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Fructose vs. fat: Which is worse?

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Obesity was recently declared a disease by the American Medical Association. One factor that is not well studied but correlates with the obesity epidemic in the U.S. is a 1000% increase in the consumption of soybean oil between 1909 and 1999. Another component of the American diet that has increased substantially in the last four decades is fructose, primarily in the form of high fructose corn syrup. To investigate, side-by-side, the effects of soybean oil and fructose on obesity and diabetes, we designed a series of specialized isocaloric diets to mimic the American diet; the diets are high in saturated fats (HFD, 40% kcal total fat) and supplemented, or not, with soybean oil (SO-HFD) and fructose. C57/BL6 mice on SO-HFD showed increased weight gain, adiposity and diabetes, as well as impaired glucose tolerance and insulin insensitivity compared to HFD. They also had fatty livers with significant ballooning injury and fibrosis and exhibited changes in crypt length in the proximal colon. Though the high fructose diets did not cause as much obesity or diabetes as SO-HFD, they did cause a very fatty liver and rectal prolapse. RNASeq of HFD and SO-HFD livers revealed a massive dysregulation of genes involved in metabolism. Metabolomic analysis shows differential effects with regard to hepatic lipid metabolism in SO-HFD versus HFD mice. These results suggest that in mice, dietary soybean oil in a high fat background causes obesity and diabetes while both soybean oil and fructose contribute to fatty liver and have negative effects on intestinal health.

Biography

Poonamjot Deol obtained PhD in Biomedical Sciences in 2008 from the University of California, Riverside. Before that, she received my MS degree in Food Science at Iowa State University and is currently working as a postdoc in the lab of Dr. Frances Sladek at UC, Riverside. Her research is focused mainly on understanding molecular processes/pathways involved in obesity and metabolism.

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