

EDITORIAL

Indian Spices and Insulin Therapy in Diabetes and Neurodegenerative Diseases

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The diabetes epidemic has become a major public concern in the developing and developed world. It is expected that by the year 2035 approx. 592 million people are to be affected with diabetes compared to the 380 million people in 2014 [1, 2]. The urgent action required to stabilize the global diabetes epidemic will prevent the induction of various organ diseases associated with diabetes [3]. The major concern with relevance to diabetes and neurodegenerative diseases is related to neuron treatment to prevent Type 3 diabetes and the induction of NAFLD [4-6]. The role of anti-aging genes in the past 15 years has become of critical interest to the global diabetes epidemic. The regulation of these genes is controlled by the calorie sensitive gene Sirtuin 1 (Sirt 1) that is connected to appetite control with relevance to NAFLD and metabolic disease [7, 8].

The major concern with diabetes and the induction of organ disease is related to hyperphagia. Excessive food intake inactivates the anti-aging genes that is now connected to mitochondrial apoptosis and programmed cell death [7]. Insulin therapy [9] and its use over the many years have reduced many diabetic complications. The initiation and titration of the insulin dose is critical for successful insulin therapy and activation of the anti-aging genes is essential to prevent uncontrolled hyperglycemia and ineffective drug therapy. Major concerns with relevance to accelerated neuron apoptosis and neurodegenerative diseases has led to the introduction of intranasal insulin therapy to allow insulin to efficiently and directly target the brain [10, 11] and delay the progression of Alzheimer's disease. Effective intranasal insulin therapy may assist to activate brain anti-aging genes and appetite control (Figure 1) that is critical to peripheral insulin therapy in Type 2 diabetics.

Indian spices [12, 13] have been used extensively in the developing and developed countries with identification of spices such as saffron, curcumin, pepper family, zingiber and cinnamon. Indian spices have been reported to have health

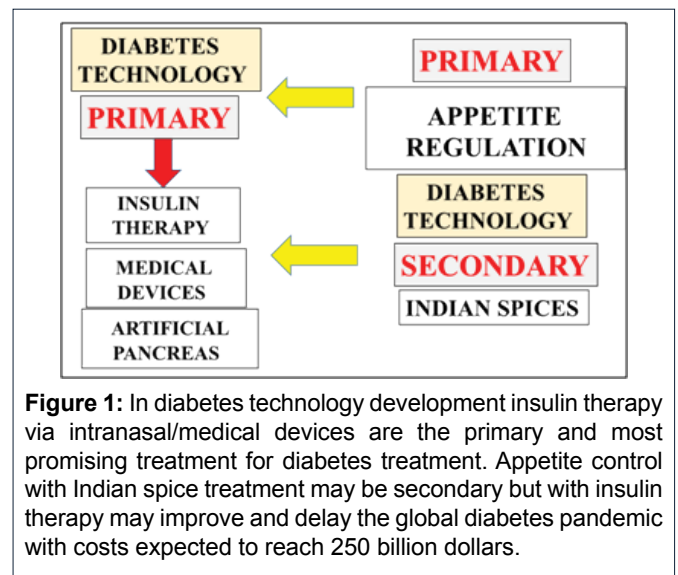


Figure 1: In diabetes technology development insulin therapy via intranasal/medical devices are the primary and most promising treatment for diabetes treatment. Appetite control with Indian spice treatment may be secondary but with insulin therapy may improve and delay the global diabetes pandemic with costs expected to reach 250 billion dollars.

promoting benefits in diabetes and important to the prevention of hyperglycemia with insulin sensitizer effects in the brain [14]. The Indian spice cinnamon has strong hypoglycemic properties and has been reported to act as an insulin mimetic with improvement in insulin activity in the brain [15-17]. The effects of cinnamon on anti-aging genes has been reported with cinnamon now referred to as a Sirt 1 activator [12, 13]. Sirt 1 is a NAD(+) dependent class III histone deacetylase (HDAC) protein that targets transcription factors to adapt gene expression to metabolic activity, insulin resistance and inflammation. Sirt 1 is involved in gluconeogenesis in the liver, cholesterol metabolism, mitochondrial biogenesis, and adipocyte senescence/energy metabolism [3].

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The review of recent literature of curcumin applications in diabetes and various organ diseases implicate its role as an antioxidant with anti-inflammatory properties and important to diabetic therapeutics [18, 19]. Curcumin has antihyperglycemic and insulin sensitizer effects with effects on isolated islets of Langerhans in the pancreas to increase insulin secretion [20]. However in many clinical trials results have been inconclusive because of dose, time of treatment, type of curcumin supplement that can change between the clinical studies [18, 19] and the role of Indian spices may be secondary with relevance to novel diabetes technology (Figure 1). The dose of curcumin should be carefully controlled since increased curcumin doses interfere with the heat shock response [6, 12, 13] that is associated with accelerated neuron apoptosis, Type 3 diabetes and neurodegenerative diseases [21].

Nutritional therapy that reverses NAFLD and cancer [21] is essential to the milestones in diabetes technology development [22]. Medical devices that promote diabetes technology assist with continuous subcutaneous insulin infusion that play an important role in the treatment of diabetes and prevent prolonged hyperglycemia with the delay in the progressive loss of β -cell function. Appetite control [23] is critical to diabetes technology development with effective insulin therapy linked to brain function. In key milestones of diabetes technology development that include the artificial pancreas intranasal Indian spice application may be a promising treatment for diabetes but careful identification of type and dose of various Indian spices are required to allow its promotion in novel diabetes technology development and maintenance of effective insulin therapy in the brain.

Conclusion

Appetite regulation is an urgent action that is required to stabilize the current global diabetes epidemic that is expected to reach a pandemic by the year 2035. Type 3 diabetes requires treatment with the development of intranasal insulin or Indian spice delivery to stabilize neuron apoptosis and neurodegenerative diseases. Anti-aging genes have become important to insulin therapy and diabetes technology with Indian spices such as cinnamon and curcumin involved in anti-aging gene activation and glucose control in global diabetes. Successful insulin therapy in Type 2 and Type 3 diabetes may involve Indian spices but dose, duration of treatment, spice supplement may determine existing insulin therapy and effective novel diabetes technology.

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