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Role of dietary risk factors in intestinal cell proliferation-A metabolomics approach in experimental mice

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Abstract

Dietary factors play an imprtant role in gastrointestinal adversities including cancers. We have demonstrated previously that intestinal cell proliferation rate is increased with acidic and high-fat diet. A synergistic effect of obesity was also evident on crypt cell proliferation. We further envisaged modulation of cellular metabolism during these exposures on the intestinal cells. Inbred Swiss albino mice were subjected to dietary regimens with about 10% high acidic diet, about 10% high fat diet and a mixture of both, for 4 months. Animals were sacrificed and gastrointestinal segments were snap-frozen in liquid nitrogen, and homogenized with 4% perchloric acid (PCA). The PCA extracted tissue samples were subjected to proton NMR spectroscopic analyses. Metabolite profiles were collected for all the experimental samples. The data was validated with 2-dimentional NMR spectroscopy for assigning the spectrum including but not limited to: amino acids, both aliphatic and aromatic; components of energy metabolism, nucleoside mono and tri phosphates and creatine; lipid conjugates such as choline, phosphoryl choline; and, several sugars. Our data profile indicated an altered metabolites profile with respect to the intestinal proliferation rate, and indicated pathologic consequences in the mouse tissues exposed to acidic and high-fat diet. We also observed a discrete increase in lipid metabolites profile in the intestinal tissues high-fat diet fed animals, and was correlated with a significant increase in intestinal cell proliferation. Thus, our study warrants investigation with chronic exposure to these diets in mice to simulate human long-term exposure and predisposition to multiple pathological assaults to the gastrointestinal functions.

Biography

D P j Shi h k d f d d Dr. Pooja Shivshankar defended her PhD thesis, on Nutritional factors in the causation of gastrointestinal cancer with a multidisciplinary approach, and was awarded her PhD degree in 2003. Since then, Dr. Shivshankar has been involved in research on Environmental factors on multiple pathologic conditions such as cardio-pulmonary disorders, including infectious diseases. Dr. Shivshankar is currently working as a Research Scientist in University of Texas Health Science Center at San Antonio, Texas, USA. With the broad spectrum of research expertise, Dr. Shivshankar has evolved her scientific interests into diverse subjects relating inflammation and immune dysfunction coinciding with intrinsic and extrinsic triggers.