Defaults in the cellular transport machinery have frequently associated with many human pathologies, including cancer. Our work focuses on elucidating the various aspects of the regulation of vesicular transport and membrane trafficking. Toward this objective, we are using a combination of approaches, including live cell imaging, micro-patterning and reconstitution of transport events using model membranes.

**Function of Rab GTPases (Bruno Goud)**

Rab GTPases (>60 in man) virtually regulate all transport steps between cellular organelles, i.e. budding of transport vesicles from donor membranes, their movement along the actin and microtubule cytoskeleton and their targeting/fusion with acceptor membranes. We are focusing on Rab6, a Golgi-associated Rab GTP-ase that coordinates several transport pathways at the level of this organelle (Fig. 1), and on Rab proteins that share common effectors with Rab6, such as Rab8, Rab11 and Rab39. In particular, our recent work has highlighted a role of myosin II in the fission of Rab6 positive vesicles from Golgi membranes and the identification of multiple Rab-binding domains on Myosin Va. Ongoing projects concern the *in vitro* reconstitution of myosin II-driven fission process, the role of...
Rab6/Rab8/myosin Va/b in post-Golgi transport events, the role of Rab11 in trafficking of APP (amyloid precursor protein) and BACE-1 in neuronal cells and the characterization of the Rab11/Rab25-mediated signaling pathways associated bladder cancer progression.

Physical parameters that underlie transport processes (Jean-Baptiste Manneville)

To unravel physical parameters such as membrane tension or membrane curvature underlying transport events, we have developed for several years the use of in vitro systems based on giant unilamellar vesicles (GUVs) from which membrane tethers are pulled with kinesin motors or optical tweezers. Our recent work has been focused on how the incorporation of polyunsaturated fatty acids modifies membrane properties and on the role of BIN1/M-amphiphysin2 in lipid clustering. We have also developed a novel approach to probe Golgi mechanics in living cells using polystyrene beads internalized in cultured cells and trapped with optical tweezers (Fig. 2).

Understanding the global organization of endomembranes (Kristine Schauer)

We have developed a computational tool based on the micropatterning technique and density estimation using kernel-based algorithms to visualize the global organization of endomembranes. Our recent work using this approach has highlighted the role of cell adhesion in the topology of endocytosis and signaling. Ongoing studies aim at identifying molecular motors of the myosin and kinesin families that sustain the steady-state organization of endomembranes and at detecting changes of this organization in cancer cells.

Function of myosins in membrane traffic (Evelyne Coudrier)

Our recent work has shown that the single-headed non-processive myosin 1 (myosin 1b) regulates the formation of tubules emanating from the trans-Golgi-Network (TGN) and can
extract membrane tubes along bundles of actin filaments in a minimal reconstituted system. Our current and future research aim at understanding the role of myosin 1b at the plasma membrane and the interplay between myosins and the actin network in the Golgi region to achieve their role in cargo transport.

Key publications

Year of publication 2019


Year of publication 2018


Year of publication 2017


Year of publication 2016


Laura Picas, Frederique Gaits-Iacovoni, Bruno Goud (2016 Apr 20)
The emerging role of phosphoinositide clustering in intracellular trafficking and signal transduction.

F1000Research: DOI: 10.12688/f1000research.7537.1


Persistent cell migration and adhesion rely on retrograde transport of β(1) integrin.

Nature cell biology: DOI: 10.1038/ncb3287