**G-actin as a regulator of protein function**

Richard Treisman

CRUK London Research Institute, Lincoln’s Inn Fields Laboratories, 44 Lincoln's Inn Fields, London WC2A 3LY, UK.

The RPEL motif is a G-actin-binding element present in MRTF transcriptional co-activators and in the Phactr family of PP1-binding proteins. The Rho-actin signal pathway couples the dynamics of the actin cytoskeleton to MRTF-dependent transcriptional regulation. G-actin functions directly as a signalling molecule in the pathway. The MRTF regulatory domain contains three RPEL motifs and acts as a sensor of G-actin concentration. Signal-induced alterations in actin dynamics affect the interaction of the RPEL domain with G-actin, in turn controlling both MRTF subcellular localisation and MRTF-dependent transcriptional activation. Recent studies on the molecular mechanisms by which MRTF activity is regulated by G-actin will be discussed.

The Phactr family of actin- and PP1-binding proteins represents a second group of RPEL proteins implicated in cancer, heart disease, and other disorders. Phactr proteins contain four RPEL motifs - one N-terminal, and a C-terminal triple RPEL repeat - together with a conserved C-terminal sequence required for PP1 interaction. Recent functional and structural studies of the Phactr1 protein will be presented and its regulation compared with that of the MRTFs.