Lung cancer is the main reason of cancer-related deaths in Poland and in the world. According to the National Cancer Registry, each year nearly 23,000 people (16,000 men and 6,700 women) in Poland die due to it. It is estimated that 90% of lung cancer cases in highly-developed countries are caused by smoking – both active and passive. It has been shown that for smokers the risk of developing a lung cancer is 20-fold higher than for non-smokers. Other risk factors are exposure to air pollution, dust, asbestos, radon and arenes, as well as chronic lung diseases and innate mutations in some genes. The most frequent is non-small cell lung cancer (NSCLC) – it accounts for about 80% of all lung cancer cases.

The treatment of NSCLC is a difficult challenge because of its low sensitivity to standard chemotherapy. Surgery is the most effective form of the therapy, but it can only be used in the early stages of the disease. Lung cancer may have no symptoms for a long time. As a result, it is often detected in an advanced stage when it is too late for a surgery. In that case, radiotherapy, chemotherapy and targeted therapy (designed to block proteins crucial for cancer development) are used. Unfortunately, despite the years of intensive research, there are no drugs that would be able to significantly help the patients in advanced stages of the disease.

One of the most important and most effective drugs used in the treatment of advanced stages of NSCLC are EGFR (Epidermal Growth Factor Receptor) inhibitors. EGFR is a receptor protein located in the cell membrane, which enhances cells proliferation and protects them from death. EGFR is present in about 50% of NSCLC patients, but not all of them qualify for therapy with EGFR inhibitors. The treatment brings the best results in a small number of people who harbour a special, mutated form of EGFR. However, the latest researches suggest that therapy with inhibitors may also be effective in patients with high levels of non-mutated EGFR. Therefore, it becomes very important to determine which factors may cause an increase in the level of this protein.

One of the proteins that can affect EGFR levels is SATB1. It is called “a global transcription factor” – it can regulate the expression of multiple genes simultaneously, and thus affect the levels of many proteins. SATB1 has been shown to play a role in development of breast, gastrointestinal, ovarian and prostate cancers. It probably affects also the progression of the lung cancer, but this hypothesis still needs to be confirmed.

In our studies, we plan to determine the levels of SATB1 and EGFR proteins and genes encoding them in the tumors resected from 300 NSCLC patients. Correlation of the SATB1 levels with the clinical-pathological data will allow us to conclude if it plays a role in NSCLC development. Comparison of the SATB1 and EGFR levels in the analyzed tumors will answer the question whether is the EGFR level SATB1-regulated.

Defining the role of SATB1 protein in the development of NSCLC would result in a better understanding of this disease and would also provide a theoretical basis for the development of new targeted therapies and molecular markers. Determining which factors regulate EGFR level would allow better treatment planning for NSCLC patients and could improve its efficacy. In further perspective, the results of the proposed study could help to improve the diagnostics of that disease and to increase the survival of NSCLC patients.