Single-cell Atlas of Mouse Colitis Tissue

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Colitis is a disease characterized by inflammation and epithelium injury in the colon. Colitis tissue consists of a variety of cells interacting with each other and gut microorganisms. These cells play critical roles in disease progression. However, the cell profile of colitis tissues is not completely defined. The experimental colitis in the mice treated with dextran sulfate sodium can be a severe condition enriched with cells playing critical roles in pathogenesis for investigation. To profile the cells in this model, a study using single-cell sequencing technology had been completed. This project analyzed the raw sequencing data and identified the major types/subtypes of cells by the expressions of specific cell lineage markers to establish the single cell atlas. The single-cell atlas showed that 1) normal colon epithelium was consisted of ~76% epithelial cells, 13.35% stromal cells and 5.62% immune cells; and 2) colitis epithelium was consisted of ~37.8% epithelial cells, 19.62% stromal cells and 42.58% immune and inflammatory cells. These results presented two remarkable changes induced by colitis: the significant reduction of epithelial cells and increase of immune and inflammatory cells. In epithelial cell population, the only proliferative cells were a subtype of Goblet cells, suggesting a possibility of Goblet cells acting as the reservoir source for repair. In inflammatory cell populations, monocytes were the majority, suggesting that they play dominant roles in colitis. Together, colitis-induced cell changes represent the injury and inflammation in colon epithelium, and the details found in this study are intriguing in our understanding of colitis.

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