

## **1. The objective of the project**

The aim of the project is to elucidate if there is a link between BRAF gene mutation (in tumor DNA and cf-DNA in plasma) and expression of the let-7 family's miRNA in tissue and plasma in papillary thyroid carcinoma (PTC) and thereby to recognize one of the mechanisms of development of this tumor.

## **2. Research project methodology**

The overall research plan is based on learning one of the molecular mechanisms responsible for the development of papillary thyroid cancer. The study aims to investigate the role of miRNA expression in the context of BRAF mutations in patients with PTC. In addition, the study aims to determine whether combined analysis of miRNA expression and plasma *BRAF* mutations can be used for diagnostic purposes in the fluid biopsy.

Patients diagnosed with papillary thyroid cancer on the basis of postoperative histopathological examination will be included in the study.

Studies will be conducted in 70 adults of both sexes with PTC.

Biological material will be used for research:

- 1) Thyroid tissue fragments obtained during surgery
- 2) venous blood (10ml EDTA)

The control group will be:

For comparison of miRNA expression and tumor genes - histopathological material taken after thyroid surgery from a tumor-free site (normal thyroid tissue preparation from regions adjacent to the tumor site).

For comparison of serum miRNA expression - venous blood (10ml EDTA) from 70 adult healthy volunteers of both genders.

## **3. Reasons for the research topic**

The inspiration for the project are problems that are associated with accurate diagnosis, treatment and monitoring the progress of a possible recurrence of papillary thyroid cancer. The results will support differential diagnosis of thyroid neoplasia and will allow a more accurate thyroid-type tumor profile at molecular level. By using a fluid biopsy in the future, it will be possible to use the miRNA expression profile in combination with the BRAF mutation analysis in cf-DNA, which may be a valuable tool in PTC diagnostics, treatment strategies, monitoring responses to radioactive iodine, or monitoring of disease recurrence. miRNA molecules have enormous biological potential and may be a potential target in personalized gene therapy based on the regulation of miRNA expression through miRNA *mimics* and miRNA *inhibitors*. The effects of the work can have a very positive impact on the development of medical research. Additionally, the analysis of gene expression proposed in the project will bring new data into the molecular basis for PTC development.