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Mini Review

The Pathogenesis and Influencing Factors of Diabetes

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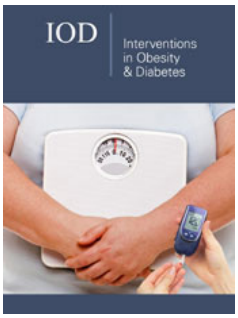

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Abstract

This article reviews the pathogenesis of diabetes and the risk factors that affect diabetes. In addition, the prevention and treatment measures for these related factors are also included.

Keywords: Diabetes; Pathogenesis; Factors; Treatment

Introduction

Diabetes is an endocrine and metabolic disease and has become a pandemic disease that threatens the health of almost all human beings. Diabetes is a metabolic syndrome with glycolipid, protein and amino acid metabolism disorder and the increase of blood sugar caused by absolute or relative deficiency of insulin. Hyperglycemia is the main feature of diabetes and the main cause of various complications [1]. In recent years, the number of patients with diabetes has increased year by year. In the 21st century, diabetes will be one of the most serious public health problems throughout the world, which not only imposes a great burden on society and individuals, but also is accompanied by higher residual rate and mortality [2]. In a word, diabetes has seriously threatened people's life.

Pathogenesis of Diabetes

Islet β-cells destruction is considered to be the major pathogenesis of diabetes. Studies have shown that type 1 diabetes is an autoimmune disease, mostly mediated by T lymphocytes. In type 1 diabetes, islet cells are attacked and destroyed, causing inflammation, leading to absolute deficiency of insulin secretion, requiring endogenous insulin for lifelong treatment. Type 1 diabetes is mainly characterized by permanent destruction of islet β-cells. The etiology has not yet been elucidated, but autoimmune abnormalities are the main pathogenic factors [3]. Type 2 diabetes is a multi-gene hereditary disease caused by the genetic and environmental factors. It is a complex heterogeneous glucose metabolic disease [4]. Recent studies have shown that hydroxy fatty acid esters (FAHFA) play an important role in the pathogenesis of diabetes [5]. In recent years, some scholars have performed in-depth proteomic profiling of peripheral CD4+ T cells in a pediatric cohort to identify cellular signatures associated with the onset of T1DM. They revealed an inflammatory signature in patients with T1DM, and this signature is characterized by circulating mediators of neutrophils, platelets, and the complement system. This signature likely reflects the inflammatory extracellular milieu, which suggests that activation of the innate immune system plays an important role in disease onset [6]. Shuli Man and others found that Litchi Seed Extract (LSE) showed hypoglycemia in Type 2 Diabetic (T2DM) rats, so they used metabolomics strategies to understand the detailed pathogenesis of LSE-interrupted diabetes. They concluded that damage to IRS2/

PI3K/Akt/mTOR insulin signaling in the liver is a major factor in the development of T2DM [7].

Factors Affecting Diabetes

Lifestyle

Lifestyle is an important factor that affects the occurrence of diabetes. Lifestyle is mainly composed of two aspects: lifestyle habits and behavioral patterns [8]. Lifestyle habits mainly include eating habits, work habits and exercise habits, and behavioral patterns mainly include smoking, drinking and sedentary work or lifestyle among other patterns. Sleep and smoking are two important factors in lifestyle. Many studies have found that sleep time and smoking are important factors in increasing the incidence of diabetes [9].

Gender, age

The data released by WHO in the "2016 National Profile of Diabetes" shows that men in Myanmar and Vietnam have lower diabetes than women, and the prevalence of diabetes among women in the United States, Canada, Singapore, Japan, South Korea, India and other countries is lower than that of men [2]. Studies have shown that age is also a risk factor for diabetes, and the prevalence of diabetes is increasing with age. According to IDF statistics, the age of diabetes is concentrated between 40 and 59 years old [10].

Obesity

Obesity refers to excessive accumulation and distribution of fat in the body, which is the result of genetic and environmental factors. Insulin is the most important hypoglycemic hormone in the human body. Although the insulin secretion function of early obese people is still normal, adipose tissue will produce insulin resistance or be attacked by the immune system to lead to insulin resistance during obesity [11]. Due to insulin resistance, the efficiency of insulin action is reduced. In order to overcome insulin resistance, the pancreas will synthesize a large amount of insulin, which causes the blood insulin level of obese people to be much higher than that of ordinary people. This is called "hyperinsulinemia" [12]. In the early stage of obesity, hyperglycemia can be used to maintain blood glucose in the normal range. Subsequently, due to the excessive work of the pancreas, the synthesis of insulin function is gradually depleted, and insulin production is gradually insufficient to lower the blood sugar to the normal range, so diabetes appears [13]. Therefore, obesity is easy to cause diabetes.

Protective Measures

With too little or too long sleep time, it may lead to glucose intolerance, insulin and some endocrine dysfunction, which eventually leads to type 2 diabetes, so we must maintain a reasonable sleep time. According to data analysis, it is found that the risk of diabetes is lowest at 7-8h sleep time [14]. In daily life, people should also minimize the number of cigarettes and alcohol to reduce the risk of diabetes. In recent years, Wang Jing and others analyzed the hypoglycemic effect of liraglutide (a newly synthesized peptide 1 analogue) on obesity and normal constitution type 2 diabetes patients. It is concluded that liraglutide is more effective in treating obese type 2 diabetes patients, which can effectively control blood sugar and reduce body mass, which is worthy of clinical promotion [15]. Studies have shown that the newly discovered peptide hormone Spexin has many important effects such as inhibition of feeding behavior, promotion of energy metabolism, regulation of blood glucose homeostasis, etc., and hence is closely related to obesity, Type 2 Diabetes (T2DM), and insulin resistance [16]. With continuous research, the potential value and clinical application prospects of Spexin will continue to be reflected, which may be an effective method for the treatment of obesity and T2DM.

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