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Banja Luka, 20-23 September 2021

ORAL PRESENTATION

Lipidomics as a Novel Tool in Cardiovascular Research

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Abstract

Lipidomics deals with small molecules metabolomes with a mass lower than 1500. In recent years, the crucial role of lipidomes in the pathogenesis and therapy of cardiovascular events has become increasingly apparent.[1-3] For example, ischemia-reperfusion (IR) injury can initiate oxidative stress that leads to harmful changes in membrane lipids, with an unwanted accumulation of fatty acids that leads to lipotoxicity. Lipid analysis provides additional insight into the pathogenesis of IR disorders and reveals new targets for drug action. A therapeutic approach to reperfusion lipotoxicity involves attenuation of fatty acids overload, i.e., their transport to adipose tissue and/or inhibition of the adverse effects of fatty acids on cell damage and death. The latter option involves using PPAR agonists and drugs that modulate the transport of fatty acids via carnitine into the interior of the mitochondria or the redirection of long-chain fatty acids to peroxisomes. Regarding platelet functions, polyunsaturated fatty acids play a role in increasing platelet reactivity, and that the prothrombotic phenotype plays a crucial role in the occurrence of major adverse cardiovascular events. The ongoing increase in cardiovascular diseases incidence emphasizes the importance of research linking lipids and platelet function. In particular, the rebound phenomenon that accompanies clopidogrel discontinuation in patients receiving dual antiplatelet therapy has been associated with changes in the lipid profile. Our many years of research underline the importance of reduced HDL values for the risk of such a rebound effect and the occurrence of thromboembolic events. Lipids are otherwise a heterogeneous group of molecules, and their signaling molecules are not deposited but formed "on-demand" in the cell. On the other hand, exosomes transmit lipid signals between cells, and the profile of such changes can be monitored by lipidomics. Changes in the lipid profile are organ-specific and may indicate new drug action targets.

Key words: Ischemia/reperfusion injury; Lipidomics; Platelet function; Rebound and resistance to antiplatelet drugs.

Reference: 1. Todorović Z, Đurašević S, Stojković M, Grigorov I, Pavlović S, Jasnić N, et al. Lipidomics provides new insight into pathogenesis and therapeutic targets of the ischemia-reperfusion injury. Int J Mol Sci 2021;22: 2798. https://doi.org/10.3390/ijms22062798. **2.** Đukanović N, Obradović S, Zdravković M, Đurašević S, Stojković M, Tosti T, et al. Lipids and antiplatelet therapy: important considerations and future perspectives. Int J Mol Sci 2021;22(6):3180; doi: 10.3390/ijms22063180. **3.** Đurašević S, Stojković M, Sopta J, Pavlović S, Borković-Mitić S, Ivanović A, et al. The effects of meldonium on the acute ischemia/reperfusion liver injury in rats. Sci Rep 2021;11(1):1305. doi: 10.1038/s41598-020-80011-y.

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