Summary

Pancreatic cancer is a malignant disease with an unfavorable prognosis. Currently, the diagnosis of pancreatic cancer is based mainly on CT, MR and EUS imaging methods, because a reliable biomarker of pancreatic cancer is not available. It is considered a success in the current clinical practice if patients suitable for surgical resection can be selected, because in this group the overall survival is slightly better than in the group where surgery is not technically possible.

In the first part, the presented dissertation focuses on testing of already established imaging diagnostic methods used in common practice, *i.e.* EUS and EUS FNA, as well as modern examination possibilities, such as contrast endosonography, and the comparison of the accuracy of the methods used. The dominant role of the EUS FNA was confirmed.

In the next phase of the work, the methodological procedure of EUS FNA collection and the preprocessing of pancreatic tissue samples was tested with regard to the quantity and quality for epigenetic examination and further testing using the prognostic role of *KRAS* and miR-21. It has been suggested that cytological smears are the most suitable source of biological material for DNA and miRNA analysis, where non-tumor tissue contamination is low. Although the prognostic role of *KRAS* is negligible, miR-21 showed differences in patient survival depending on its expression levels.

In the last part of the work, emphasis was placed on the development and testing of new methods for cancer detection using blood plasma testing *via* a combination of spectroscopic methods and metabolomics. Specific areas have been identified in the spectrum, which determine pathological changes associated with pancreatic cancer, especially fluctuating levels of carotenoids and aromatics, structural alterations in proteins and lipids. Metabolomics allowed for the identification of certain molecules with specific connenction to carcinogenesis - tyrosine and guanosine and their derivatives, 8-isoprostane, or carnitine derivatives - which are closely related to oxidative stress, cell membrane or genetic information damage induced by the presence of cancer. The tested methodology showed higher performance characteristics than the currently employed clinical marker CA 19-9.