12. INTERPLAY OF GLUCOSE METABOLISM AND ITS INFLUENCE ON MYOPIA DEVELOPMENT

Author: Dacu Nicoleta

Scientific advisor: Pavlovschi Ecaterina, Assistant Professor, Department of Biochemistry and Clinical Biochemistry, *Nicolae Testemitanu* State University of Medicine and Pharmacy, Chisinau, Republic of Moldova

Introduction. Available data suggests that by the year 2050, approximately half of the global population will experience nearsightedness, marking myopia as a genuine worldwide epidemic. To this day, the impact of nutrition on the progression of myopia has been lacking attention, but new researches are done in order to strengthen the idea, that high glycemic load carbohydrate diets, resulting in hyperglycemia and hyperinsulinemia, may potentially disrupt the proper development of the sclera and choroid, thus inducing lasting alterations in the progression of myopia during the critical period of childhood growth.

Aim of study. Elucidating the correlation between glucose metabolism, and its role in shaping the progression of myopia.

Methods and materials. The analysis encompassed 15 studies conducted between 2013 and 2023, exploring the correlation between Western dietary patterns, characterized by increased intake of high glycemic load foods, and the risk of developing myopia in various countries.

Results. Countries such as the United States, Australia, Sweden, Hungary, Switzerland, Iceland, France, Austria, Germany, Denmark, the Czech Republic, the Netherlands, Spain, Belgium, Finland, and New Zealand, collectively classified as the "Western diet countries", have been noted to experience enhancing incidences of hyperglycemia, insulin resistance (IR), hyperinsulinemia, and type 2 diabetes (DM). These diseases are a cause of glucose metabolism malfunction, typically arising from the dysregulation of two crucial hormones in glucose homoeostasis – insulin and glucagon. In type 2 DM, insulin secretion is defective and delayed, coupled with resistance to its action. This affects the removal of glucose from the bloodstream to cell membranes and hinders the glucose uptake in the liver. Proper insulin secretion is also of major importance due to the fact that it exerts control over glycolysis and gluconeogenesis, stimulating the former and reciprocally inhibiting the latter, by catalyzing the expression of phosphofructokinase, pyruvate kinase, and fructose 2,6-bisphosphate. Hyperglycaemia itself inducers IR and beta-cell dysfunction, leading to glucotoxicity. Furthermore, the studies confirmed that myopia is more prevalent in diabetic patients compared to non-diabetic individuals, with ongoing debates among researchers regarding the influence of the resulting hyperinsulinemia from high glycaemic load carbohydrate diets on different growth factors resulting subsequently in scleral growth.

Conclusion. Even though the fundamental mechanism of refractive changes remains unclear, studies do indicate a connection between compromised glucose metabolic control resulting from the adoption of a Westernized lifestyle and the onset of myopia. These findings also serve as evidence that, in addition to genetic factors, myopia development can be mitigated in individuals through proper nutritional education and food choices.