Endocrinology-2013

OMICS Group Conferences
Accelerating Scientific Discovery

World Congress on
Endocrinology

August 26-28, 2013 Raleigh, North Carolina, USA

Diet, diabetes and Alzheimer's disease

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Abstract

Alzheimer's disease (AD) is the most common cause of senile dementia that progressively robs the victims of their memory, mental faculties and basic activities of independent living. Although specific genetic mutations have been identified that directly cause the disease, these cases are rare. Rather, interplay between genetic, metabolic and environmental factors seems to trigger the onset of pathological changes. In fact, there is increasing evidence supporting a link between cardiometabolic disorders and the development of sporadic forms AD. Metabolic disorders such as type-2 diabetes (T2DM) and atherosclerosis develop mainly due to unhealthy lifestyles including consumption of fatty food and physical inactivity –the major causes also of the obesity epidemic. Although the underlying mechanisms are unclear and tend to be complex, certain common features are emerging including inflammation and insulin resistance leading to pathological metabolic changes in the brain as well as in the peripheral tissues. In fact, AD is now being described as 'type 3' diabetes –a consequence of insulin deficiency and inaction (i.e., resistance). Supporting evidence comes from experimental studies using genetic and diet-induced models of metabolic diseases. We will highlight the findings along with our own studies using such an approach to show high fat/high cholesterol diet-induced AD-like memory impairment correlated with altered brain insulin signaling and increased tau phosphorylation, an indicator of neuronal dysfunction. A related approach uses a non-genetic T2DM paradigm applied to a transgenic mouse model of AD investigating T2DM-AD interaction. The results showing an accelerated amyloid deposition along with increased neuroinflammation and cerebrovascular changes have prompted us to formulate a model of dietary link to dementia wherein cerebrovascular dysfunction plays a central role.

Biography

Dr. Bhat is a Professor in the department of Neurosciences at the Medical University of South Carolina (MUSC), Charleston. He got his Ph.D. in Biochemistry from the Indian Institute of Science, Bangalore and postdoctoral training in neurochemistry/neuroscience at Temple University, Philadelphia and Washington University in St. Louis following which, he moved to University of Kentucky, Lexington to take up a Junior faculty position where he was also associated with the Center on Aging. In 1991, he moved to MUSC as an Associate Professor in the department of Neurology and was then promoted to a Full Professor. Current research focus is on glia-mediated neuroinflammation relevant to mechanisms of neurodegeneration and repair, and the link between metabolic disorders and Alzheimer's disease. He serves(d) on the editorial boards of J. Neurochem (2000-2010), J. Biol Chem (2003-) and J. Alz. Dis (2014-) and on NIH and VA Merit Review Study Sections.