

## Data Repository

Figure	Graph	Dataset	Data Dictionary
Fig. 1d		Fig_1d.csv	<ul style="list-style-type: none"> <li>- meanE: Gel stiffness in kPa</li> <li>- SpeedXY: Cluster speed modulus (μm/h)</li> </ul>
Fig. 1e		Fig_1e.csv	<ul style="list-style-type: none"> <li>- meanE: Gel stiffness in kPa</li> <li>- diamAZ: Cluster diameter in μm</li> <li>- ContactAngle: Contact angle (°)</li> </ul>
Fig. 1i		Fig_1i.csv	<ul style="list-style-type: none"> <li>- DistRadial: Distance from the edge (μm)</li> <li>- meanTracR: Radial Traction (Pa)</li> <li>- SE: Standard Error</li> <li>- meanE: Gel stiffness (kPa)</li> </ul>
Fig. 1j		Fig_1j.csv	<ul style="list-style-type: none"> <li>- DistRadial: Distance from the edge (μm)</li> <li>- meanTracZ: Normal Traction (Pa)</li> <li>- SE: Standard Error</li> <li>- meanE: Gel stiffness (kPa)</li> </ul>

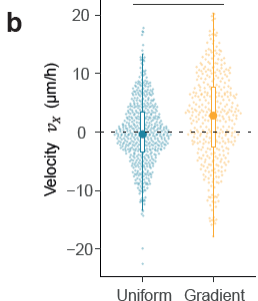
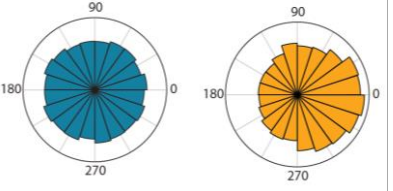
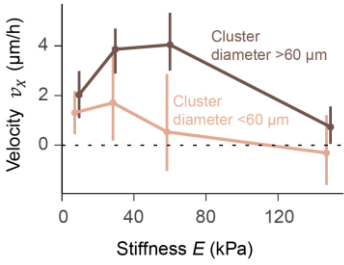
Fig. 2b		Fig2_b.csv	<ul style="list-style-type: none"> <li>- Type: Type of gel (gradient or uniform)</li> <li>- SpeedX: Speed in the x direction (um/h)</li> </ul>
Fig. 2c d		Fig2_cd.csv	<ul style="list-style-type: none"> <li>- rangeTheta: Angle bin (rad, <math>(-\pi, -\pi]</math>)</li> <li>- count: number of displacement that the bin has</li> <li>- mean: mean value of the bin</li> <li>- Condition: "Uniform" for panel c; "Gradient" for panel d</li> </ul>
Fig. 2e		Fig2_e.csv	<ul style="list-style-type: none"> <li>- rangeE: Bin with stiffness (kPa)</li> <li>- LenBin: Bin with cluster length. "&gt;60" and "&lt;60"</li> <li>- n_clusters: number of clusters in each bin</li> <li>- n_displacements: number of displacements in each bin</li> <li>- medianSX: median of diaplacements in each bin</li> <li>- meanE: mean stiffness of each bin</li> <li>- CIL: Lower confidence interval of medianSX estimated by bootstrapping (um/h)</li> <li>- CIM: Higher confidence interval of medianSX estimated by bootstrapping (um/h)</li> </ul>

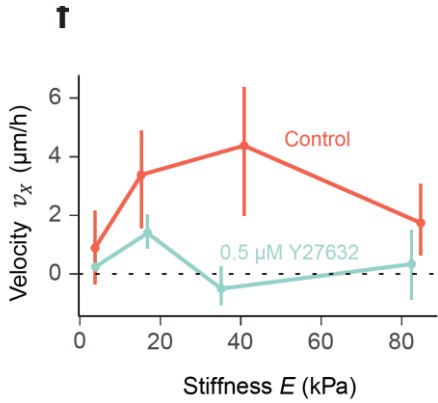
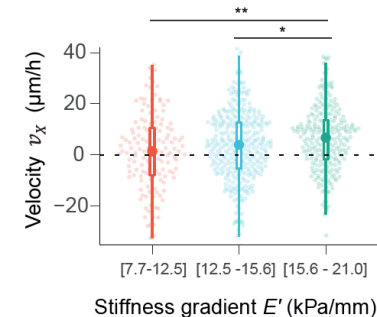
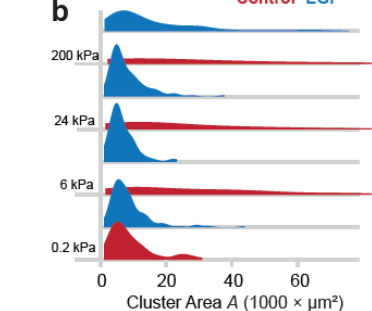
Fig. 2f	 <p>Figure 2f is a line graph showing the relationship between Stiffness <math>E</math> (kPa) on the x-axis and Velocity <math>v_x</math> (<math>\mu\text{m/h}</math>) on the y-axis. The x-axis ranges from 0 to 80 kPa with major ticks every 20 units. The y-axis ranges from -2 to 6 <math>\mu\text{m/h}</math> with major ticks every 2 units. Two data series are plotted: 'Control' (red line) and '0.5 <math>\mu\text{M}</math> Y27632' (teal line). Both series include error bars representing confidence intervals. The Control series starts at approximately 1 <math>\mu\text{m/h}</math> at 0 kPa, rises to about 3.5 <math>\mu\text{m/h}</math> at 20 kPa, peaks at approximately 4.5 <math>\mu\text{m/h}</math> at 40 kPa, and then decreases to about 2 <math>\mu\text{m/h}</math> at 80 kPa. The 0.5 <math>\mu\text{M}</math> Y27632 series starts near 0 <math>\mu\text{m/h}</math> at 0 kPa, rises slightly to about 1.5 <math>\mu\text{m/h}</math> at 20 kPa, then drops to approximately -1 <math>\mu\text{m/h}</math> at 40 kPa, and remains near 0 <math>\mu\text{m/h}</math> at 80 kPa.</p>	<p>Fig2_f.csv</p> <ul style="list-style-type: none"> <li>- Condition: "Control" or "0.5 <math>\mu\text{M}</math> Y27632"</li> <li>- rangeE: Bin with stiffness (kPa)</li> <li>- LenBin: Bin with cluster length. "&gt;60" and "&gt;60"</li> <li>- n_clusters: number of clusters in each bin</li> <li>- n_displacements: number of displacements in each bin</li> <li>- medianSX: median of displacements in each bin</li> <li>- meanE: mean stiffness of each bin</li> <li>- CIL: Lower confidence interval of medianSX estimated by bootstrapping (<math>\mu\text{m/h}</math>)</li> <li>- CIM: Higher confidence interval of medianSX estimated by bootstrapping (<math>\mu\text{m/h}</math>)</li> </ul>
Fig. 2g	 <p>Figure 2g is a scatter plot with overlaid box plots showing Velocity <math>v_x</math> (<math>\mu\text{m/h}</math>) on the y-axis versus Stiffness gradient <math>E'</math> (kPa/mm) on the x-axis. The y-axis ranges from -20 to 40 <math>\mu\text{m/h}</math> with major ticks every 20 units. The x-axis has three categories: [7.7-12.5], [12.5-15.6], and [15.6-21.0]. Each category has a box plot and individual data points. The median velocity increases significantly from the first bin to the second and third bins. Statistical significance is indicated by asterisks: ** between the first and second bins, and * between the second and third bins.</p>	<p>Fig2_g.csv</p> <ul style="list-style-type: none"> <li>- rangeS: slope range (kPa/mm)</li> <li>- SpeedX: Speed in the X direction (<math>\mu\text{m/h}</math>)</li> </ul>
Fig. 4b	 <p>Figure 4b is a stacked area plot showing the distribution of Cluster Area <math>A</math> (<math>1000 \times \mu\text{m}^2</math>) on the x-axis for different stiffness levels on the y-axis. The x-axis ranges from 0 to 60 with major ticks every 20 units. The y-axis has four categories: 0.2 kPa, 6 kPa, 24 kPa, and 200 kPa. For each stiffness level, there are two overlapping distributions: Control (red) and EGF (blue). The distributions are right-skewed, with most clusters having an area between 0 and 20. As stiffness increases, the overall area of the clusters tends to decrease.</p>	<p>Fig4_b.csv</p> <ul style="list-style-type: none"> <li>- Area: Area of the cluster in <math>\mu\text{m}^2</math></li> <li>- Kind: Control+Stiffness</li> <li>- Condition: Control or EGF</li> </ul>

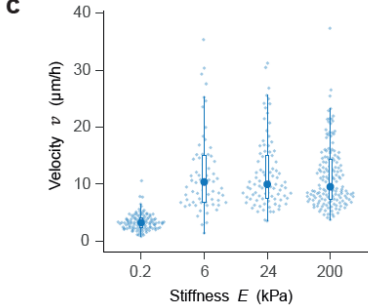
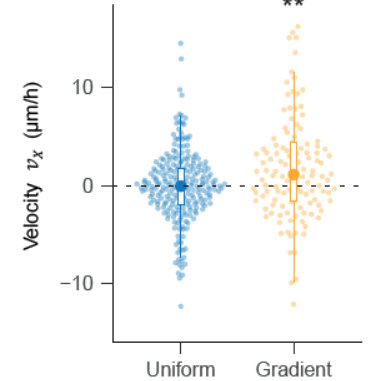
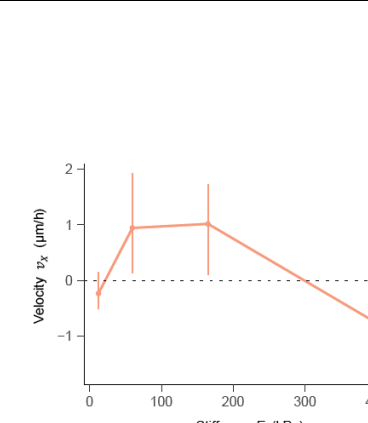
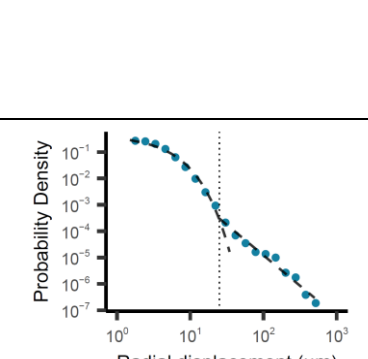
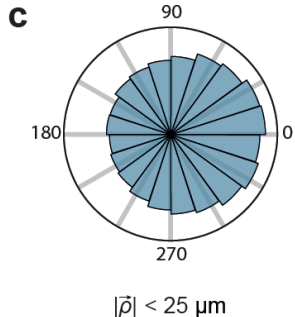
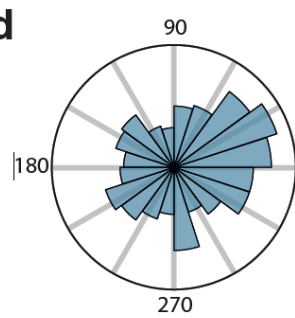
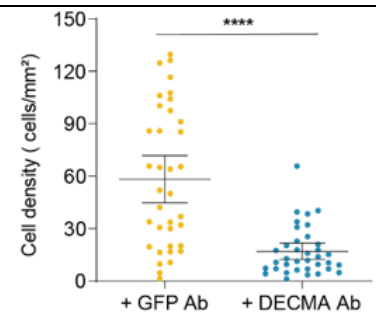
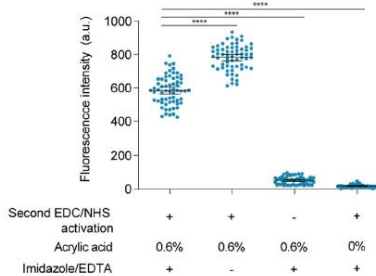
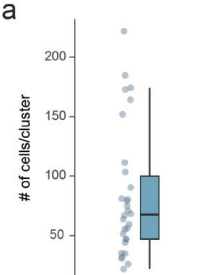
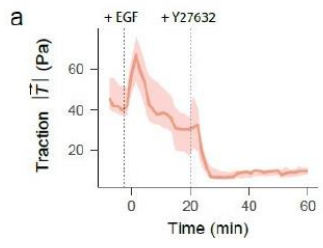
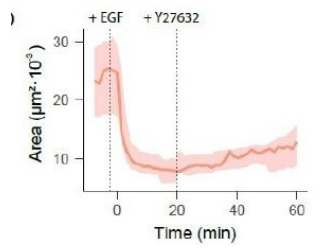
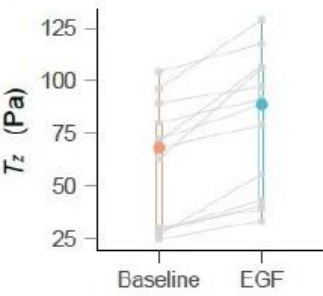
Fig. 4c		Fig4_c.csv	<ul style="list-style-type: none"> <li>- meanE: Stiffness condition (kPa)</li> <li>- SpeedXY: Cluster Speed (um/h)</li> </ul>
Fig. 4e		Fig4_e.csv	<ul style="list-style-type: none"> <li>- Type: "Uniform" or "Gradient"</li> <li>- SpeedX: Speed along the X direction (um/h)</li> </ul>
Fig. 4f		Fig4_f.csv	<ul style="list-style-type: none"> <li>- rangeE: Bin with stiffness (kPa)</li> <li>- n_clusters: number of clusters in each bin</li> <li>- n_displacements: number of displacements in each bin</li> <li>- medianSX: median of diaplacements in each bin</li> <li>- meanE: mean stiffness of each bin</li> <li>- CIL: Lower confidence interval of medianSX estimated by bootstrapping (um/h)</li> <li>- CIM: Higher confidence interval of medianSX estimated by bootstrapping (um/h)</li> </ul>
Fig. 5a		Fig5_a.csv	<ul style="list-style-type: none"> <li>- breaks: Position of Radial displacement bin (um)</li> <li>- dens: Probability Density</li> </ul>

Fig. 5c	 <p><math> \rho  &lt; 25 \mu\text{m}</math></p>	Fig5_c.csv	<ul style="list-style-type: none"> <li>- angle (rad, <math>(-\pi, -\pi]</math>)</li> <li>- count: number of displacements that the bin has</li> </ul>
Fig. 5d	 <p><math> \rho  &gt; 25 \mu\text{m}</math></p>	Fig5_d.csv	<ul style="list-style-type: none"> <li>- angle (rad, <math>(-\pi, -\pi]</math>)</li> <li>- count: number of displacements that the bin has</li> </ul>
Ext Fig. 2 c		Ex_Fig2_c.csv	<ul style="list-style-type: none"> <li>- Condition: Antibody treatment, "GFP ab" or "DECMA"</li> <li>- Cell_Density: number of cells per <math>\text{mm}^2</math></li> </ul>
Ext Fig. 2b		Ex_Fig2_b.csv	<ul style="list-style-type: none"> <li>- Fluo: Fluorescence (a.u.)</li> <li>- Condition: <ul style="list-style-type: none"> <li>A: + 0.6% +</li> <li>B: + 0.6% -</li> <li>C: - 0.6% -</li> <li>D: + 0% +</li> </ul> </li> </ul>
Ext. Fig. 1a		Ex_Fig1_a.csv	<ul style="list-style-type: none"> <li>- nuc: Density of cells per cluster</li> </ul>

Ext. Fig. 1b		Ex_Fig_b.csv	<ul style="list-style-type: none"> <li>- ContactAngle: Contact angle of each cluster (°)</li> <li>- meanE: Stiffness of the gel (kPa)</li> <li>- Condition: “Control” or “Y27632”</li> </ul>
Ext. Fig. 4 a		Ex_Fig4_a.csv	<ul style="list-style-type: none"> <li>- xn: Position of the gel in <math>\mu\text{m}</math></li> <li>- x: Position of the gel in mm</li> <li>- meanE: Mean measured stiffness (kPa)</li> <li>- SE: Standard Error of the mean</li> <li>- n: number of gels measured</li> </ul>
Ext. Fig. 4b		Ex_Fig4_b.csv	<ul style="list-style-type: none"> <li>- ID: Unique ID for each gel</li> <li>- Type: “Shallow” or “Steep”</li> <li>- x_mm: Position</li> <li>- E_kPa: measured stiffness (kPa)</li> </ul>
Ext. Fig. 4c		Ex_Fig4_c.csv	<ul style="list-style-type: none"> <li>- Type: Type of gel (Shallow or Steep)</li> <li>- Stiffness: Measured Stiffness (kPa)</li> <li>- Fluo: Normalized Fluorescence (a. u.)</li> <li>- X:</li> <li>- Id:</li> </ul>
Ext. Fig. 5		Ex_Fig5.csv	<ul style="list-style-type: none"> <li>- rangeE: Bin with stiffness (kPa)</li> <li>- n_clusters: number of clusters in each bin</li> <li>- n_displacements: number of displacements in each bin</li> <li>- medianSX: median of diaplacements in each bin</li> <li>- meanE: mean stiffness of each bin</li> <li>- CIL: Lower confidence interval of medianSX estimated by bootstrapping (<math>\mu\text{m/h}</math>)</li> <li>- CIM: Higher confidence interval of medianSX estimated by bootstrapping (<math>\mu\text{m/h}</math>)</li> </ul>

Ext. Fig. 6a		Ex_Fig6_a.csv	<ul style="list-style-type: none"> <li>- Time: Time (min)</li> <li>- Traction: Median Traction Forces (kPa)</li> <li>- CIL: Lower Confidence Interval of forces (kPa)</li> <li>- CIM: Maximal Confidence Interval of forces (kPa)</li> </ul> <p>EGF was added at time=-1.5 min Y27632 was added at time = 20 min</p>
Ext. Fig. 6b		Ex_Fig6b.csv	<ul style="list-style-type: none"> <li>- Time: Time (min)</li> <li>- Area: Median Area (um<sup>2</sup>/1000)</li> <li>- CIL: Lower Confidence Interval of Area (um<sup>2</sup>/1000)</li> <li>- CIM: Higher Confidence Interval of Area (um<sup>2</sup>/1000)</li> </ul>
Ext. Fig. 6g		Ex_Fig6_g.csv	<ul style="list-style-type: none"> <li>- Condition: "Baseline" or "EGF"</li> <li>- meanTracZ: Mean Traction Z</li> </ul>