M2 INTERNSHIP PROPOSAL

Mechanisms of confluence-induced transition in cell migration persistence

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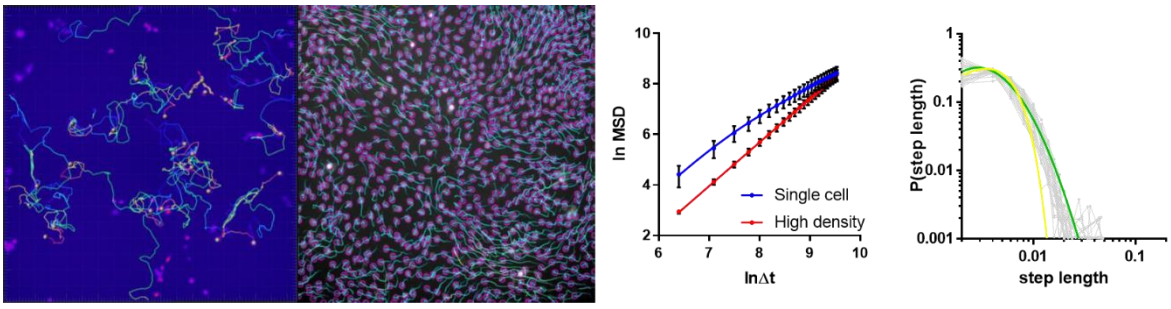
Collective cell migration is a fundamental behavior involved in multicellular development, regeneration and homeostasis, and that is deregulated in cancer. It is, however, much less studied and understood than single cell migration.

The goal of this project is to understand the cell-autonomous and non-cell autonomous determinants of efficient collective cell migration, and in particular our recent observation of a confluence-induced transition in cell migration persistence.

To address this, our strategy is to assess the effects of perturbations affecting cell adhesions on cell migration persistence as a function of cell density. We want to determine:

- the super/sub/diffusive behaviour of cells.
- the cell walks characteristics: Gaussian/Lévy-like step length distribution, temporal correlations between steps and their range.
- the mutants affecting the above.

The project will involve fluorescence live cell imaging and image analysis combined with genetic and pharmacological perturbations of cell-matrix and cell-cell adhesions.



Recent publications of the team:

- 'Nesprins are mechanotransducers that discriminate epithelial-mesenchymal transition programs'. J Cell Biol. (2020) 219:e201908036. Déjardin T, Carollo PS, Sipieter F, Davidson PM, Seiler C, Cuvelier D, Cadot B, Sykes C, Gomes ER, Borghi N.
- 'Nesprin-2 accumulates at the front of the nucleus during confined cell migration.' EMBO Rep. (2020) 21:e49910. Davidson PM, Battistella A, Déjardin T, Betz T, Plastino J, Borghi N, Cadot B, Sykes C.
- "Chromatin condensation fluctuations rather than steady-state predict chromatin accessibility". Nucleic acids research (2019) 47:6184-6194. N Audugé, S Padilla-Parra, M Tramier, N Borghi*, M Coppey-Moisan*. *co-corresponding.
- "Intermediate filaments control collective migration by restricting traction forces and sustaining cell-cell contacts". J Cell Biol. (2018) 217:3031-3044. C. De Pascalis, C. Pérez-Gonzales, S. Seetharaman, B. Boëda, B. Vianay, M. Burute, C. Leduc, N. Borghi, X. Trepat, S. Etienne-Manneville.
- "Src- and confinement-dependent FAK-activation causes E-cadherin relaxation and beta-catenin activity", J Cell Biol. 217 (2018) 1063-77. Gayrard C, Bernaudin C, Déjardin T, Seiler C, Borghi N.
- "Coordination between Intra- and Extracellular Forces Regulates Focal Adhesion Dynamics", Nano Letters 17 (2017) 399-406. Sarangi BR, Gupta M, Doss BL, Tissot N, Lam F, Mège RM, Borghi N, Ladoux B.

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Team "Mechanotransduction: from cell surface to nucleus", http://www.ijm.fr/en/research/research-groups/mechanotransduction/

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