

Altered nutritional experience in the immediate postnatal life can predispose to development of adult-onset obesity

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Abstract

Altered nutritional experiences in early life (fetal period and infancy) due to developmental plasticity can predispose the individual for the development of metabolic disorders in adulthood. To induce metabolic programming effects in the immediate postnatal period rat pups were reared on a milk formula enriched in carbohydrate calorie (HC formula) until the time of weaning. The HC rat pups developed immediate onset of hyperinsulinemia associated with specific alterations in pancreatic islet structure and beta cell function as well as increased parasympathetic nervous system activity. Additionally, specific alterations in the expression of neuropeptides in the hypothalamus of HC pups contributed to increased insulin secretion by their effect on PNS activity. These changes persisted into the post-weaning period resulting in chronic hyperinsulinemia and hyperphagia predisposing to the development of adult-onset obesity. The changes in the expression of the *Npy* and *Pomc* genes in the hypothalamus are supported by DNA methylation and histone 3 acetylation and methylation patterns of these two genes. Food restriction by pair-feeding normalized body growth rates as well as plasma hormonal levels in pair-fed HC rats in the post-weaning period. However, when pair-fed HC rats were given a choice for *ad libitum* feeding, these rats demonstrated hyperphasia and reestablished HC metabolic phenotype. This result indicated that the programmed predisposition for the hypersecretory capacity of islets and the hyperphagic response in the HC rats could not be permanently erased by moderate food restriction. These findings indicate that increased consumption of carbohydrates in infancy can predispose for development of adult-onset obesity.

Biography

Mulchand Patel received his Ph.D. degree from the University of Illinois, Urbana-Champaign. He is SUNY Distinguished Professor in the Department of Biochemistry, School of Medicine and Biomedical Sciences, University at Buffalo. His research has been supported by grants from the NIH since 1971. He has published over 230 research papers and reviews. He has served as a member of the Editorial Boards of several prestigious journals including the Journal of Biological Chemistry and has served on several NIH Study Sections. He is a member of American Society for Nutrition (since 1971) and American Society for Biochemistry and Molecular Biology (1974).