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Abstract:	The cytoplasm is as a complex, heterogeneous environment with substructures spanning the nanoscale to the microscale. The heterogeneity produces a plethora of physicochemical properties that cells exploit to exact various biochemistries with spatiotemporal precision. In this context, the role of position-dependent viscosity remains poorly understood. Here, we propose an interaction- free mode of cellular compartmentalisation that relies on inhomogeneous diffusion (arising from space-dependent viscosity) and study its effects on mesoscale organisation via agent-based mod- elling. Such viscophoretic accumulation also affects the rate of interaction-driven clustering. In silico FRAP simulations reveal emergent turnover timescales arising from heterogeneous dynamics. Microrheology-based calculations identify anomalous diffusive behaviours manifesting as a result of such inhomogeneous diffusion. We also probe inhomogeneous diffusion in the case of subcellu- lar viscous granules arising during viscoadaptation in cells, and identify how timescales depend on granule-packing parameters.
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