

LECTURE #5: SIGNAL TRANSDUCTION— RECEPTORS AND ADAPTORS

1. Cells communicate with their environment and with each other
 - cells respond to a wide range of physical and chemical stimuli
2. Detection, identification, and isolation of receptors
 - biochemical techniques
 - genetic approaches
 - molecular biological methods
3. Topology and classification of cell surface receptor super-families
 - two-component signaling systems (primarily prokaryotes)
 - ligand-gated ion channels
 - seven-transmembrane segment (G protein-coupled) receptors
 - Other 7-TMS-like receptors (Frz receptor for Wnt; Smo-Ptc for Hhg)
 - receptors with intrinsic enzymic activity
 - receptor-tyrosine kinases (RTKs and fractured RTKs)
 - receptor-phosphotyrosine-specific phosphoprotein phosphatases
 - receptor-serine/threonine kinases
 - receptor-guanylate cyclases
 - receptors with non-covalently associated enzymic activities
 - cytokine receptors
 - Toll-like receptors
 - Death domain receptors
4. Ligand binding and receptor activation and deactivation mechanisms
 - ligand-induced conformational change
 - receptor oligomerization
 - receptor recruitment of associated factors
 - receptor desensitization and endocytosis
5. Adaptor (scaffold / docking / anchoring / linker) proteins in cell signaling
 - conserved modular domains involved in protein-protein and protein-lipid coupling bind to conserved recognition elements
 - SH2 domains and PTB domains
 - 14-3-3 proteins, FHA domains, and Polo Box domains
 - SH3 domains and WW domains
 - PH, PX, C2 and ENTH domains
 - PDZ domains and SAM domains
 - RBD/RID/RA domains, LIM domains, DEP domains, etc. etc.