

**SUPPLEMENTARY TABLE S1 Features computed for each complete colony after segmentation and tracking of cells.**

Fluorescence features	Object of measurement	Time point of measurement	Measurement	Units
<i>Mean_Myc</i>	Nucleus	Current	Mean GFP-MYC	intensity
<i>MeanMyc_Neighbours</i>	<sup>3</sup> Nuclei neighbors	Current	Mean <i>Mean_Myc</i>	intensity
<i>MaxMyc_Neighbours</i>	<sup>3</sup> Nuclei neighbors	Current	Max. <i>Mean_Myc</i>	intensity
<i>MinMyc_Neighbours</i>	<sup>3</sup> Nuclei neighbors	Current	Min. <i>Mean_Myc</i>	intensity
<i>mean_myc_cell</i>	Nucleus	All	Mean <i>Mean_Myc</i>	intensity
<i>median_myc_cell</i>	Nucleus	All	Median <i>Mean_Myc</i>	intensity
<i>max_myc_cell</i>	Nucleus	All	Max. <i>Mean_Myc</i>	intensity
<i>min_myc_cell</i>	Nucleus	All	Min. <i>Mean_Myc</i>	intensity
<i>std_myc_cell</i>	Nucleus	All	Std. <i>Mean_Myc</i>	intensity
<i>mode_myc_cell</i>	Nucleus	All	Mode <i>Mean_Myc</i>	intensity
<i>mean_myc_family</i>	<sup>1</sup> Family	All	Mean <i>Mean_Myc</i>	intensity
<i>max_myc_family</i>	<sup>1</sup> Family	All	Max. <i>Mean_Myc</i>	intensity
<i>min_myc_family</i>	<sup>1</sup> Family	All	Min. <i>Mean_Myc</i>	intensity
<i>std_myc_family</i>	<sup>1</sup> Family	All	Std. <i>Mean_Myc</i>	intensity
<i>Norm_Myc</i>	Nucleus	Current	Mean GFP-MYC <sup>5</sup> normalized	intensity
<i>Compensated_Mean_Myc_Correct</i>	Nucleus	Current	Mean GFP-MYC <sup>6</sup> compensated	intensity
<i>MeanMyc_Neighbours_Compensated</i>	<sup>3</sup> Nuclei neighbors	Current	Mean <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>MinMyc_Neighbours_Compensated</i>	<sup>3</sup> Nuclei neighbors	Current	Min. <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>MaxMyc_Neighbours_Compensated</i>	<sup>3</sup> Nuclei neighbors	Current	Max. <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>Myc_Progenitor_AfterCompBleaching</i>	<sup>4</sup> Nucleus progenitor	All	Mean <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>mean_Compensated_Mean_Myc_Correct_percell</i>	Nucleus	All	Mean <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>std_Compensated_Mean_Myc_Correct_percell</i>	Nucleus	All	Std. <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>median_Compensated_Mean_Myc_Correct_percell</i>	Nucleus	All	Median <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>min_Compensated_Mean_Myc_Correct_percell</i>	Nucleus	All	Min. <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>max_Compensated_Mean_Myc_Correct_percell</i>	Nucleus	All	Max. <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>mean_Compensated_Mean_Myc_Correct_perfamily</i>	<sup>1</sup> Family	All	Mean <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>std_Compensated_Mean_Myc_Correct_perfamily</i>	<sup>1</sup> Family	All	Std. <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>median_Compensated_Mean_Myc_Correct_perfamily</i>	<sup>1</sup> Family	All	Median <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>min_Compensated_Mean_Myc_Correct_perfamily</i>	<sup>1</sup> Family	All	Min. <i>Compensated_Mean_Myc_Correct</i>	intensity
<i>max_Compensated_Mean_Myc_Correct_perfamily</i>	<sup>1</sup> Family	All	Max. <i>Compensated_Mean_Myc_Correct</i>	intensity

Table describes fluorescence features calculated in the proposed workflow including which objects were segmented, time points where the measure is applicable and measurement details.

Morphological features	Object of measurement	Time point of measurement	Measurement	Units
<i>Pixel_size</i>	Nucleus	Current	Volume	pixel
<i>Cell_Roudness</i>	Cell	Current	<sup>2</sup> Roundness	<sup>9</sup> a. u.
<i>mean_Cell_Roudness_percell</i>	Cell	All	Mean <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>std_Cell_Roudness_percell</i>	Cell	All	Std. <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>median_Cell_Roudness_percell</i>	Cell	All	Median <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>min_Cell_Roudness_percell</i>	Cell	All	Min. <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>max_Cell_Roudness_percell</i>	Cell	All	Max. <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>mean_Cell_Roudness_perfamily</i>	<sup>1</sup> Family	All	Mean <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>std_Cell_Roudness_perfamily</i>	<sup>1</sup> Family	All	Std. <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>median_Cell_Roudness_perfamily</i>	<sup>1</sup> Family	All	Median <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>min_Cell_Roudness_perfamily</i>	<sup>1</sup> Family	All	Min. <i>Cell_Roudness</i>	<sup>9</sup> a. u.
<i>max_Cell_Roudness_perfamily</i>	<sup>1</sup> Family	All	Max. <i>Cell_Roudness</i>	<sup>9</sup> a. u.

Continuation of Table 1 with morphological features.

Motility features	Object of measurement	Time point of measurement	Measurement	Units
<i>XCenter_Pxl_</i>	Cell	Current	Center of mass: X coordinate	pixel
<i>YCenter_Pxl_</i>	Cell	Current	Center of mass: Y coordinate	pixel
<i>ZCenter_Pxl_</i>	Cell	Current	Center of mass: Z coordinate	pixel
<i>move_velocity_px_per_frame</i>	Cell	Current (using current and previous)	<sup>7</sup> Velocity	pixel/frame
<i>move_direction</i>	Cell	Current (using current and previous)	<sup>8</sup> Direction	degrees
<i>move_Xvelocity_px_per_frame</i>	Cell	Current (using current and previous)	<sup>7</sup> Velocity	pixel/frame
<i>move_Yvelocity_px_per_frame</i>	Cell	Current (using current and previous)	<sup>7</sup> Velocity	pixel/frame
<i>move_distance_px_from_previous</i>	Cell	Current (using current and previous)	Euclidean distance	pixel
<i>walkdistance_from_oigin_px</i>	Cell	Current (using initial to current)	Accumulative <i>move_distance_px_from_previous</i>	pixel
<i>walkdistance_to_end_px</i>	Cell	Current (using current to final)	Accumulative <i>move_distance_px_from_previous</i>	pixel
<i>walkdistance_total_px</i>	Cell	All (using initial to final)	Accumulative <i>move_distance_px_from_previous</i>	pixel
<i>effectivedistance_from_origin_px</i>	Cell	Current (using initial and current)	Euclidean distance	pixel
<i>effectivedistance_to_end_px</i>	Cell	Current (using current and final)	Euclidean distance	pixel
<i>effectivedistance_total_px</i>	Cell	All (using initial and final)	Euclidean distance	pixel
<i>effectivedistance_max_from_origin_px</i>	Cell	All	Max. <i>effectivedistance_from_origin_px</i>	pixel
<i>effectivedistance_max_to_end_px</i>	Cell	All	Max. <i>effectivedistance_to_end_px</i>	pixel
<i>mean_move_velocity_px_per_frame</i>	Cell	All	Mean <i>move_velocity_px_per_frame</i>	pixel/frame
<i>std_move_velocity_px_per_frame</i>	Cell	All	Std. <i>move_velocity_px_per_frame</i>	pixel/frame
<i>mean_move_velocity_px_per_frame_fam</i>	<sup>1</sup> Family	All	Mean <i>move_velocity_px_per_frame</i>	pixel/frame
<i>std_move_velocity_px_per_frame_fam</i>	<sup>1</sup> Family	All	Std. <i>move_velocity_px_per_frame</i>	pixel/frame
<i>DirectionalityIndex</i>	Cell	All	<i>effectivedistance_total_px</i> / <i>walkdistance_total_px</i>	pixel

Continuation of Table 1 with motility features.

## Legend:

<sup>1</sup>Family: All the cells in a lineage tree from first ancestor to the entire progeny.

<sup>2</sup>Roundness: Feature that describes how much the shape of an image object is similar to an ellipsoid. It is defined as the radius of the smallest enclosing ellipsoid minus the radius of the largest enclosed ellipsoid and its range goes from 0 (highest roundness) to infinite.

<sup>3</sup>Nuclei neighbors: Nuclei of the neighbor cells. Neighbors are defined as cells whose membranes are in direct contact with the cell of interest.

<sup>4</sup>Nucleus progenitor: Identifier of first ancestor.

<sup>5</sup>Normalized: Z-score normalization to obtain mean 0 and standard deviation 1 on each dataset.

<sup>6</sup>Compensated: compensation of intensity loss along time on each dataset following Methods section.

<sup>7</sup>Velocity: Euclidean distance between centers of mass points (in XY axes) divided by the timepoint difference (number of frames).

<sup>8</sup>Direction: Angle with respect to positive X axis. From -180 to 180 degrees

<sup>9</sup>a.u.: Arbitrary units.