

Peptydowe aktywatory TGF- β - pochodne trobmospondyny-1 do zastosowań w kosmeceutyce
New Thrombospondin-1-deriving Peptides as TGF- β Activators of Cosmeceutical Interest

In recent years, the outward appearance, healthy and strong body or wellbeing have become the object of interest not only to advertisers and cosmetics producers, but to scientists as well. Research on new compounds possessing the ability to improve the condition of the skin, is no longer adequate only for drugs, but also for cosmeceuticals – cosmetic products with scientifically proven and thoroughly tested biological activity, and therefore with higher efficiency and quality compared to traditional cosmetics available in drugstores.

Collagen makes up about 30 percent of all proteins in the human body and is the main component of the extracellular matrix. As fibrillar support of tissues, the collagen is also responsible for the elasticity and firmness of the skin. It plays a key role in the human body and has a significant impact on both physiological and pathological conditions. The process of collagen biosynthesis and degradation is extremely complex, and its proper turnover ensures adequate homeostasis of this protein, thus preventing various diseases such as pulmonary and heart fibrosis, as well as abnormal wound healing and premature skin aging. One of the important stimuli is the so-called Transforming Growth Factor- β (TGF- β). In addition to the collagen biosynthesis stimulation in epidermal fibroblast cells, it also prevents its subsequent breakdown by the upregulated secretion of proteolytic enzymes, such as metalloproteases. In human tissues, TGF- β is present in an inactive form and requires conversion to the active form, mainly involving the thrombospondin 1 (TSP-1).

The aim of this project is to find a new peptide sequence that has the ability to activate TGF- β and acts as a TSP-1 agonist. An additional aspect is the possible modification of the designed structures in order to improve skin permeability, increase *in vivo* stability and overall resistance to enzymatic degradation. The project will be implemented in cooperation with the University of Florence (Italy), where the synthetic part and bioassays will be carried out. The design of peptide molecules, along with subsequent conformational studies, will take place at the Wrocław University of Technology (Poland).

The expected results of the project include the design and synthesis of a new peptide or sequence with prospective applications in cosmeceuticals. The general bioavailability of peptides, their low toxicity and ease of synthesis provide the possibility to obtain bioactive molecules at relatively low production costs. An additional advantage is the ease of modification of their structures in order to ensure the desired properties, such as increased hydrophilicity necessary for the penetration of the active substance into the deeper layers of the epidermis.