**Comparative Analysis Between Flaviviruses Reveals Specific Neural Stem Cell Tropism for Zika Virus in the Mouse Developing Neocortex.**

*EBioMedicine*: [DOI: 10.1016/S2352-3964(16)30323-1](https://doi.org/10.1016/S2352-3964(16)30323-1)

**Summary**

The recent Zika outbreak in South America and French Polynesia was associated with an epidemic of microcephaly, a disease characterized by a reduced size of the cerebral cortex. Other members of the Flavivirus genus, including West Nile virus (WNV), can cause encephalitis but were not demonstrated to cause microcephaly. It remains unclear whether Zika virus (ZIKV) and other flaviviruses may infect different cell populations in the developing neocortex and lead to distinct developmental defects. Here, we describe an assay to infect mouse E15 embryonic brain slices with ZIKV, WNV and dengue virus serotype 4 (DENV-4). We show that this tissue is able to support viral replication of ZIKV and WNV, but not DENV-4. Cell fate analysis reveals a remarkable tropism of ZIKV infection for neural stem cells. Closely related WNV displays a very different tropism of infection, with a bias towards neurons. We further show that ZIKV infection, but not WNV infection, impairs cell cycle progression of neural stem cells. Both viruses inhibited apoptosis at early stages of infection. This work establishes a powerful comparative approach to identify ZIKV-specific alterations in the developing neocortex and reveals specific preferential infection of neural stem cells by ZIKV.

**Cellular and subcellular imaging of motor protein-based behavior in embryonic rat brain.**

*Methods in cell biology*: 349-63 : [DOI: 10.1016/bs.mcb.2015.06.013](https://doi.org/10.1016/bs.mcb.2015.06.013)

**Summary**

Development of the cerebral cortex is a very dynamic process, involving a series of complex morphogenetic events. Following division of progenitor cells in the ventricular zone, neurons undergo a series of morphological changes and migrate outward toward the cortical plate, where they differentiate and integrate into functional circuits. Errors at several of stages during neurogenesis and migration cause a variety of severe cortical malformations. A number of disease genes encode factors associated with the cytoskeleton, which plays a crucial role throughout cortical development. Methods for regulating gene expression coupled with imaging of subcellular structures have provided important insight into the mechanisms governing normal and abnormal brain development. We describe here a series of protocols for imaging motor protein-dependent processes in real time in the developing rat brain.
Study of dendritic cell migration using micro-fabrication.

Summary

Cell migration is a hallmark of dendritic cells (DCs) function. It is needed for DCs to scan their environment in search for antigens as well as to reach lymphatic organs in order to trigger T lymphocyte’s activation. Such interaction leads to tolerance in the case of DCs migrating under homeostatic conditions or to immunity in the case of DCs migrating upon encounter with pathogen-associated molecular patterns. Cell migration is therefore essential for DCs to transfer information from peripheral tissues to lymphoid organs, thereby linking innate to adaptive immunity. This stresses the need to unravel the molecular mechanisms involved. However, the tremendous complexity of the tissue microenvironment as well as the limited spatio-temporal resolution of in vivo imaging techniques has made this task difficult. To bypass this problem, we have developed microfabrication-based experimental tools that are compatible with high-resolution imaging. Here, we will discuss how such devices can be used to study DC migration under controlled conditions that mimic their physiological environment in a robust quantitative manner.

Cdk1 Activates Pre-mitotic Nuclear Envelope Dynein Recruitment and Apical Nuclear Migration in Neural Stem Cells.

Summary

Dynein recruitment to the nuclear envelope is required for pre-mitotic nucleus-centrosome interactions in nonneuronal cells and for apical nuclear migration in neural stem cells. In each case, dynein is recruited to the nuclear envelope (NE) specifically during G2 via two nuclear pore-mediated mechanisms involving RanBP2-BicD2 and Nup133-CENP-F. The mechanisms responsible for cell-cycle control of this behavior are unknown. We now find that Cdk1 serves as a direct master controller for NE dynein recruitment in neural stem cells and HeLa cells. Cdk1 phosphorylates conserved sites within RanBP2 and activates BicD2 binding and early dynein recruitment. Late recruitment is triggered by a Cdk1-induced export of CENP-F from the nucleus. Forced NE targeting of BicD2 overrides Cdk1 inhibition, fully rescuing dynein recruitment and nuclear migration in neural stem cells. These results reveal how NE dynein recruitment is cell-cycle regulated and identify the trigger mechanism for apical nuclear migration in the brain.
**Year of publication 2014**

Alexandre D Baffet (2014 Jan 30)

[Nuclear migration in neuronal progenitors: when the brain plays yo-yo].
*Médecine sciences : M/S : 30-2 : DOI : 10.1051/medsci/20143001009*

**Summary**

**Year of publication 2013**


Dynein recruitment to nuclear pores activates apical nuclear migration and mitotic entry in brain progenitor cells.
*Cell : 1300-13 : DOI : 10.1016/j.cell.2013.08.024*

**Summary**

Radial glial progenitors (RGPs) are elongated epithelial cells that give rise to neurons, glia, and adult stem cells during brain development. RGP nuclei migrate basally during G1, apically using cytoplasmic dynein during G2, and undergo mitosis at the ventricular surface. By live imaging of in utero electroporated rat brain, we find that two distinct G2-specific mechanisms for dynein nuclear pore recruitment are essential for apical nuclear migration. The “RanBP2-BicD2” and “Nup133-CENP-F” pathways act sequentially, with Nup133 or CENP-F RNAi arresting nuclei close to the ventricular surface in a premitotic state. Forced targeting of dynein to the nuclear envelope rescues nuclear migration and cell-cycle progression, demonstrating that apical nuclear migration is not simply correlated with cell-cycle progression from G2 to mitosis, but rather, is a required event. These results reveal that cell-cycle control of apical nuclear migration occurs by motor protein recruitment and identify a role for nucleus- and centrosome-associated forces in mitotic entry. PAPERCLIP:

Alexandre D Baffet, Carol-Anne Martin, Ilaria Scarfone, Owen M Daly, Ahuvit David, Alexandra Tibelius, Ramona Lattao, Muhammad S Hussain, Jeffrey B Woodruff (2013 Aug 3)

**Meeting report - building a centrosome.**
*Journal of cell science : 3259-62 : DOI : 10.1242/jcs.136721*

**Summary**

Located in the 16th century Wiston House in West Sussex, UK, the ‘Building a Centrosome’ Workshop was organised by The Company of Biologists and chaired by Fanni Gergely and David Glover (University of Cambridge). Held in March 2013, the Workshop gathered together many of the leaders in the field of centrosome biology, as well as postdocs and students who were given the opportunity to meet and interact with many of the scientists who inspired their early careers. The diverse range of speakers provided a multi-disciplinary
forum for the exchange of ideas, and gave fresh impetus to tackling outstanding questions related to centrosome biology. Here, we provide an overview of the meeting and highlight the main themes that were discussed.

**Year of publication 2012**

Alexandre D Baffet, Béatrice Benoit, Jens Januschke, Jennifer Audo, Vanessa Gourhand, Siegfried Roth, Antoine Guichet (2012 Aug 3)

**Drosophila tubulin-binding cofactor B is required for microtubule network formation and for cell polarity.**

*Molecular biology of the cell* : 3591-601 : [DOI : 10.1091/mbc.E11-07-0633](http://doi.org/10.1091/mbc.E11-07-0633)

**Summary**

Microtubules (MTs) are essential for cell division, shape, intracellular transport, and polarity. MT stability is regulated by many factors, including MT-associated proteins and proteins controlling the amount of free tubulin heterodimers available for polymerization. Tubulin-binding cofactors are potential key regulators of free tubulin concentration, since they are required for α-β-tubulin dimerization in vitro. In this paper, we show that mutation of the Drosophila tubulin-binding cofactor B (dTBCB) affects the levels of both α- and β-tubulins and dramatically destabilizes the MT network in different fly tissues. However, we find that dTBCB is dispensable for the early MT-dependent steps of oogenesis, including cell division, and that dTBCB is not required for mitosis in several tissues. In striking contrast, the absence of dTBCB during later stages of oogenesis causes major defects in cell polarity. We show that dTBCB is required for the polarized localization of the axis-determining mRNAs within the oocyte and for the apico-basal polarity of the surrounding follicle cells. These results establish a developmental function for the dTBCB gene that is essential for viability and MT-dependent cell polarity, but not cell division.

**Year of publication 2010**


**A developmentally regulated two-step process generates a noncentrosomal microtubule network in Drosophila tracheal cells.**

*Developmental cell* : 790-801 : [DOI : 10.1016/j.devcel.2010.03.015](http://doi.org/10.1016/j.devcel.2010.03.015)

**Summary**

Microtubules (MTs) are essential for many cell features, such as polarity, motility, shape, and vesicle trafficking. Therefore, in a multicellular organism, their organization differs between cell types and during development; however, the control of this process remains elusive. Here, we show that during Drosophila tracheal morphogenesis, MT reorganization is coupled to relocation of the microtubule organizing centers (MTOC) components from the
centrosome to the apical cell domain from where MTs then grow. We reveal that this process is controlled by the tracheal patterning gene in a two-step mechanism. MTOC components are first released from the centrosome by the activity of the MT-severing protein Spastin, and then anchored apically through the transmembrane protein Plopio. We further show that these changes are essential for tracheal development, thus stressing the functional relevance of MT reorganization for morphogenesis.