Microfluidic contraction flow of artificial tissues

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The aim of this study is to develop an artificial cohesive tissue and determine its spatiotemporal dynamics under microfluidic flow. The artificial tissue is obtained by the assembly of human ghosts (red blood cells from which hemoglobin has been released [Dodge1962]) and mediated by the presence of wheat proteins.

By imposing a constant flow, we study the passage of the ghost aggregates through a microfluidic constriction. Our velocimetry results show that, depending on the aspect ratio between the cell aggregate and the constriction size, the tissue adopts different strategies in order to advance through the constriction: aggregate reorientation, flow localization, or cell deformation.

The comparison of our results with experiments performed with living cell aggregates under comparable flow conditions [Tlili2015] may enable to have a deeper insight on the effect of internal cell activity on tissue mechanics as well as the role of cell adhesion, which are both essential in embryogenesis and tumor metastasis processes [Lecuit2007].

References

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