

## **STRESZCZENIE W JĘZYKU ANGIELSKIM**

Recently, there has been an increasing number of literature reports indicating that the mechanical environment of tissues can play a key role not only in the development of the human brain, but also in brain tumour induction and progression. With this in mind, it is suggested that changes in the mechanical properties of tissues and organs during pathology development can be used as a marker, and thus, become an important factor in tumour diagnosis. It also appears interesting to see whether these traits impact the efficacy of anticancer drugs used to treat tumours of the central nervous system.

The aim of the dissertation was to determine the mechanical properties of the central nervous system tumours of different origin and different degree of malignancy, and to evaluate the possibility of using atomic force microscopy as a complementary tool to enrich its histopathological evaluation during diagnostic process of central nervous system tumours.

Additionally, using a glioma cell model, the influence of the stiffness and viscosity of the extracellular environment on the antitumor efficacy of temozolomide was evaluated. The study was performed using freshly collected samples of the central nervous system tumour and healthy tissues that had been removed from oncology patients undergoing brain surgery.

Mechanical analysis of the tissues was performed using atomic force microscopy, while histopathological evaluation was performed using haematoxylin and eosin staining. Studies assessing the sensitivity of cells cultured on viscoelastic matrices to the applied cytostatic treatment were performed in an *in vitro* glioma model using optical microscopy and flow cytometry.

Over the course of the studies, statistically significant changes were observed in the stiffness of tumour tissues compared to the normal white and grey matter. Importantly, the stiffness of the examined tissues increased with the histopathologically determined degree of malignancy. It was further shown that compression-stiffening characterises all primary CNS tumours studied. The results also indicate the possibility of using atomic force microscopy as a complementary method for the histopathological evaluation of tissues. In experiments using cell lines, it was confirmed that increased viscosity of the extracellular environment significantly impairs the sensitivity of glioma cell lines LN-18 and LN-229 to temozolomide treatment.