phosphatidylcholine in rat liver nuclear preparations was studied after the cisplatin and estradiol separate and combined exposure. These results showed the different measure of alteration in sphingomyelin and phosphatidylcholine amount in all studied nuclear preparations caused by cisplatin and estradiol separate and combined treatment. The phosphatidylcholine exhibits the greatest susceptibility to estradiol alone action. The absolute quantity of this phospholipid increased by 110% in comparison with baseline in case of exposure to estradiol while after the cisplatin alone action the amount of phosphatidylcholine increased only by 10%. Cisplatin and estradiol joint action lead to increased quantity of phosphatidylcholine about 18 %. Absolute content of sphingomyelin reduced by 35.5%, after the cisplatin alone action. In case of cisplatin and estradiol combined treatment the absolute quantity of sphingomyelin remained unchanged. At the same time the sphingomyelin/phosphatidylcholine ratio was significantly decreased after both cisplatin (1.7 times) and estradiol (2.2 times) separate action and approaches the level of the baseline in case of combined exposure. Thus, it can be concluded that nuclear lipids are key elements for the correct functioning of all nuclear processes. The identified quantitative changes will help clarify how cisplatin and estradiol implement their effects when acting separately and together.

Keywords: cisplatin, estradiol, sphingomyelin, phosphatidylcholine

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