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A new method of treating type 1 diabetes — a closed-loop system

To the Editor

Type 1 diabetes is an autoimmune disease resulting from the destruction of insulin-producing beta cells of the pancreas by autoantibodies. The disease is chronic and requires constant insulin therapy to maintain normoglycaemia. The treatment of people with type 1 diabetes is based on various methods of insulin therapy. The first method is injection therapy, which involves injecting long-acting basal insulin and appropriate doses of fast-acting insulin before meals. The second method is continuous subcutaneous insulin infusion using an insulin pump [1]. The incidence of type 1 diabetes increases every year by an average of 3–4% worldwide and is an increasing health problem [2]. People with type 1 diabetes must make many decisions regarding insulin dosage to maintain blood glucose levels within the appropriate range. Glycaemia is influenced by numerous factors, which make it even more difficult to select the proper dose of insulin [3]. Statistically, only about one-third of people with type 1 diabetes achieve the recommended range for their blood glucose levels [4]. This is an important issue considering the presence of possible complications of type 1 diabetes. These include episodes of hypoglycaemia, which adversely affect cognitive functions and are a direct threat to life. Hyperglycaemia is a major risk factor for the development of microvascular complications, such as retinopathy, neuropathy, and nephropathy, as well as macrovascular complications, including atherosclerosis and thrombosis [5]. Studies have shown that by using a closed-loop system, it is possible to relieve a person with type 1 diabetes from making so many decisions regarding insulin supply, and at the same time achieve an improvement in glycaemia compared to people who do not use the closed-loop system [6]. The closed-loop system consists of three elements: an insulin pump, a continuous glucose monitoring (CGM) system and an appropriate computer algorithm. The insulin pump is responsible for the continuous delivery of insulin, and the CGM system allows real-time glucose measurement. The algorithm is responsible for calculating appropriate insulin doses based on the CGM system readings. Currently, hybrid systems that require user input during meals dominate in use [7]. The latest closed-loop systems can predict both hypoglycaemia and hyperglycaemia and prevent them by changing the insulin dose. They improve the quality of life of people with type 1 diabetes, who make about 180 decisions related to the disease every day [8]. A multicentre, randomized clinical trial of 172 children and adolescents with type 1 diabetes showed an improvement in the time-in-range (TIR) glucose control rate from 53.1% (13.0%) at baseline to 62.5% (12.0%) at the end of the study [9]. The closed-loop system is the future of type 1 diabetes treatment, therefore efforts should be made to popularize this method of treatment, as it provides better therapeutic effects than previously used methods and significantly reduces the risk of disease complications (Fig. 1).
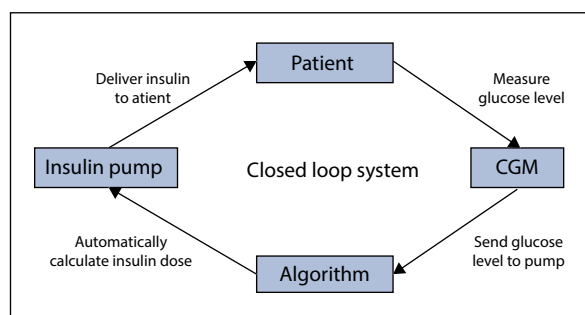

Figure 1. Closed-loop system

Article information

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