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Review Article

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Current advances in Diabetes Type 1 and type 2 treatment: an overview

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Abstract
Diabetes is undoubtedly one of the diseases that cause disastrous of human health and wellbeing, and unfortunately which is in constant increasing worldwide. Especially, when the connection with the current lifestyle and the interdependence with other varied health problems (obesity, arterial tension...etc.). Classical treatment methods unfortunately allow the treatment of symptoms and the alleviation of the disease state. The search for new alternatives is a promising strategy to reduce the cost of Diabetes cure and ameliorate the life of millions suffering people worldwide.

Keywords: Diabetes, Treatment Advances, Advantages, Therapy, Insulin, Microbiome

Introduction
Diabetes is a metabolic illness correlated with impaired metabolism of proteins, fats and carbohydrates. However, most authors believe that diabetes is primarily a violation of carbohydrate metabolism (glucose). Glucose is the main source of energy, since the brain and blood cells use only glucose as an energy source, and only glucose can supply ATP energy under anaerobic conditions [1]. This disease has emerged as an epidemic, affecting over 422 million of the human population in the world to endure treatment. Science is trying to discover a diabetes therapy that may cure this chronic illness [2]. Notably, Type 1 diabetes is an autoimmune disease that alters the production of insulin by beta-pancreatic cells. Whereas, patients with type 2 diabetes evolve insulin struggle, signifying that it has less and less effect on decreasing blood sugar [3, 4].

On the other hand, people with diabetes acquiring surgical measures are more likely to require convoluted experience and hospitalization perioperative aggravations. Up to half of people with diabetes are undiagnosed [5]. Moreover, Diabetes can cause heart disease, stroke, kidney disease, blindness, and nerve damage [6]. Despite its huge consequence, there is still no remedy for any kind of diabetes. Most therapy aid patients regulate the symptoms to a certain degree, although diabetics still face various durable health difficulties [2]. In this context, this review deals mainly with current methods and scientific advances in the field of Diabetes treatment.

Classical Diabetes treatment
Insulin is the mainstay of treatment for subjects with type 1 diabetes. It is furthermore crucial treatment for type 2 diabetes since blood glucose heights cannot be restrained by weight, diet, exercise, loss and oral medications [7, 8]. Furthermore, other molecules like metformin, which is the basic oral medication for type 2 diabetes. Withholding metformin for two days preoperatively was formerly approved to decrease the possibility of lactic acidosis, however, it actually occurs this endanger was extremely overestimated [9]. Also, sulfonylureas have been in the clinical use considering the early 1950s and still second-line treatment for type 2 diabetes in several guidelines [5].

Advances in Diabetes therapy
The clinical proceeding incriminations of novel insulin formulations, and recent systems for insulin consignment, are not clear. The optimal perioperative management of these will vary according to local institutional considerations like existing clinical practices and staff skills. Elaborated hospital care consignment standards, quality assurance, consistency in clinical practice, process improvements and integrated multidisciplinary teamwork could be a main focus for ameliorating outcomes of perioperative subjects with diabetes [10].

Technological modernizations play a considerable function in diabetes management. For example, approaches in continuous glucose monitoring (CGM) nowadays permit systems to register glucose readings over the day and reveal trends in glucose amounts. In addition, recent features enable greater glycemic management and avoid complication of hyperglycemic and hypoglycemic episodes [11]. Figure 1 presents current advances in Diabetes treatment methods.

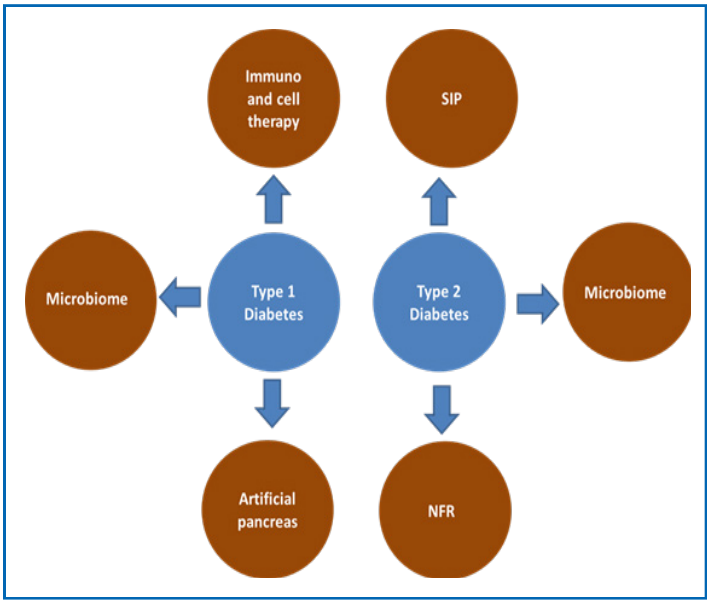

Figure 1: Current advances in Diabetes treatment methods (SIP: Stimulating insulin production; NFR: Needle-free revolution)

Type 1 diabetes

Cell therapy

This cell-based therapy aimed to produce functional insulin-secreting β-cells to cure diabetes on forever basis. The intrinsic regenerative potential along with immunomodulatory abilities of stem cells (SCs) highlights the therapeutic potential of SC-based strategies [12]. Moreover, replacing the production of insulin by beta-cells have been lost in subject with type 1 diabetes is a promising procedure to restore regulation of glucose levels. Despite, considering the autoimmune illness is a consecutive process, substituting beta-cells consequences in alternative immune offensive if immunosorbent drugs are not utilized, which carry considerable side-impacts [13]. Furthermore, islet implantation has set the field for diabetes cell therapy and is remains undergoing different improvements that could develop clinical outcomes. Other origins for β-cell substitution procedures are actually led by human multi effective cellular stem that reveal near-normal β-cell attributes after in vitro differentiation and which might converse diabetes in mice [14].

Immunotherapy

Since Type 1 diabetes is an autoimmune illness that manifests in genetically susceptible individuals. Regulatory T cells (T regs) have been exhibited to be inoperative in the autoimmune pathology disorder regulation. Thus, attempts to replace or repair T reefs' in T1D can reverse autoimmunity [15]. Effectively, potent induction immunotherapy promotes long-term insulin independence after islet transplantation in type 1 diabetes [16]. Several broad-based antigen-specific immunoregulatory and immunosuppressive therapies have been and are presently being assessed for their benefit in the treatment and prevention of T1D [17]. Also, new immunotherapeutic approaches based on tolerogenic dendritic cells, T regulatory cells and mesenchymal stem cells (MSCs) have been tested in clinical essays, endeavoring to directly modulate the autoimmune destruction process in pancreas [18].

Artificial pancreas

The widespread clinical utilization of continuous insulin pumps and glucose sensors has allowed a steady advance for the creation of artificial pancreas [19]. Furthermore, designed as closed-loop technique in the bibliography, this is an emerging alternative therapy based on utilizing an algorithm that gets into account the constant glucose monitoring to evaluate the great proper insulin infusion level needed [20]. Notably, to develop a fully automated manufacturing pancreas, it is crucial to be capable to evaluate blood glucose in a stable and accurate method. Modern strategies of continuous monitoring glucose are related to the activity of an enzyme which could wear-out over time, meaning the capacity for inaccurate need and readings for permanent calibration or replacement [21].

Type 2 diabetes

Stimulating insulin production

The first antidiabetic treatment (exenatide; Byetta) based on the incretin hormone glucagon-like peptide-1 (GLP-1) was approved in 2005 as a complementary treatment in diabetic subjects in whom sulfonylurea, metformin or both had failed. Many GLP-1 mimetics or dipeptidyl peptidase IV inhibitors are currently in clinical improvement for the therapy of type 2 diabetes and show promising results in the improvement of glucose homeostasis [22]. Additionally, recent research shows that vitamins like vitamin D, Vitamin K deficiency may have negative effects on glucose intolerance, insulin secretion and T2DM [23].

Furthermore, flavonoids are polyphenolic substances that are abundant in vegetables and fruits, and expanding evidence determines a positive rapport between ingestion of flavonoid-rich aliments and illness prophylaxis. It is promising that the useful impacts of a number of flavonoids are at physiological amounts and assimilable to clinically-utilized anti-diabetic drugs; despite, clinical exploration in this discipline and researches on the anti-diabetic impacts of flavonoid molecules are restrained [24].

Microbiome

The gut microbiota is a group of over 38 trillion bacterial cells in the human microbiota that plays a crucial function in the controlling of human metabolism through its symbiotic relationship with the host [25]. In current years, several researchers have associated gut microbiome with improvement of highly widespread illnesses like type 2 diabetes [26-28]. Especially, gut microbiome is regarded as another essential modulator of type 1 Diabetes susceptibility in recent years, illustrated by a very quickly growing number of studies reported [29]. There are many processes that relate microbiota to the onset of insulin resistance and diabetes, endotoxemia, regrouping modifications in bowel permeability, interchange with bile acids, impacts associated with the utilization of drugs such as metformin and variations in the rate of brown adipose tissue [30].

Needle-free revolution

Needle free injection techniques are a new method to introduce a range of medicines in subjects without piercing the skin with a conventional needle. These techniques are operated by the system in which liquid cure compelled at a raised speed over a small orifice that is held to the skin. They are designed to solve the complications created due to traditional needles designing them more suitable, less expensive and safer [31]. This technology was first described in the 19th century in France, when the French company-H Galantemanufactured an 'apparatus for aquapuncture'. Since then, the demand had increased considerably [32]. It was first commercialized in the US in 1960s. Actually, the global needles-free diabetes care market is expected to benefit from this non-invasive method and gain 7.5% CAGR during the forecast period 2017-2023 [33]. For instance, current progresses have fundamentally changed controlling implements to oral anti-diabetes drugs and long-acting injectable. Novel insulin-like Glargi-ne U-300 with a more constant rate and slower absorption, inhalation of insulin, smart and oral insulin patches are a number of the front runners in therapy [34]. Table 1 shows current methods of Diabetes treatments.

Table 1: Current methods of Diabetes treatments

Diabetes type	Methods	Advantages and beneficial impacts
D1T	Cell therapy	Replace B-cell dysfunction, reduce or avoid sticking insulin injection
	Immunotherapy	Reduce insulin injections; re-educate T cells to protect insulin-producing cells.
	Artificial pancreas	Reduce the risk of severe hypoglycemia; all the markers of diabetes can be improved.
D2T	SIP	Reduce or avoid sticking insulin injection
	Microbiome	Modulation of the immune system; restoration of intestinal flora; reduces blood glucose and improve insulin sensitivity
	NFR	Reduce patient discomfort; more careful self-monitoring

D1T: Diabetes 1 type; D2T: Diabetes 2 type; SIP: Stimulating Insulin Production; NFS: Needle-Free Revolution.

Conclusion

Several recent methods are being developed and promoted in the treatment of diabetes. These methods vary from those based on the use of advanced technology, metabolic functioning, immunology and medicine. But these methods need to be improved in order to allow therapeutic effectiveness, ease and above all a low cost of treatment. In order to ensure the treatment of a wide range of world population, which is constantly suffering from diabetes due to risk factors difficult to eradicate at the time our way of life in the 20th century.

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