



# Universités de Paris, Master BMC

## Master 1 : Biologie Cellulaire

### Fiche de Projet de Stage, Année 2019-2020

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**Master 1 BMC: projets de stage 2020 en Biologie Titre du projet :** Cell Division in Epithelial Cancer

**Résumé du Projet de Stage** (en 300 mots maximum, mots clés en gras) :

Cell divides at specific and highly regular position. The control of **division position and orientation is crucial for tissue development**, stem cell lineages, and its dysregulation can lead to metastatic cancer in many organs. Our team has gained leading expertise in the study of how cells regulate division site placement, by combining **interdisciplinary approaches**, including cell and tissue live imaging, biophysical methods and mathematical modelling. In this project, we will build on a recent method developed in the team, to control division positioning *in vivo*, and study the relationships between division control and cancer development in epithelial cells. This approach is based on magnetic beads injected inside cells, which can exert forces that move or orient the mitotic spindle. The student, will be supervised by a senior post-doc, to implement this method in model epithelial cell lines (cancer and non-cancer), and in drosophila epithelial tissue cells. The broad aim of this project is to address in a systematic manner the impact of a mis-regulated division position and orientation on cell behavior, fate specification, and cancer progression.

**Publications de l'équipe, relatives au stage proposé :**

- Sallé J, Xie J, Ershov D, Lacassin M, Dmitrieff S, **Minc N** (2019) "Asymmetric division through a reduction of microtubule centering forces." *J Cell Biol.* 218(3):771-782.
- Tanimoto H, Sallé J, Dodin L, and **Minc N** (2018) "Physical Forces Determining the Persistency and Centering Precision of Microtubule Asters" *Nature Physics.* [114, 848-854.](#)
- Bosveld, ..., **Minc N**, Bellaïche Y (2016) "Epithelial tricellular junctions act as interphase cell shape sensors to orient mitosis" *Nature* 530, 495-498
- Pierre A, Sallé J, Wühr M, Minc N. (2016) "Generic Theoretical Models to Predict Division Patterns of Cleaving Embryos." *Developmental Cell.* 39(6):667-682.
- Tanimoto H, Kimura A, **Minc N.** (2016) "Shape-motion relationships of centering microtubule asters." *J Cell Biol.* 28;212(7):777-87
- Campinho P, Behrndt M, Ranft J, Risler T, **Minc N**, Heisenberg CP. (2013) "Tension-oriented cell divisions limit anisotropic tissue tension in epithelial spreading during zebrafish epiboly." *Nat Cell Biol.* Dec; 15(12):1405-14.
- Minc<sup>#</sup> N., Burgess, D. and Chang F. (2011), "Influence of cell geometry on division plane positioning" *Cell.*, 144 (3): 414-426.