N-linked glycosylation and its potential within different rat strain´s pharmacology basic research

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Statement of the Problem: Glycosylation is one of the most common posttranslational modifications of proteins. Altered glycosylation is present in many pathophysiological conditions. Glycomic studies on rat serum have revealed variations in the N-glycans of glycoproteins correlated with disease progress, which is consistent with the findings in human serum. The main goal of our study was to describe the glycoprofiles of different rat strains fed 5 weeks standard diet and to evaluate their differences according to the N-glycan type. Methodology & Theoretical Orientation: For our observation we used Wistar rats (W), the general multipurpose model strain. Then spontaneously hypertensive rats (SHR) were used, developed as animal models for human essential (idiopathic or primary) hypertensions. Finally, hereditary hypertriglyceridemic rats (hHTG) were also included, regarded as suitable animal model of cardiovascular disease and metabolic syndrome. The analysis of serum N-glycoprofilewas done by mass spectrometry analytics on MALDI-TOF/TOF instrumentation. Analyzed data were processed by FlexAnalysis (Bruker Daltonics) and GlycoWork Bench software. Findings: The cluster of 22 N-glycanswas appointed and sorted with special impact on their structural type. The changes in relative intensities of N-glycans were not significant, however, there were observed some trends in its remodelation within different rats strains. In W group there was detected higher percentage of high-manose N-glycan type. In SHR group was higher portion of complex-bi-antennary N-glycans with fucose and in hHTG group higher portion of complex-bi-antennary and complex-bi-antennary N-glycans with fucose.Conclusion & Significance: These data of blood sera glycoprofiling in different rat strains might assume as a possible tool for basic research to test therapeutic perspectives within various civilization and metabolic diseases. Further impact on clinical studies tendencies might be considered. Acknowledgements:This work supported by grants: EU project ITMS2014+313021Y920, APVV-18-0336, VEGA 2/0104/21 and Ministry of Health´s SR project No. 2019/7-CHUSAV-4.

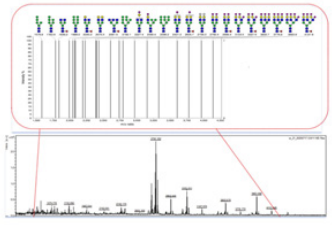

Fig. 1. Representative mass spectrum of N-glycans derived from blood sera of Wistar rats.
Legend: green circle – Mannose; blue rectangle – N-acetylglucosamine; yellow circle – Galactose; red triangle – Fucose; purple diamond – Sialic acid; white diamond – Neuraminic acid; Ac - Acetyl.

Biography

Dr. Brnoliakova(maiden name: Kyselova) has been conducting independent research on metabolic diseases, pharmacological interventions, applied glycomics and proteomics for more than 15 years. As a deputy Director of the Institute of Experimental Pharmacology and Toxicology, Slovak Academy of Sciences, she has got an extensive biochemistry & molecular biology laboratory experiences. She is familiar with animal handling and led various in vivo and in vitro studies including preclinical trials. Dr. Brnoliakova is also practising pedagogical activities in the field of biochemistry. She completed her PhD studies at the in 2004. Within 2005-2007 accomplished post-doctoral studies at the Chemistry Department of Indiana University in Bloomington, US. Since then she is keen on applying glycobiology and glycomics as a possible tool for basic research to test various therapeutic perspectives with further impact on clinical studies tendencies.