

Topics

- Presynaptic: transmitters
 - general considerations
 - criteria, types
 - small molecules
 - synthesis, location
 - peptides
 - roles, synthesis from precursors
 - co-existence

Topics

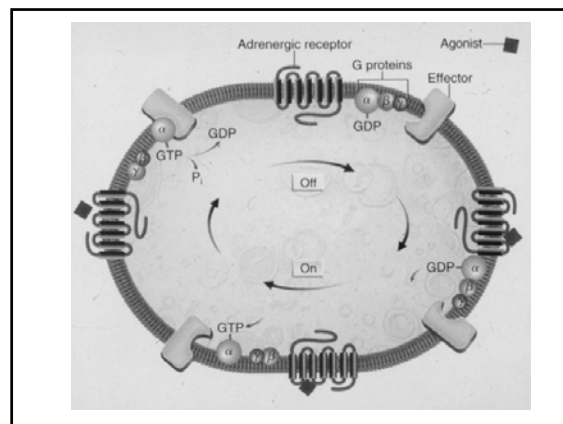
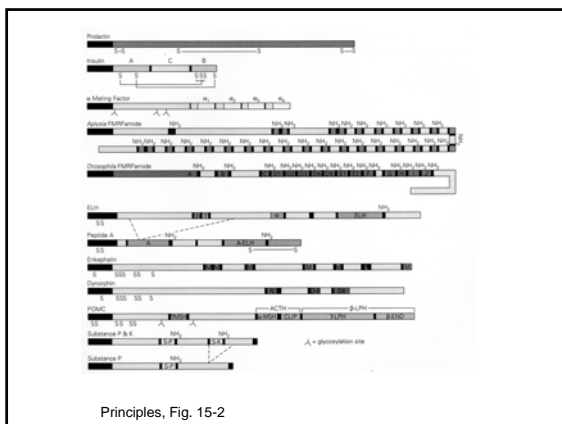
- Postsynaptic: second messengers
 - access
 - 7 transmembrane domain receptors, G proteins
 - types
 - cAMP, AA, DAG, IP₃
 - protein kinases
 - truncating pathway
 - utility

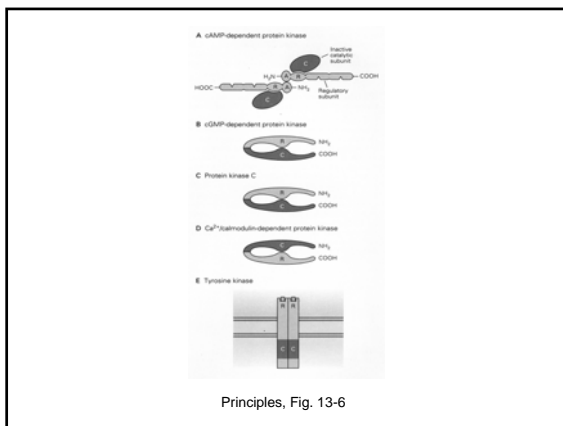
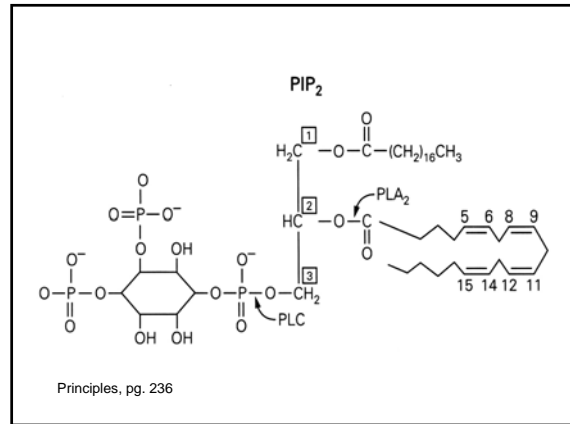
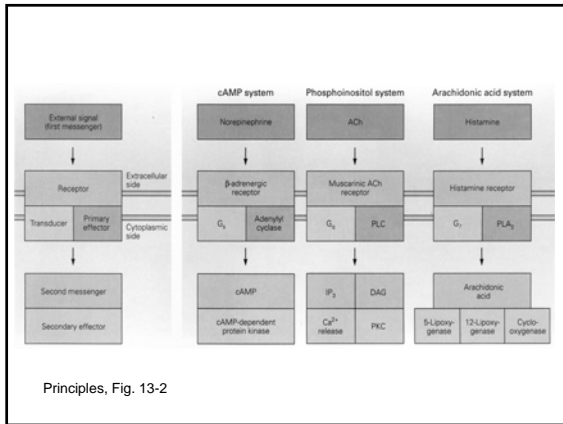
acetyl CoA + choline \xrightarrow{CAT} <chem>CC(=O)OCCN(C)C</chem> + CoA acetylcholine	motor neur. → skel. mus. ANS, esp. parasympath. n. basalis of Meynert presynaptic modulator	myasthenia gravis Alzheimer's
tyrosine + O ₂ \xrightarrow{TH} L-DOPA \xrightarrow{AAAD} <chem>Oc1ccc(O)cc1CCN</chem> dopamine	substant. nigra → caudate n. midbrain → limbic system	Parkinson's drug addiction schizophrenia
dopamine \xrightarrow{DBH} <chem>Oc1ccc(O)cc1C(O)CN</chem> norepinephrine	sympathetic endings locus coeruleus	depression
norepinephrine \xrightarrow{PNMT} <chem>Oc1ccc(O)cc1C(O)CN(C)C</chem> epinephrine	adrenal medulla (neurohormone)	
tryptophan + O ₂ \xrightarrow{TrH} 5-HTP \xrightarrow{AAAD} <chem>Cc1ccc(O)cc1N</chem> serotonin	raphé n.	depression
glutamate	major excitatory transmitter in brain	stroke
glutamate \xrightarrow{GAD} gamma-amino butyric acid (GABA)	major inhibitory transmitter in brain	epilepsy
glycine	major inhibitory transmitter in spinal cord	

Some Families of Neuroactive Peptides

Family	Peptide members
Opioids	Opiocortins, enkephalins, dynorphin, FMRamide
Neurohypophysial hormones	Vasopressin, oxytocin, neurophysins
Tachykinins	Substance P, physalaemin, kassinin, upeleoin, eledoisin, bombesin, substance K
Secretins	Secretin, glucagon, vasoactive intestinal peptide, gastric inhibitory peptide, growth hormone-releasing factor, peptide histidine isoleucineamide
Insulins	Insulin, insulin-like growth factors I and II
Somatostatins	Somatostatins, pancreatic polypeptide
Gastrins	Gastrin, cholecystokinin

Principles, Table 15-3





Utility of second messengers

- lengthening of signal
- amplification of signal
- divergence to several targets
- convergence to single target
- spatial spreading of signal
- regulation of gene transcription