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Gender and tissue specific activation of AMPK in a mouse model of type I diabetes mellitus

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Diabetes mellitus (DM) is one of the most rampant metabolic disorders characterized by hyperglycemia with altered carbohydrate, lipid and protein metabolism. DM is associated with the production of reactive oxygen species (ROS) thereby generating oxidative damage in different tissues. 5' adenosine mono phosphate-activated protein kinase (AMPK) is a serine-threonine kinase found in all eukaryotes that regulates glucose and lipid metabolism and its dysregulation results in the development of DM. The present study demonstrates the novel observation that activation of AMPK in type I diabetic mice is gender- and tissue-specific. The study involved the use of a type 1 diabetic mouse model in both male and female Swiss albino mice by administering alloxan monohydrate (150 mg kg⁻¹ body weight) injection intraperitoneally (i.p). Spectro-photometric analysis of DM associated oxidative stress parameters (viz. lipid peroxidation and protein carbonylation) and slot blotting of phospho-AMPK were performed using anti-phospho AMPK antibody. There was a pronounced increase in oxidative stress parameters in heart, kidney and liver tissue in male alloxan-induced diabetic mice in comparison to female. Lipid profiling also showed a steep increase in total cholesterol, triglyceride, low-density lipoproteins (LDL) and very low-density lipoproteins (LDL) with decrease in high-density lipoproteins (HDL) in both male and female DM mice. With increase in oxidative stress parameters, mean intensities of phospho-AMPK levels in heart, kidney and liver tissues of male DM mice displayed a significant decrease in comparison to that of control mice. However, in female DM mice there was an increase of phospho-AMPK level in heart tissue with respect to controls, while a decreased phospho-AMPK level was noticed for kidney and liver tissues with respect to controls.

Biography

Sayantana Nath has completed his MSc from Dept. of Biotechnology, Assam University, Silchar, India and is currently pursuing Doctoral research under Dr. Yashmin Choudhury at the same university. He has published 3 papers in reputed journals and has 1 book chapter.

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