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Selenium and iodine in diabetes mellitus with a focus on the interplay and speciation of the elements

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Abstract

Diabetes mellitus is a chronic metabolic disease caused by insulin deficiency (type I) or dysfunction (type II). Diabetes is a threatening public health concern. It is considered as one of the priority non-communicable diseases, due to its high and increasing incidence, the associated healthcare costs, and threatening medical complications. Two trace elements selenium (Se) and iodine (I) were intensively discussed in the context of diabetic pathology and, possibly, etiology. It seems there is a multilayer involvement of these essential nutrients in glucose tolerance, energy metabolism, insulin signaling and resistance, which are mainly related to the antioxidant selenoenzymes and the thyroid hormones. Other factors might be related to (auto)immunity, protection against endoplasmic reticulum stress, and leptin signaling. The aim of the current review is to evaluate the current understanding of the role of selenium and iodine in diabetes with a focus on the biochemical interplay between the elements, their possible role as biomarkers, and their chemical speciation. Possible impacts from novel analytical techniques related to trace element speciation and isotopic analysis are outlined.

Keywords: Diabetes mellitus; Iodine; Selenium; Speciation analysis; Thyroid; Trace element interaction.

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