

Alteration of Glucose Metabolism in Long-term Dietary Experiment

Zuzana Brnoliakova, Sonam Kapoor, Karol Svik, Lukas Slovak, Lucia Rackova

Department of Tissue Cultures and Biochemical Engineering, Institute of Experimental Pharmacology and Toxicology, Center of Experimental Medicine, Slovak Academy of Sciences, Bratislava, Slovak Republic

Abstract

The field of ageing research has been rapidly advancing in recent decades. The experimental studies have shown the beneficial effects of various dietary patterns on metabolic outcomes. The improvement of eating habits might serve as anti-ageing prevention and treatment strategy for metabolic disorders. The goal of our study was to contribute to the elucidation of interrelationship between glycosylation alterations and pathophysiology in rats in a long-term study. We have also investigated the impact of guided nutritional intervention, the effect of high fat diet (HFD), on the fundamental metabolic parameters as well as the glucometabolic hormones. Animals were fed either standard diet or HFD (1% cholesterol and 7.5% lard) for 18 months. The non-invasive blood pressure measurement was carried out by tail-cuff plethysmography. The plasmatic levels of total cholesterol (TC), triacylglycerides (TAG), low density lipoprotein (LDL-C), high density lipoprotein (HDL-C), adipose triglyceride lipase (ATGL), C-reactive protein (CRP) and tumor necrosis factor alpha (TNF- α) were assessed by ELISA kits. The serum levels of glucagon, glucagon-like peptide-1 (GLP-1), ghrelin, leptin and plasminogen activator inhibitor 1 (PAI-1) were thoroughly assessed by magnetic bead-based immunoassays on Bio-Plex 200 systems (Bio-Rad, U.S.) and interpreted. We observed the relevant changes in cluster of those five glucometabolic hormones measured and compared within the experimental groups. Our data indicates that the metabolic, diet related disturbances, leads to significant alterations in glucose metabolism regulation in rats. Although various interacting mechanisms have already been proposed, the role of these modifications is still not well understood. In conclusions, data indicates the important role of systemic glucose metabolism regulation and suggests its importance within age and metabolic disorders. Interactions with glucose metabolism might represent the potential pharmacological target to focus on in further research strategies. Acknowledgements: Supported by EU project ITMS2014+313021Y920, APVV-18-0336 and VEGA 2/0104/21.



Fig.1: The Centre of Experimental Medicine of Slovak Academy of Sciences in Bratislava, Slovak Republic.

Recent Publications

1. Rackova L, Mach M, Brnoliakova Z (2021) An update in toxicology of ageing. *Environmental Toxicology and Pharmacology* 84:103611.
2. Csekes E, Rackova L (2021) Skin Aging, Cellular Senescence and Natural Polyphenols. *International Journal of Molecular Sciences* 22:12641.
3. Rackova L, Csekes E (2021) Proteasome Biology: Chemistry and Bioengineering Insights. *Polymers (Basel)* 12:2909.
4. Kapoor S, Kala D, Svoboda J, Brnoliakova Z, Otahal J (2021) The Effect of Sulphoraphane on Brain Glucose Uptake during Neonatal Hypoxic-Ischemic Encephalopathy in Newborn Rats. *European Journal of Pharmacology* 68:136-138.
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Biography

Dr. Brnoliakova (maiden name: Kyselova) has been conducting independent research on metabolic diseases and pharmacological interventions more than 15 years. As 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 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. She is also practising pedagogical activities in the field of biochemistry. Within 2005-2007 accomplished post-doc at Indiana University, Bloomington, US. At present working within The Department of tissue cultures and biochemical engineering being focused on the field of glycobiology trying to elucidate the interrelationship between glycosylation changes and pathophysiology of metabolic disturbances *in vivo*, *in vitro* and *in silico*. She is the PI of several projects, has published >45 articles with >1.500 citations and achieved h-index 22. Email: zuzana.brnoliakova@gmail.com

Notes/Comments: