

Regulators and Effectors of Small GTPases, Part G: Ras Family II #2001

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Small GTPases are key regulators of cellular events, and their dysfunction causes many types of cancer. They serve as molecular switches by cycling between inactive guanosine diphosphate (GDP)-bound and active guanosine triphosphate (GTP)-bound states. GTPases are deactivated by GTPase-activating proteins (GAPs) and are activated by guanine-nucleotide exchange factors (GEFs). The intrinsic GTP hydrolysis activity of small GTPases is generally low and is accelerated by GAPs. Sciforum Preprints Scilit SciProfiles MDPI Books Encyclopedia JAMS Proceedings. About. Sign In / Sign Up. Structural Insights into the Regulation Mechanism of Small GTPases by GEFs. by. Sachiko Toma-Fukai. Small GTPases are tightly regulated molecular switches that make binary on/off decisions through controlled loading of GTP (activation) and hydrolysis of GTP to GDP (inactivation). Small GTPases typically function as nodal points that integrate broad upstream regulatory inputs and disseminate broad effector outputs. The superfamily comprises five families that are conserved across eukaryotes: Ras, Rho, Rab, Arf, and Ran. In addition to being the founding member of the superfamily, Ras is also the reference protein of the Ras family of small GTPases—one of five families in the Ras superfamily: the others being Rho (Ras homology), Arf (ADP-ribosylation factor), Rab (Ras-like in brain), and Ran (Ras-like nuclear). Part of the Methods in Molecular Biology book series (MIMB, volume 1120). Abstract. superfamily members, as well as of their multiple regulators and effectors. In this review we provide a general overview of the major milestones that eventually allowed to unlock the secret treasure chest of this large and important superfamily of proteins. Key words. Small GTPases Ras superfamily Posttranslational modifications of Ras GTPases Subcellular dynamics of Ras GTPases Function and regulation of Ras GTPases Signaling of Ras GTPases. This is a preview of subscription content, log in to check access. Springer Nature is developing a new tool to find and evaluate Protocols. Small GTPases are critical regulators of cytoskeletal and membrane dynamics underlying cell motility, cell polarity, and cell growth. Small GTPase proteins are molecular switches that generally act on downstream effectors when bound to GTP and are inactive when this GTP is hydrolyzed to guanosine diphosphate (GDP). Several members of the Ras-family of small GTPases have been shown to regulate neuronal polarity including H-Ras, R-Ras, K-Ras, and N-Ras. Small GTPases have a plethora of effectors within cells, and proper activation of these effectors, both spatially and temporally, requires exquisite control of both activation and inactivation by GEFs and GAPs, respectively.