MICROFLUIDIC CHIP SYSTEM FOR CELL ADHESION AND POTENTIAL APPLICATION IN GLIOBLASTOMA TREATMENT STUDIES

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Glioblastoma is known for its difficult treatment and poor survival rate. One of the main obstacles to effective therapy is the complexity of tumour microenvironment (Jayaram and Phillips, 2024). To develop new treatments for glioblastoma, it is important to understand microenvironment, for which microfluidic chips can be applied. Collagen is commonly used to improve cell adhesion because cells recognise it well through collagen-binding integrins (Zeltz and Gullberg, 2016). For this reason, collagen can be used in a microfluidic chip to coat a membrane.

To contribute to the development of new systems for glioblastoma research, the main aim of this study is to optimise microfluidic chip system and determine the optimal collagen concentration for C6 rat glioblastoma cell adhesion.

The microfluidic chip was constructed and optimised to provide suitable conditions for mammalian cell growth. The design is based on a sandwich principle, where components such as a cyclic olefin copolymer (COC) with a molded channel and a polycarbonate (PC) membrane were used. The PC membrane was treated with oxygen plasma and then coated with type I collagen, onto which the cultured cells were seeded.

After 5 days results were assessed, and the best growth was observed at a collagen concentration of 3mg/mL. Overall, this confirms that collagen is suitable for cultivating cells on a chip, and the data will be used in further studies to develop a collagen matrix to improve the system for further studies recreating the glioblastoma microenvironment

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