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Lurking dangers of endocrine disrupting chemicals (insecticides-OP) induced diabetic incidence

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Organophosphates (OP) are the largely used insecticides in the world and every human is being exposed to OP via food, water and air. Due to their biodegradable nature OP are considered comparatively harmless but studies exposed their association with neuronal and other disorders. Here, we demonstrate that chronic exposure to OP is associated with hyperglycemia and glucose intolerance mediated by OP metabolizing potential of gut microbiota. Interstitial metatranscriptomic and metabolomic analyses revealed that gut microbial degradation of OP produces acetic acid, which induces interstitial and hepatic gluconeogenesis and thus accounts for glucose intolerance. We also identified a similar association of plasma OP residues and fecal acetate level with diabetic status of humans. We demonstrate a high prevalence of diabetes among people directly exposed to organophosphates in rural India (n=3080). Correlation and linear regression analysis reveal a strong association between plasma organophosphate residues and HbA1c but no association with acetylcholine esterase was noticed. Collectively, our results implicate gluconeogenesis as the key mechanism behind organophosphate-induced hyperglycemia, mediated by the organophosphate-degrading potential of gut microbiota. This study reveals the gut microbiome-mediated diabetogenic nature of organophosphates and hence that the usage of these insecticides should be reconsidered.

Biography

Subbiah Ramasamy is an Assistant Professor in the Department of Molecular Biology at Madurai Kamaraj University, India. His research interest is in cardiology, genomic endocrinology, gene regulation, cell signaling and cardio-protective drugs.

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