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Pro- and anti-inflammatory biomarkers associated with Carrageenan-induced edema

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The purpose of this study was to quantify the serum blood biomarkers of the inflammatory process induced by subcutaneous injection of 0.1% Carrageenan solution into the rat paw. There are a variety of endogenous compounds participate in the process of inflammation, which can be divide into two groups: pro-inflammatory (inducing inflammatory reaction) and anti-inflammatory (concluding inflammation). Over time, their ratio may vary. Analysis of the rat blood serum metabolome after 3 and 24 hours (n=3) after the onset of the inflammatory reaction was carried out using HPLC/MS/MS equipment (Shimadzu 8040), Lipid Mediators v.2 and SPE (Chromabond HR-X 60 mg cartridges). From the obtained profile of metabolites, the prostaglandin groups of 8-iso-PGE2, PGE2, PGD2 (pro-inflammatory) and 8-iso-PGA2, PGA2, PGJ2 (anti-inflammatory) were chosen. A change in the ratio of these molecules during growth and resolution of inflammation in the Carrageenan-induced edema of the rat paw has been established. Quantity of the selected metabolites was expressed using relative units (RU) through normalization 8-iso-PGE2, PGE2, PGD2 to PGE2-d4 and 8-iso-PGA2, PGA2, PGJ2 to PGA2-d4. Control values in rats without inflammation were 48.57 RU and 8.03 RU for the sum of 8-iso-PGE2, PGE2, PGD2 and the sum of 8-iso-PGA2, PGA2, PGJ2, respectively. 3 hours after the onset of inflammation, the amount of pro-inflammatory metabolites was 135.22 RU, while for 24 hours 91.72 RU. For the anti-inflammatory metabolites group, 10.18 RU was determined for 3 hours, and 10.34 RU for 24 hours. Thus, there was an increase and a subsequent decrease in the number of pro-inflammatory prostaglandins, whereas the amount of anti-inflammatory drugs by 24 hours remained high. An analysis of the ratio of pro- and anti-inflammatory mediators in vivo using the model of Carrageenan-induced edema of the rat paw can be used to compare the anti-inflammatory activity of potential drugs. The determination of the metabolic profile kinetics during inflammatory process makes it possible to clearly demonstrate inhibition of the inflammatory cascade, and the prevention from transition acute form of inflammatory to chronic.

Biography

Goriainov Sergey was graduated from Peoples' Friendship University (RUDN University) with a master degree in chemistry in 2010. Since 2010 he works as a Head of the laboratory of mass spectrometry and NMR spectroscopy in the Shared Research and Educational Center of RUDN University. His activities associated with the use of these two most powerful methods of analysis. Objects of interest - drugs, dietary supplements, functional foods, their safety and efficiency. Since 2017 in the laboratory the researches in the field of metabolomics have been started.

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