OFFICIAL ABSTRACT and CERTIFICATION

Characterization Of 3D Collagen Matrix vs 2D transwell permeable membrane for differentiation/barrier formation of Caco-2 cells

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Due to the rising number of diseases and mortality from digestive related issues, there is a need for efficient and cost effective intestine models. Although in vitro models provide well controlled and repeatable conditions, they are far from perfect. One such aspect that can be improved is the 3D architecture which we aim to mimic by using a collagen matrix.
To test whether the 3D environment provided by the matrix will mimic the in vivo scenario, we characterized the effects of using a collagen matrix on Caco-2 cell differentiation/barrier formation. For the experiment, Caco-2 cells grown on an in vitro transwell system had been compared to transwells with a collagen matrix. Production of Apo-b secretion was compared using ELISA, while TEER measurements were taken to determine the strength of the barrier formation. Our results showed that the Apo-b secretion significantly increased between the selected time points for the Collagen group compared to the No Collagen group, suggesting an increase in Caco-2 differentiation. However, the TEER measurements only increased for the No Collagen group, although that may have been due to the collagen lifting off of the transwell membranes, preventing a proper barrier formation. In the future, we aim to compare tissue specific matrix and engineer transwell chambers that allow for constant media flow to speed up differentiation and provide a more in vivo like environment to the cells.

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