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CARBOXYMETHYLCELLULOSE HYDROGELS SUPPORT CNS-DERIVED TUMOR CELL CHEMOTACTIC MIGRATION

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Abstract

Glia cells migrate via complex interactions with surrounding neurons, endothelial cells, and the extracellular matrix of the brain. Glia provide support and protection for neuronal cells and interface heavily with cerebral microvasculature. The goal of this study is to find an ECM that provides minimal integrin interaction with the ECM proteins with which we can study the natural migration pattern and test the motility of the glial cells.

Introduction

• The matrix microenvironment plays a critical role in cell migration, as cells are well known to interact with the proteins of the surrounding extracellular matrix to achieve locomotion (reviewed in 1-3).
• The migration of cancer cells within defined extracellular matrix (ECM) has increasing interest among CNS researchers who examine the formation and dissemination of tumors via metastasis and the motility of so-called cancer stem cells (4).
• However, one large difficulty in the study of directed cell migration within ECM is not only the complexity of the biological process itself (5-7), but the intricate relationship between the ECM and the cellular biochemical microenvironment.

Materials and Methods

- Cell Line: Gial derived Daoy cell line (ATCC, HTB-186™)
- ECM proteins: Collagen-1, Matrigel, Laminin, Poly-D-Lysine, Fibronectin, Collagen-Laminin (10% and 20%) blends, and Carboxy methyl cellulose (CMC)
- Nikon (TE2000-E) and Zeiss Microscope: Spectral Analysis
- 2D: 2-well Nunc Lab-Tek II chamber slides well were coated with protein solutions.
- 3D: wells were coated with protein solution and a 1.5mm thick substrates were obtained
- Cell shape index (CSI) was measured for Daoy cells on ECM proteins listed above
- Immunostaining (ICC) of integrin αβ was performed to observe relationship between ECMs and Daoy cells
- CMC hydrogels are water soluble polysaccharide derivatives of cellulose. A 2% solution of methacrylated CMC in 0.05% photoinitiator solution is polymerized under UV light for 10 mins.

Results

Figure 1: Changes in average cell shape index (CSI) of cells cultured on 2D substrates.
Figure 2: Changes in average CSI of cells within 3D ECM materials.
Figure 3: Daoy cell migration within 3D matrices.

Future Work

Applying the information obtained through this study about CMC gels to the co-culture systems of HB9-GFP mouse motor neurons and C2C12 (myoblasts) and measure cell interaction and response of co-cultures to a haptotaxis neutral hydrogel.

References

Lu et al., 2012; Bernier et al., 2007; Zaman et al., 2006; Able, Jr. et al., 2011; Even-Ram et al., 2005; Friedl et al., 2000; Lu, Weaver et. al., 2012; http://www.ijbs.com/v03p0303.htm

Acknowledgments

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