

Abstract

Tumors are one of the leading causes of death worldwide. Generally, the prognosis is better if the treatment begins at an early stage. Nowadays, the conventional chemotherapy treatment of cancer, known for its limited efficacy and side effects, is being gradually replaced by targeted biological treatment, which is used when specific genetic mutations are found. A part of the treatment is a detection of a potential progression, which is mainly based on the tumor biomarkers monitoring. Currently, further investigation of a so-called liquid biopsy method are ongoing, on which this thesis is focused.

The main aim of this work was the experimental development and validation of the method for detection of the ctDNA in the plasma samples based on the somatic mutations presence. For the development and optimization of the system on the principle of denaturation capillary electrophoresis, the samples of cancer patients with *KRAS* mutation were used. Subsequently, a clinical part of the research was performed on a pilot set of 21 plasma samples. Finally, the method was optimized for the detection of *BRAF* and *EGFR* markers. A partial objective was to improve the detection sensitivity and increase the capture of the ctDNA in patients with advanced stage of the disease.

The results of this work suggest the possibility of using this method for monitoring patients with not only colorectal or lung carcinoma, but other types of cancer as well.