

The aim of the project is to determine the effect of polyphenolic compounds and plant foods, which are their sources, on thyroid peroxidase (TPO) activity - a key enzyme that determines the synthesis of thyroid hormones. Changes in TPO activity are noticed in thyroid dysfunctions (both hyperthyroidism and hypothyroidism). Scientific and epidemiological research indicates the connection of thyroid dysfunction with the modern lifestyle, which allows to include them in the so-called civilization diseases.

More importantly, other pathological conditions such as chronic inflammation, metabolic syndrome or mood disorders that often lead to depression coexist with thyroid disorders. For this reason, the main goal of the proposed research is to select phenolic compounds with multidirectional biological activity and edible plants which are their natural source. Additionally, the selected compounds (and edible plants containing them) will have the ability to inhibit the pro-inflammatory and prooxidative enzymes (lipoxygenase (LOX), cyclooxygenase (COX) and xanthine oxidase (XO)). What is more, they will be able to inhibit enzymes associated with metabolic syndrome (α -amylase, α -glucosidase, angiotensin-converting enzyme - ACE, lipase) and monoamine oxidase (MAO) involved in development of depression. Due to the fact that chronic inflammation is a key factor in the pathogenesis of tumors, the anti-cancer potential of selected phenolic compounds and their natural sources will be determined. An important part of the project will be the study of antioxidant potential because the oxidative stress is a risk factor for all these pathological states. Multidirectional pro-health effects of phenolic compounds are widely documented, however, in the case of such a complex system as food, the interaction of biologically active ingredients plays a key role. Therefore the type and strength of interaction will be investigated allowing to determine their impact on the biological activity of the tested components. The final effect is also determined by the bioavailability of biologically active substances. Conclusions about it will be based on the results obtained using the human gastrointestinal tract model.

The innovation of this project consists in a comprehensive approach to the simultaneous (coordinated) impact of phytochemical components on the activity of TPO, LOX, COX, XO, α -amylase, α -glucosidase, ACE, lipase and MAO. The role of diet in thyroid dysfunction and its impact on the effectiveness of pharmacotherapy, according to doctors, is undeniable, but paradoxically, dietary recommendations of nutritionist are often imprecise and sometimes contradictory.

The research planned in the project will allow to select pure phenolic compounds and their natural sources that will modulate the TPO activity in a targeted manner, and also inhibit the enzymes associated with the coexisting pathological conditions.

The undertaken research will be able to fill an important gap in current knowledge, all the more that many publications dedicated to people with thyroid dysfunctions contain inconsistent information. Many authors suggest eating foods that are discouraged by others. Obtained results will be a valuable hint for nutritionist and patients while choosing the right diet dedicated to people struggling with thyroid disorders. In the future as a result of the planned research it will be able to create a database on food of plant origin supporting thyroid dysfunction therapy.