

Renal cell carcinoma accounts for 2-3% of all adult malignant tumors. RCC is an adverse malignancy, accounting for more than 80% of all kidney neoplasms. There are three main histological subtypes, such as clear cell (ccRCC), chromophobe and papillary RCC. Relative 5-year survival for kidney cancer is 71%. According to GLOBOCAN in 2012 there were approximately 337,800 new cases of RCC and 143,400 kidney cancer-related deaths worldwide.

Patients with ccRCC have the worst prognosis when compared to chromophobe or papillary subtype of RCC. Clear cell RCC has characteristic yellowish appearance, and in most cases is well circumscribed. On microscopic examination it has abundant clear cytoplasm due to high content of lipids and glycogen.

As there are several different types of RCCs with different survival rates, biomarkers are needed for early detection and monitoring of recurrence and response to treatment. Since the introduction of mass spectrometric techniques for proteomics, numerous attempts have been made to discover cancer-specific chemical compounds.

The objectives of this project are to find new kidney cancer biomarkers and study their structure in detail. Additionally, biomarkers that were found by our group will also be studied. Objectives will be realized by:

1. MS analysis of renal cancer tissue, urine and blood plasma in search for low-molecular weight cancer biomarkers.
2. MS imaging of renal cancer (and normal) tissue with laser desorption/ionization on AuNPET and ¹⁰⁹AgNPET.
3. Isolation of biomarkers and confirmation of structure with the aid of modern analytical methods.
4. Analysis of metabolic pathways containing potential biomarkers.