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A high-energy diet stimulates development of diabetes mellitus in spontaneous diabetic rats

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Statement of the Problem: The inconsistently controlled Diabetes Mellitus (DM) concerning mainly diet can lead to serious complications. In DM of type-2 (T2DM), which is considered as one of the most common diseases, insulin resistance, relative insulin deficiency and elevated glucose level occur. The aim of this study was to analyze the effect of chronic high-energy diet on DM complications in ZDF rats focusing on live weight, intake of feed and water, glucose and insulin metabolism.

Method: The suitable animal model of T2DM is Zucker Diabetic Fatty (ZDF) rats which are deficient in the leptin receptors. ZDF rat (fa/fa) genotype is obese and displays glucose intolerance, hyperglycemia, hyperlipidemia and hyperinsulinemia. Male ZDF rats (n=20) and their lean controls (non-diabetic, n=10) in the age of 3 months were used in the experiment. Animals were provided with water and diet on ad libitum base. Rats were divided into three groups as follows, lean untreated rats (C) fed by KKZ-P/M (10 MJ/kg), obese rats fed by KKZ-P/M (10 MJ/kg, E1) and obese rats fed by enriched high energy diet (E2, enriched KKZ-P/M, 20 MJ/kg). The consumption of feed, water, live weight, glucose, ketones levels and insulin content were measured.

Findings: ZDF rats in E1 and E2 group showed hyperphagia followed by developed obesity, insulin resistance and high hyperglycemia.

Conclusion: High-energy diet promptly induced hyperglycemia followed by accelerating the secondary symptoms of diabetes complications. This diet caused ketoacidosis what meant two cases of death.

Biography

Marcela Capcarova is a Teacher and Researcher at the Department of Animal Physiology, Faculty of Biotechnology and Food Sciences, Slovak University of Agriculture in Nitra. Her professional field of study is focused on internal milieu of diabetic rats-model ZDF, blood biochemistry, immunological parameters and antioxidant status after exposition with natural substances (flavonoids, mycotoxins). In the year 2005 she was awarded by Ministry of Education of Slovak Republic as Scientist of the Year.

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