

In recent years, there has been an avalanche increase in the production and sale of cosmetic, food and medical products as well as dietary supplements containing cannabidiol as an active ingredient on the Polish and global markets. Cannabidiol (CBD) is a phytocannabinoid derived from the hemp species (mainly *Cannabis sativa*), which is devoid of psychoactive effects and can be legally grown in Polish and EU legal conditions. Its not fully proven effect on the human body is analgesic, anticonvulsant, muscle relaxant, anxiolytic and antipsychotic. CBD also exhibits neuroprotective, anti-inflammatory and antioxidant effects. While there is no EU law to allow CBD for human consumption, practical evidence shows that it is widely used by various social groups in Poland, from adolescents to elderly patients with serious health problems. CBD is also potentially used in veterinary medicine, primarily in the treatment of pain, inflammation and nervous tension in domestic animals, as well as in the treatment of seizures seen in dogs and horses. On a molecular level, the effects of CBD on living cells are not well understood. It is known that it acts through a number of cell receptors, but its action is often modulating in nature with an unclear mechanism. There is also a very limited amount of evidence (studies in an in vitro model) describing the effects of CBD on changes in the global cell transcriptome, which is the most important effector, mediator and regulator of the cycle, metabolism and differentiation of living cells.

In order to present the effects of CBD on the living organism as comprehensively as possible, in this project we plan to use a high-throughput RNA sequencing approach using the next generation technique (RNA-Seq) to describe the effects of CBD on changes in the transcriptome of organs such as the brain, spleen and liver. in the standard mouse model. The organs were selected to take into account the observed effects of CBD on the nervous system and immune system, and to assess the potentially toxic effects of its metabolism on the liver. The experiment also takes into account aspects such as dosage and timing of CBD administration. The RNA-Seq approach used will allow for an objective observation of the final effect of CBD on gene expression in the analyzed tissues, without the need to make preliminary assumptions or test the a priori research hypothesis. The results will help to fully recognize the mechanism of action of CBD and identify the real effectors of CBD administration in the animals.

The obtained RNA-Seq results, supplemented with behavioral and biochemical tests (levels of IL-1 beta, IL-6, TNF alpha and corticosterone) will allow to fill the existing gap in knowledge about the changes that CBD causes in the transcriptome of organs and target tissues and ensure global, objective and comparative characterization of the effects of CBD consumption on living cells and organs. They will also allow for the compilation of a comprehensive list of genes that are affected by CBD and the construction of reliable mechanisms for the interaction of CBD as a biologically active compound. The obtained results will also allow the assessment of the potential effectiveness and usefulness of CBD in the treatment of various diseases in domestic and farm animals. They will also provide the basis for a deeper involvement of Polish agriculture in the cultivation of hemp for the production of cannabidiol-containing drugs and nutritional supplements for farm animals.