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Editorial

Drug Potential of Dietary Compounds in Treatment of Type 2 Diabetes and Cancer

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Abbreviations

PTP: Protein Tyrosine Phosphatase

Protein tyrosine phosphatases are potential therapeutic targets due to their involvement in numerous disease processes, such as type 2 diabetes and obesity (PTP1B) or cancer development (PTP1B and SHP2) [1]. PTP1B protein tyrosine phosphatase due to regulation of insulin signaling pathways has become a therapeutic target in the treatment of type 2 diabetes, and its role also in the formation and development of tumors has been already documented [2]. Due to the key contribution of protein tyrosine phosphatases in cancer biology, they may be promising targets for the development of new anticancer diagnostic and therapeutic strategies [3].

PTP1B through participation in the regulation of insulin signaling is related with the development of type 2 diabetes and obesity, which in turn predisposes to the development of cancer [4,5]. The predisposition of type 2 diabetes, as well as obesity to the induction of tumors is associated primarily with insulin resistance resulting from obesity, or futher with hyperinsulinemia as a consequence of insulin resistance [6,7].

The implications of protein tyrosine phosphatases in the tumor formation and development of cancer were presented during the implementation of a number of scientific research. They have been shown to be involved in development of glioblastomas, colon, lung, breast, stomach and multiple myeloma cancers. Phosphatases PTP1B and SHP2 play especially important role in the breast cancer pathophysiology. Overexpression and mutation of these phosphatases were observed in breast cancer cells. Phosphatase PTP1B dephosphorylates tyrosine kinases essential for the induction of breast cancer, such as HER1/EGFR, Src, JAK and STAT and initiates tumor formation [8,9].

There are recent studies indicating that selected natural dietary compounds can possess potential antidiabetic and anticancer properties due to they are able to reduce protein tyrosine phosphatases activity.

Curcumin is a natural phenol present in *Curcuma longa*, a member of the ginger family, *Zingiberaceae.* Recent research indicates that the curcumin derivative alleviates the glucose intolerance caused by obesity, giving rise to further studies on the use of curcumin molecule in the design of the antidiabetic agent. In addition, it was found that curcumin may have PTP1B phosphatase inhibitory properties [10,11].

Cinnamaldehyde is a flavonoid that naturally occurs in the bark of cinnamon trees and other species of the genus *Cinnamomum*. The half of the essential oil of cinnamon bark is cinnamaldehyde. Studies carried out so far show a beneficial role of cinnamaldehyde in the treatment of diabetes mellitus and its complications, as well as allow to suggest that cinnamaldehyde can regulate PTP1B phosphatase activity [12].

Chicoric acid is a natural phenolic compound and one of the numerous active ingredients (alkamides, polysaccharides, and glycoproteins) associated with human health benefits from *Echinacea purpurea* in dietary supplements. Chicoric acid possesses a large spectrum of biological properties and has been showed to inhibit protein tyrosine phosphatase PTP1B through potent binding at the allosteric site [13].

Conclusion

The key contribution of protein tyrosine phosphatases in cancer biology indicated that they can be promising targets for the development of new antidiabetic and anticancer strategies. Due to the inhibitory properties of curcumin, cinnamaldehyde or chicoric acid molecules against protein tyrosine phosphatases implicated in diabetes and cancer development, they can be utilized to design of potential antidiabetic and anticancer therapies.

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