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Using a cell-vertex model to study the role of differential adhesion in the intestinal crypt

A cell-based vertex model in Chaste was used to study differential adhesion and cell positioning in the intestinal crypt. The results were compared to the ones obtained using a different modelling framework, namely the Potts model.

When directly comparing the models simulations we see that both models agree with experimental data in transit time, migratory velocities and migratory patterns of cells. However, this is not the case when comparing the boundary between differentiated and transit amplifying cells: while using the Potts model a sharp boundary can be observed, using the vertex model such boundary is not seen.

Our results suggest that different modelling frameworks can give different answers when studying the same phenomenon, reinforcing the importance of testing in more than one modelling platform in order to obtain robust results.