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Sugary insights: A biochemical perspective

Manjeet K Sharma
National Institute for Research in Reproductive Health, India

Diabetes mellitus (DM) is a disease of the peripheral organs while Diabetes Insipidus (DI) is a disease of the brain. Both forms of diabetes are characterized by excess levels of blood sugar or glucose. Whereas the former is due to insulin resistance or insufficiency the latter is due to insufficiency of vasopressin (VP) or hypophyseal anti-diuretic hormone (ADH). But the causes underlying the accumulation of glucose in circulation are different in the two types of diabetes. Diabetes mellitus is of two types. While type-1 diabetes (T1D) is due to autoimmune destruction of insulin-producing cells viz. pancreatic islets of Langerhans (IL), type-2 diabetes (T2D) is a lifestyle disease due to exhaustion of IL to produce insulin. Whereas glucose fuel unavailability in the mitochondria leads to deficit of energy production in the form of ATP, its accumulation in blood leads to complications due to inflammatory damage to blood vessels. Recently, Alzheimer's disease (AD) has been hypothesized to be type-3 diabetes (T3D), caused by insulin resistance in the brain, an organ absolutely dependent upon glucose as fuel for ATP biosynthesis. Whereas AD and DM are characterized by dementia and cognitive decline respectively, their known cellular biomarkers are different namely neuronal amyloid peptide (βAP), Tau, glial TDP-43 for AD and islet amyloid polypeptide (IAPP) for DM. DM also has a genetic component namely *HLA-DQB1, CTLA-4, INS* genes. Biomarkers of AD need to be demonstrated in mouse and human models of DM before dementia of AD can be equated with cognitive decline of DM and therefore of lifestyle and dietary origin and essentially reversible, for it may have additional yet unknown causes.

Biography

Manjeet K Sharma, as a Biochemist specialized in Neurochemistry, ascertained the effects of psychotropic drugs on catecholamines in brains of inbred mouse strains and established that behavior and drug responses have a genetic basis. As Neuroendocrinologist, she established in vitro and in vivo animal models (rodent and primate) and focused studies on feedback regulation of reproductive hormones and regulation of spermatogenesis at a molecular level by hypophyseal and gonadal, protein and steroid sex hormones. She retired as Head of Neuroendocrinology Department, National Institute for Research in Reproductive Health, India.

manjitgill_sharma@rediffmail.com

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