Glioblastoma is the most aggressive type of brain cancer with survival of about 12-15 months. Unfortunately, despite the constant advancements in the development of anti-glioblastoma agents, so far, its treatment is still ineffective. Some reports suggest that observed differences between anti-cancer efficiency of drugs, when tested in laboratory and clinical settings, are determined by poor preclinical systems that do not account for the all features present in human brain.

The extracellular matrix (ECM) of the brain is a dynamic network, that provide a microenvironment to which cells adhere and undergo the physiological processes, including cell death. Interestingly, it has been shown that numerous central nervous system (CNS) cells such as astrocytes or neurons respond to modifications of ECM stiffness, and this mechanical feature determine their cellular function and behavior, including morphology, tumor progression or treatment response. Considering the above, a majority of currently tested experimental settings assumed stiffness as a critical determinant, which was taken under the consideration in preclinical tests. Nevertheless, an ever-growing number of studies demonstrate, that not only stiffness, but also viscoelasticity exerts critical role in above processes. Recent developments in hydrogel manipulation create an opportunity to reevaluate the approach to analysis of treatment methods. Having that in mind, it is suggested that ECM viscoelasticity controls not only cancer development and growth, but also cancer cell response to anticancer treatment and altering ECM viscoelasticity can provide an effective way to improve anticancer therapies. The implementation of this project will answer questions: Do changes in the mechanical properties of the underlying substrate influence cell response to chemotherapy drugs? Do cells exhibit different treatment responses on hard or soft substrates? Additionally, effect of combinatory therapies consisting of anti-glioma chemotherapeutics (temozolomide, bevacizumab) in combination with antibodies will be tested and potentially introduced as a potential therapy of glioblastoma.