LECTURE #6: STRUCTURE AND REGULATION OF G PROTEINS

Assigned (Required) Reading is (1) - (4):

•General Background (in your Reader):

(1) Wennerberg K, Rossman KL, Der CJ (2005) The Ras superfamily at a glance. J. Cell Sci. 118: 843-846.

(2) Bos JL, Rehmann H, Wittinghofer A (2007) GEFs and GAPs: critical elements in the control of small G proteins. Cell 129: 865-877.

(3) Oldham WM, Hamm HE (2006) Structural basis of function in heterotrimeric G proteins. Quart. Rev. Biophys. 39: 117-166.

•Paper for Discussion Session (Friday, 12/7) (handed out in class):

Ballon DR, Flanary PL, Gladue DP, Konopka JB, Dohlman HG, Thorner J (2006) DEP-domain-mediated regulation of GPCR signaling responses. Cell 126: 1079-1093.

G protein structure and function (general references):

Castro AF, Rebhun JF, Quilliam LA. (2005) Measuring Ras-family GTP levels in vivo-running hot and cold. Methods 37: 190-196.

Vetter IR, Wittinghofer A (2001) The guanine nucleotide-binding switch in three dimensions. Science 294: 1299-1304.

Corbett KD, Alber T (2001) The many faces of Ras: recognition of small GTP-binding proteins. Trends Biochem Sci. 26: 710-716.

Sprang SR (2000) Conformational display: a role for switch polymorphism in the superfamily of regulatory GTPases. Sci STKE Sep 19, 2000; 2000(50):PE1. Review.

Sprang SR (1997) G protein mechanisms: insights from structural analysis. Annu. Rev. Biochem. 66: 639-678.

Bourne HR (1995) GTPases: a family of molecular switches and clocks. Philos Trans R Soc Lond B Biol Sci 349: 283-289.

Ras and its closest relatives:

Mitin N, Rossman KL, Der CJ (2005) Signaling interplay in Ras superfamily function. Curr. Biol. 15: R563-R574.

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Rho proteins:

Hall A (2005) Rho GTPases and the control of cell behaviour. Biochem. Soc. Trans. 33: 891-895.

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Burridge K, Wennerberg K (2004) Rho and Rac take center stage. Cell 116: 167-179.

Ridley AJ. (2001) Rho proteins: linking signaling with membrane trafficking. Traffic 2: 303-310.

Fukata Y, Amano M, Kaibuchi K (2001) Rho-Rho-kinase pathway in smooth muscle contraction and cytoskeletal reorganization of non-muscle cells. Trends Pharmacol Sci 22: 32-39.

Bishop AL, Hall A. (2000) Rho GTPases and their effector proteins. Biochem J. 348: 241-255.

Symons M, Settleman J. (2000) Rho family GTPases: more than simple switches. Trends Cell Biol. 10: 415-419.

Bokoch GM. (2000) Regulation of cell function by Rho family GTPases. Immunol Res. 21: 139-148.

Schmitz AA, Govek EE, Bottner B, Van Aelst L. (2000) Rho GTPases: signaling, migration, and invasion. Exp Cell Res. 261: 1-12.

Rac and Cdc42:

Hoffman GR, Cerione RA. (2002) Signaling to the Rho GTPases: networking with the DH domain. FEBS Lett. 513: 85-91.

Buchwald G, Hostinova E, Rudolph MG, Kraemer A, Sickmann A, Meyer HE, Scheffzek K, Wittinghofer A (2001) Conformational switch and role of phosphorylation in PAK activation. Mol Cell Biol 21: :5179-5189.

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Structures of small G proteins:

Mossessova E, Corpina RA, Goldberg J (2003) Crystal structure of ARF1*Sec7 complexed with Brefeldin A and its implications for the guanine nucleotide exchange mechanism. Mol. Cell 12: 1403-1411.

Merithew E, Hatherly S, Dumas JJ, Lawe DC, Heller-Harrison R, Lambright DG (2001) Structural plasticity of an invariant hydrophobic triad in the switch regions of Rab GTPases is a determinant of effector recognition. J Biol Chem. 276: 13982-13988.

Amor JC, Horton JR, Zhu X, Wang Y, Sullards C, Ringe D, Cheng X, Kahn RA (2001) Structures of Yeast Arf2 and Arl1. Distinct roles for the N-terminus in the structure of Arf family GTPases. J. Biol. Chem 276: 42477-42484.

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Heterotrimeric G Proteins:

Holinstat M, Oldham WM, Hamm HE (2006) G-protein-coupled receptors— evolving views on physiological signalling; the Keystone Symposium on "G-protein-coupled receptors: evolving concepts and new techniques." EMBO Rep. 7: 866-869.

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Clapham DE, Neer EJ (1997) G protein beta gamma subunits. Annu Rev Pharmacol Toxicol. 37: 167-203.

Structures of Gαβγ heterotrimers:

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Cabrera-Vera TM, Vanhauwe J, Thomas TO, Medkova M, Preininger A, Mazzoni MR, Hamm HE (2003) Insights into G protein structure, function, and regulation. Endocr Rev. 24: 765-781.

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Galpha targets:

Hart MJ, Roscoe W, Bollag G. (2000) Activation of Rho GEF activity by G alpha 13. Methods Enzymol. 325: 61-71.

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RGS proteins:

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AGS proteins and GoLoco motifs:

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Post-translational modifications of G proteins:

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