

Cancer is the second most common cause of death worldwide. According to data from 2021, approximately 170,000 new cancer diagnoses are made in Poland every year, and approximately one million people are living with a cancer diagnosis. Prostate cancer is the second most common cancer in men. One out of eight men is estimated to develop prostate cancer during his lifetime. It is therefore important to have a thorough understanding of the events leading to the formation and growth of prostate cancer. Particularly important is to develop better diagnostic markers to differentiate between benign and malignant forms of prostate cancer.

In this project, we will investigate β 4-integrin, a protein that is involved in the regulation of epithelial cell adhesion to the underlying basement membrane. Currently, it is known that a decrease of the β 4-integrin amount is important to initiate the transformation of a normal cell into a prostate cancer cell. Our recent data have shown that this protein can also regulate the shape and function of the nuclear envelope and alter the spatial organization of the genetic material, i. e. the DNA which in the nucleus is condensed into chromatin. We hypothesize that these alterations subsequently lead to increased availability of the chromatin for transcription factors, resulting in oncogenic transcription thereby causing uncontrolled cell growth and cell transformation. By using different cell lines, primary organoid cultures prepared from the primary prostate cancer tissues (tumors) and healthy prostate tissues from patients, and state-of-the-art methodology, our task will be to investigate how the loss of β 4-integrin leads to prostate tumor formation and why the reduction of this protein is so important for cancer progression. Our understanding of the mechanisms of action of integrin β 4 will contribute to devising novel or improved solutions to inhibit prostate cancer transformation and expansion. Furthermore, we believe that the results of this project will also facilitate the development of better diagnostic markers for the prediction of highly malignant forms of prostate cancer and consequently, significantly improve the identification of new targets for anti-cancer drugs, thereby ameliorating the current treatment strategies.