LUCIA BALÁŽOVÁ

Biomedical Research Center SAS

Project number
1260/02/02

Project duration
9/2022 - 8/2025

"I see opportunity in SASPRO 2 fellowship to take a step towards my scientific independence and professional maturation since I can develop my own research ideas. Financial support by the grant allows me to follow up on my previous research activities diverging from the researcher of my mentors. I am convinced that SASPRO2 fellowship will help me to establish my own research group and together with my team we will foster excellence of Slovak research."

BIOGRAPHY

Lucia Balazova studied Animal Physiology at Comenius University in Bratislava. After completing doctoral studies, she worked as a postdoctoral researcher at ETH Zürich, while she was awarded the prestigious ETH postdoctoral fellowship. Lucia´s expertise lies in energy metabolism and metabolic diseases. She contributed to discovery of novel cell populations within adipose tissue as well as identification of several mechanisms regulating thermogenic adipocyte function. Her work was published in renowned scientific journals. She holds Young Investigator award by the Federation of European Physiological Societies (2014) and recently, she was recognized as the Scientist of the Year 2021 in Slovakia.

PROJECT SUMMARY

Investigating the role of GPR180/CTHRC1 axis in regulation of pancreatic β cell function and pathogenesis of diabetes

Diabetes is a chronic metabolic disorder characterized by impaired glucose homeostasis and currently represents one of the major public health challenges worldwide. Although numerous medications to treat diabetes are available, optimizing management of the disease is a continuous effort since prevalence of diabetes is still rising dramatically. Maintenance of pancreatic islets cytoarchitecture and β cells functionality is essential for proper glycaemic control. TGFβ signalling pathway is involved in regulation of diverse physiological processes such as cellular proliferation, differentiation and growth, extracellular matrix deposition and tissue repair. Recently, I discovered and characterized in detail an orphan receptor GPR180 and its ligand CTHRC1 as novel components of TGFβ signalling machinery. My preliminary data show that both global as well as β cell-specific deletion of Gpr180 leads to a defect in the first phase insulin secretion and thereby to impaired glucose tolerance. This research proposal aims to investigate: 1) the role and mechanism of GPR180 action in regulation of β cell function; 2) therapeutic potential of CTHRC1 to restore insulin secretion and improve glycaemic control; 3) genetic variance and functionally validate the existing single nucleotide polymorphisms in GPR180 gene in association with β cells functionality and diabetes. To meet this goal, I will employ β cell-specific Gpr180 knockout mice, viral overexpression of CTHRC1 in vivo as well as gain- and loss-of function studies including CRISPR/Cas9 technology in vitro on β cell-like cell lines of murine and human origin in combination with extensive phenotyping, cell imaging and molecular biology techniques. The proposed project will identify the molecular mechanism by which this novel regulatory axis of TGFβ signalling controls insulin production and/or secretion. Thus, findings of this research program might devise new therapeutic strategies for prevention and treatment of diabetes.

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PUBLICATIONS

Dong H, Sun W, Shen Y, Baláz M, **Balázová L**, Ding L, Löffler M, Hamilton B, Klöting N, Blüher M, Neubauer H, Klein H, Wolfrum C. Identification of a regulatory pathway inhibiting adipogenesis via RSPO2. Nature Metabolism, 2022; 4(1):90-105.
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