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INTERNATIONAL SCIENTIFIC UNITY

XXXIII INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE «State of Scientific Research: Methods and Prospects for Development Across Different Fields»

August 7-9, 2024
Graz, Austria

ISBN 978-617-8427-44-3

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Collection of abstracts

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UDC 01.1

XXXIII International scientific and practical conference «State of Scientific Research: Methods and Prospects for Development Across Different Fields» (August 7-9, 2024) Graz, Austria. International Scientific Unity, 2024. 115 p.

ISBN 978-617-8427-44-3

The collection of abstracts presents the materials of the participants of the International scientific and practical conference «State of Scientific Research: Methods and Prospects for Development Across Different Fields».

The conference is included in the Academic Research Index ReserchBib International catalog of scientific conferences.

The materials of the collection are presented in the author's edition and printed in the original language. The authors of the published materials bear full responsibility for the authenticity of the given facts, proper names, geographical names, quotations, economic and statistical data, industry terminology, and other information.

ISBN 978-617-8427-44-3

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4. Наказ Міністерства охорони здоров‘я України від 03 серпня 2021 №1614. Затверджено в Міністерстві юстиції України 11 жовтня 2021 №1324/36946 «Про організацію профілактики інфекцій та інфекційного контролю в закладах охорони здоров‘я та установах соціального нахисту населення»

NEW INSIGHTS IN THE TREATMENT OF DIABETES MELLITUS TYPE 2

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Introduction. Diabetes Mellitus Type 2 (T2DM) is a chronic metabolic disorder characterized by insulin resistance and impaired insulin secretion. It has reached epidemic proportions globally, affecting millions of individuals and posing significant health risks, including cardiovascular disease, neuropathy, retinopathy, and nephropathy. The traditional management of T2DM has involved lifestyle modifications, oral hypoglycemic agents, and insulin therapy. However, recent advances have introduced new therapeutic strategies that promise improved glycemic control and reduced complications. This article reviews the latest methods for the treatment of T2DM, focusing on novel pharmacological agents, surgical interventions, and technological innovations.

Novel Pharmacological Agents.

GLP-1 Receptor Agonists. Glucagon-like peptide-1 (GLP-1) receptor agonists have emerged as a cornerstone in the management of T2DM. These agents mimic the incretin hormone GLP-1, enhancing insulin secretion, suppressing glucagon release, slowing gastric emptying, and promoting satiety. Semaglutide, a once-weekly GLP-1 receptor agonist, has shown significant efficacy in reducing HbA1c levels and

promoting weight loss. Studies indicate that semaglutide is associated with greater body weight loss and waist circumference reduction than other drugs. Additionally, it has cardiovascular benefits, reducing the risk of major adverse cardiovascular events (MACE) in T2DM patients with high cardiovascular risk [1, 2].

SGLT2 Inhibitors. Sodium-glucose co-transporter-2 (SGLT2) inhibitors, such as empagliflozin and dapagliflozin, represent another innovative class of antidiabetic drugs. These agents work by inhibiting glucose reabsorption in the kidneys, leading to increased urinary glucose excretion. SGLT2 inhibitors not only improve glycemic control but also offer cardioprotective and renoprotective effects. Clinical trials have demonstrated a reduction in hospitalization for heart failure and progression of kidney disease among patients treated with these drugs [3].

Dual GIP and GLP-1 Receptor Agonists. The development of dual glucose-dependent insulinotropic polypeptide (GIP) and GLP-1 receptor agonists marks a significant advancement. Tirzepatide, the first-in-class dual GIP and GLP-1 receptor agonist, has shown superior efficacy in glycemic control and weight reduction compared to existing GLP-1 receptor agonists. In clinical trials, tirzepatide significantly reduced HbA1c and body weight, demonstrating potential as a powerful therapeutic option for T2DM.

Surgical Interventions.

Bariatric Surgery. Bariatric surgery, primarily aimed at weight loss, has profound effects on glycemic control and can induce remission of T2DM. Procedures such as Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy alter the gastrointestinal anatomy, leading to hormonal changes that enhance insulin sensitivity and secretion. Long-term studies have shown that bariatric surgery results in sustained weight loss, significant reductions in HbA1c, and decreased need for antidiabetic medications [4, 5].

Metabolic Surgery. Metabolic surgery extends beyond traditional bariatric surgery, targeting specific pathways to improve metabolic outcomes. Duodenal-jejunal bypass liner (DJBL) and ileal interposition are emerging procedures that modify the nutrient flow and stimulate the release of incretin hormones. These interventions have shown promising results in improving glycemic control and reducing insulin resistance in T2DM patients.

Technological Innovations.

Continuous Glucose Monitoring (CGM). Continuous glucose monitoring (CGM) systems have revolutionized diabetes management by providing real-time glucose readings. These devices help patients and healthcare providers make informed decisions about diet, exercise, and medication adjustments. Studies have shown that CGM use leads to improved glycemic control, reduced HbA1c levels, and decreased hypoglycemia incidence.

Artificial Pancreas.

The artificial pancreas, also known as closed-loop insulin delivery systems, represents a significant leap forward in diabetes technology. These systems combine a CGM with an insulin pump, using advanced algorithms to automatically adjust insulin delivery based on real-time glucose readings. Clinical trials have demonstrated that

artificial pancreas systems improve glycemic control, reduce HbA1c, and minimize hypoglycemic events compared to standard insulin therapy.

Gene and Cell-Based Therapies.

Gene Therapy for T2DM aims to modify or correct genetic defects that contribute to insulin resistance and beta-cell dysfunction. Researchers are exploring various approaches, including the delivery of insulin gene constructs and the use of gene editing technologies like CRISPR/Cas9 to enhance insulin production and sensitivity. Although still in experimental stages, gene therapy holds promise for a long-term cure for T2DM.

Stem Cell Therapy involves the transplantation of stem cells that can differentiate into insulin-producing beta cells. This approach aims to restore the functional beta-cell mass in T2DM patients. Recent advancements in stem cell biology and regenerative medicine have led to the development of protocols for generating functional beta cells from pluripotent stem cells. Early clinical trials have shown potential benefits, with patients exhibiting improved glycemic control and reduced insulin requirements.

Lifestyle and Behavioral Interventions.

Digital Health Platforms and mobile health applications provide innovative ways to manage T2DM through personalized interventions. These platforms offer features such as telemedicine consultations, remote monitoring, and personalized feedback on diet and exercise. Studies have demonstrated that digital health interventions can improve glycemic control, enhance patient engagement, and promote sustainable lifestyle changes.

Cognitive Behavioral Therapy (CBT) has been shown to be effective in managing the psychological aspects of T2DM. CBT helps patients address behaviors and thought patterns that contribute to poor glycemic control, such as stress eating and medication non-adherence. Integrating CBT with standard diabetes care can lead to improved mental health, better glycemic control, and enhanced overall quality of life.

Conclusion. The treatment landscape for Type 2 Diabetes Mellitus is rapidly evolving, with new pharmacological agents, surgical techniques, technological innovations, and behavioral interventions offering improved outcomes for patients. GLP-1 receptor agonists, SGLT2 inhibitors, and dual GIP and GLP-1 receptor agonists are at the forefront of pharmacotherapy, providing significant glycemic control and cardiovascular benefits. Surgical interventions, particularly bariatric and metabolic surgeries, offer durable solutions for severe cases. Technological advancements, including continuous glucose monitoring and artificial pancreas systems, are transforming diabetes management by enhancing real-time monitoring and insulin delivery. Emerging gene and cell-based therapies hold the potential for long-term cures, while digital health platforms and cognitive behavioral therapy offer holistic approaches to lifestyle management. As research continues to advance, these novel treatments promise to improve the quality of life and health outcomes for individuals with T2DM.

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ОБМІН ВІТАМІНУ D У ДІТЕЙ ІЗ ДЕФІЦИТОМ ГОРМОНУ РОСТУ

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Вступ. На сучасному етапі все більша уваги приділяється впливу вітаміну D (віт. D) на організм людини та наслідкам його дефіциту. [1]. Поширеність цього дефіцитного стану в усьому світі сильно варіює залежно від країни і в деяких випадках охоплює 98% населення [2].

Припускають тісний взаємозв'язок між віт. D і віссю ГР/ІПЧР-1 та можливий вплив віт. D на зріст дитини, однак точний механізм їхньої взаємодії доки що не з'ясований [3].

Мета роботи – вивчення статусу вітаміну D у дітей із дефіцитом гормону росту.

Матеріал і методи. Осбтежено 36 дітей, із дефіцитом гормону росту, та які перебували на лікуванні в ДУ «Інститут ендокринології та обміну речовин ім. В.П. Комісаренка НАМН України».

Середній вік обстежених дітей (28 хлопчиків, 8 дівчаток), становив 11,33±3,04 років. Середнє відставання у зрості становило мінус 2,37 (±0,77) SDS.

На момент обстеження всі пацієнти знаходились в стані еутиреозу. У дослідження були включені діти, які не отримували препарати кальцію та віт. D упродовж ≥ 6 місяців. Була отримана інформована згода учасників та їх батьків (опікунів).

Статистичну обробку результатів дослідження виконували із використанням статистичних програм Microsoft Excel.

Результати дослідження. При вивченні показників росту дітей із недостатністю ГР встановлено, що показник Ht-SDS (показник стандартного відхилення зросту залежно від хронологічного віку) не мав статевих