Lung cancer is one of the most common and deadly type of cancer in the world. The main reason of poor statistics is high genetic heterogeneity within lung cancer subtypes. Research on molecular pathways involved in cancer genesis allow to extend knowledge, which in the future, may contribute to the development of novel targeted therapies and drugs. The subject of this study are short, 22-24 nucleotides long, single-stranded RNAs called microRNAs (miRNAs). Through complementary binding to the mRNA of target genes, miRNAs have the ability for posttranscriptional regulation of gene expression. Growing interest in these particles in the context on anticancer therapies is due to the potential ability for inhibition of unfavourable mechanism, which can be activated in cancer cells. In studies on cancer specimens from patients with lung cancer we indicated significant decrease in the expression of miR-30a-5p in comparison to the healthy adjacent tissue. This miRNA in cancer is indicated as an tumor suppressor, therefore the goal of this project is to investigate its potential therapeutic activity in lung cancer cells. Bioinformatics analysis revealed that miR-30a-5p presumably has ability for posttranscriptional silencing of disks large-associated protein 1 (*DLGAP1)* gene coding guanylate-kinase-associated protein (GKAP), which according to the latest paper on this subject, is associated with activity of N-methyl-D-aspartic acid receptor (NMDAR), and can influence processes associated with cancer cell growth and development.

This project aim is to verify whether miR-30a-5p has the ability for posttranscriptional silencing of the expression of *DLGAP1* and whether it has anticancer activity in lung cancer cells. To investigate the miR-30a-5p–*DLGAP1*–NMDAR2B signalling axis, *in vitro* studies on A549 cell line will be conducted. Cells will be transfected with synthetic RNA oligonucleotides, which will enhance or silence expression of tested genes. Next, using qRT-PCR and Western Blot methods, cells will be analysed on the molecular level. It will allow to assess processes and interactions occurring in transfected cells on the level of mRNA and proteins. The influence of overexpression or knockdown of miR-30a-5p and *DLGAP1* gene on cancer cell proliferation and apoptosis will be assessed by MTT assay and flow cytometry. Verification of miR-30a-5p binding with the target gene will be assessed by Luciferase Reporter Gene assay.

Extending knowledge about miR-30a-5p-*DLGAP1*-NMDAR2B signalling axis and its role in lung cancer development, undoubtedly will help to better understand cancer pathogenesis, and possibly will allow to develop new drugs and targeted therapies in the future.