Parth Rajput et al., J Diabetes Metab 2015, 6:8
http://dx.doi.org/10.4172/2155-6156.C1.031

OMICS International
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International Conference on

Targeting Diabetes and Novel Therapeutics

September 14-16, 2015 Las Vegas, Nevada, USA

Targeting type 2 diabetes and obesity: The role of gut microbiota produced Short chain fatty acid (SCFAs) in adiposity and inflammation

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Background: Type 2 diabetes, Obesity and low grade inflammation are becoming worldwide epidemics. The gut microbiota has been identified as a potential contributor to the development of metabolic diseases. Gut microbiota alteration using spectrum specific antibiotics can prevent progression of high sucrose diet (HSD) mediated obesity and diabetes, through microbial metabolites and inflammatory mediators like adipokines.

Aim: To study the effect of modulating the gut microflora by oral administration of spectrum specific antibiotics targeting delivery to small intestine and colon in HSD induced obesity and insulin resistance.

Methods: Rats were fed HSD with or without antibiotics for 60 days. The physiological and biochemical parameters, fecal microbiota composition, Short chain fatty acids (SCFAs), Liver biochemistry, histopathology and gene expression of various G-protein coupled receptors (GPCRs) and various adipokines were investigated.

Results: Simultaneous administration of HSD and antibiotics has shown significant improvements in glucose tolerance and obesity associated parameters like hypercholesterolemia and hypertryglyceremia as compared to HSD. The qPCR study of fecal samples showed increased in gram positive bacteria and reduction in gram negative bacteria, which shows that restoration of commensal microflora in direction to improvement in obesity and insulin sensitivity. Treatment had reduce the effect of Lipopolysaccharide content, which further reduced immune receptors, GPCRs expression along with reduced the expression of proinflammatory cytokines. Gut microbiota manipulation towards decreased inflammation and insulin resistance needs to be further explored for its therapeutic applications in order to treat the metabolic complications.

Biography

Parth Rajput has completed his M.Sc. in Biotechnology from Sardar Patel University (SPU). He is currently pursuing Ph.D. from Institute of Science, Nirma University. His work is mainly focused on the gut microbiota and its alteration in diet induced obesity and diabetes. He has published three research papers in peer reviewed international journals. He has presented his work at more than 25 national and international conferences and presented lectures at nationally.

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