

**P023** Activation and roles of Rac and Cdc42 in mammalian oocytes

**Guillaume Halet and John Carroll**

*Department of Physiology, University College London,  
United Kingdom*

The Rho GTPases Rac and Cdc42 are major regulators of cytoskeletal dynamics and polarisation in somatic cells. During female meiosis, mammalian oocytes become highly polarised, due to the localisation of the meiotic spindle in close apposition to the oocyte cortex. We investigated the activation and roles of Rac and Cdc42 in mouse oocytes during meiosis. Rac and Cdc42 activation were monitored using specific fluorescent probes for Rac-GTP (PAK-PBD-YFP) and Cdc42-GTP (EGFP-wGBD). During spindle migration to the cortex, Rac-GTP accumulated in the cortex overlying the spindle, defining the area forming the polar body. Inhibition of Rac signalling using N17Rac1 resulted in a meiotic arrest in prometaphase I, with defects in spindle shape and chromosome misalignment. Rac inhibition in Metaphase II (MII) eggs prevented cytokinesis and polar body formation after egg activation and disturbed spindle anchoring to the cortex. In contrast, Cdc42-GTP was detected on the meiotic spindle. Interestingly, a remarkable accumulation of Cdc42-GTP was observed on the midline of the central spindle after anaphase. Inhibition of Cdc42 signalling using N17Cdc42 resulted in defects in spindle formation or migration, and defects in spindle anchoring in MII eggs. Together, these data show that Rac and Cdc42 play major roles during meiosis, promoting spindle stability, oocyte polarisation, chromosome segregation and cytokinesis. However their sites of action are very distinct, as reflected in their localisation to the cortex (Rac-GTP) or to the spindle itself (Cdc42-GTP).