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Food-based xenobiotic chemicals creates glucose dyshomeostasis

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Environmental chemicals from industries, traffic and smoking are compartmentalized to a small exposure groups but the food-based xenobiotics like agrochemicals and food additives pose risk for a larger group through food chain. In our study we analyzed the effect of an agrochemical monocrotophos (MCP) and a byproduct of caramel coloring 4-methylimidazaole (4-MEI) on glucose homeostasis of mice. Chronic administration of MCP leads to hyperglycemia and glucose intolerance mediated by the activation of OP metabolizing potential of gut microbiota. Meta-transcriptomics and metabolomics studies revealed that gut microbial degradation of OP produces short chain fatty acids like acetate, which induces intestinal and hepatic gluconeogenesis and thus accounts for glucose intolerance. On the other hand, 4-MEI induces hypoglycemia through β-cell hyperplasia leading to hyperinsulinemia condition. Molecular studies revealed the induction of glycogenesis and lipogenesis and inhibition of gluconeogenesis during 4-MEI treatment. Observance of cytoplasmic lipid particles and serum lipid profile confirmed the induction of lipogenesis. Oxidative stress was induced during both chemical treatments and lipid peroxidation and protein carbonylation were increased. Collectively, our results showcased rather than traditional risk factors (genetics, physical activity, smoking, mental stress), these food-based xenobiotics plays a major role in glucose dyshomeostasis and conclusively we are recommending creation of proper rules for the management of these chemicals use in food.

Biography

Subbiah Ramasamy has completed his PhD in Molecular Cardiology from Madurai Kamaraj University and Post-doctoral research at University of Temple, Philadelphia and University of Alabama at Birmingham, USA. He has joined Madurai Kamaraj University as an Assistant Professor in 2010. He has published more than 20 papers in reputed journals.

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