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**Overcrowding drives the unjamming transition of gap-free monolayers**[1] GANHUI LAN, TAO SU, The George Washington University — Collective cell motility plays central roles in various biological phenomena such as wound healing, cancer metastasis and embryogenesis. These are demonstrations of the unjamming transition in biology. However, contradictory to the typical density-driven jamming in particulate assemblies, cellular systems often get unjammed in highly packed, sometimes overcrowding environments. Here, we investigate monolayers' collective behaviors when cell number changes under the gap-free constraint. We report that overcrowding can unjam gap-free monolayers through increasing isotropic compression. We show that the transition boundary is determined by the isotropic compression and the cell-cell adhesion. Furthermore, we construct the free energy landscape for the T1 topological transition during monolayer rearrangement, and discover that the landscape evolves from single-barrier W shape to double-barrier M shape during the unjamming process. We also discover a distributed-to-disordered morphological transition of cells' geometry, coinciding with the unjamming transition. Our analyses reveal that the overcrowding and adhesion induced unjamming reflects the mechanical yielding of the highly deformable monolayer, suggesting an alternative mechanism that cells may robustly gain collective mobility through proliferation in confined environments, which differs from those caused by loosing up a packed particulate assembly.

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