

Information Transmission and Signal Transduction

Nucleic Acids

Enzymes

Context-Dependent Molecules

Definitions

Endocrine

Paracrine

Autocrine

Hormone

Receptor

Affinity

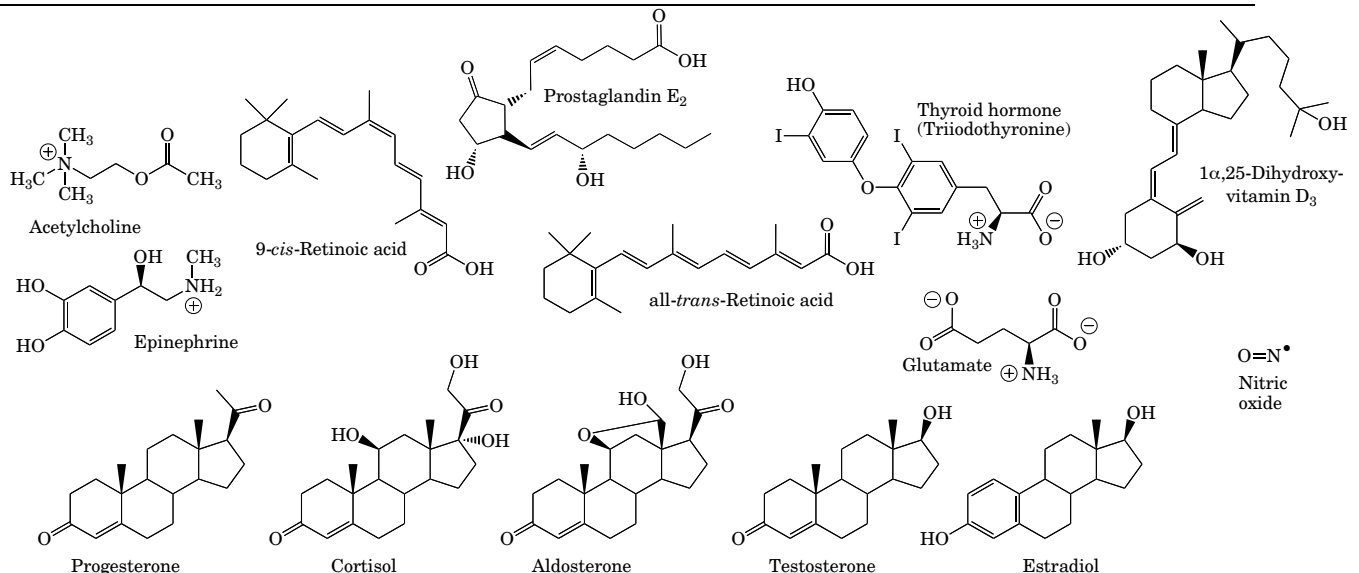
Specificity

Capacity

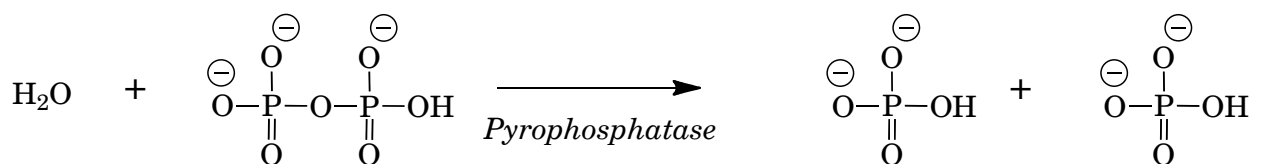
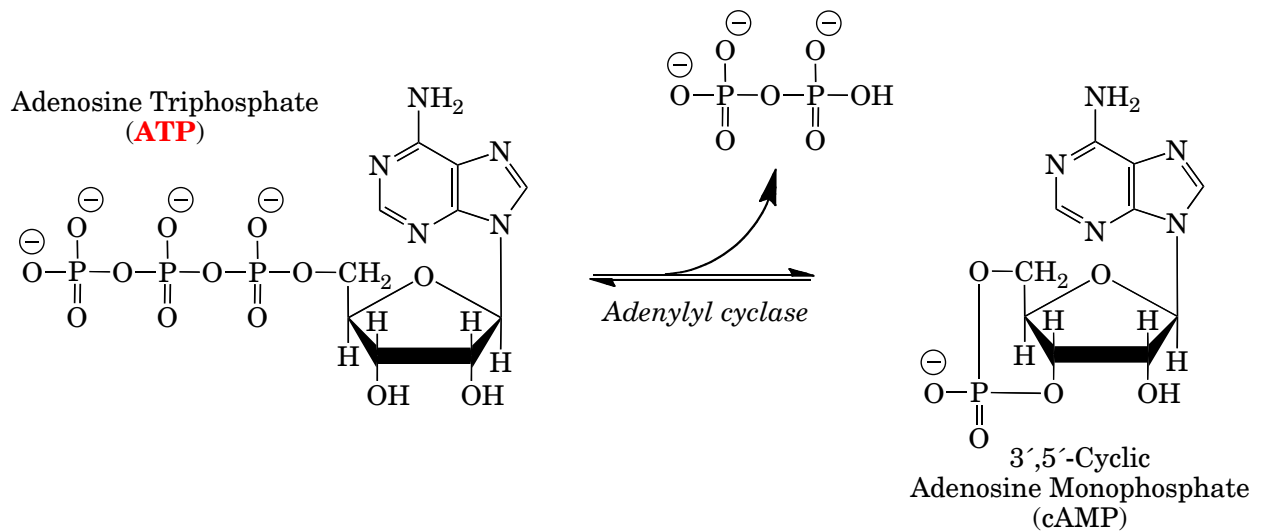
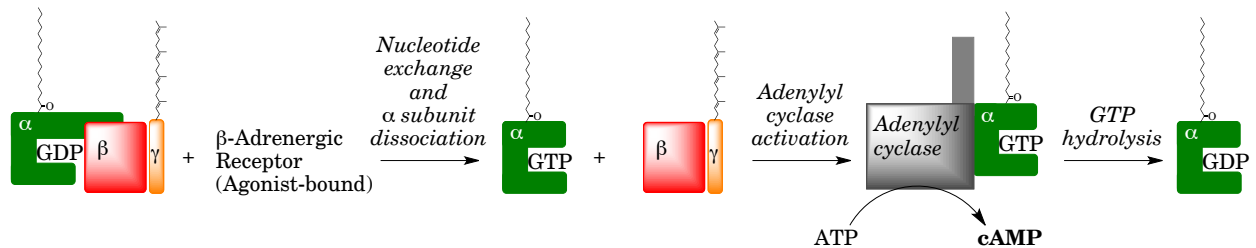
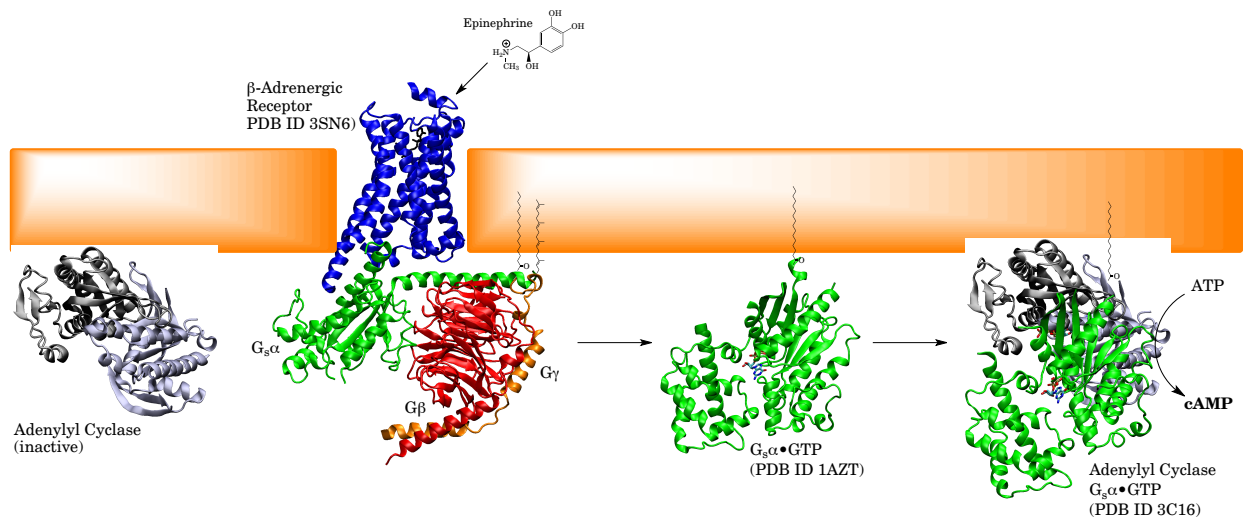
Mechanism

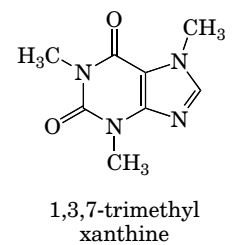
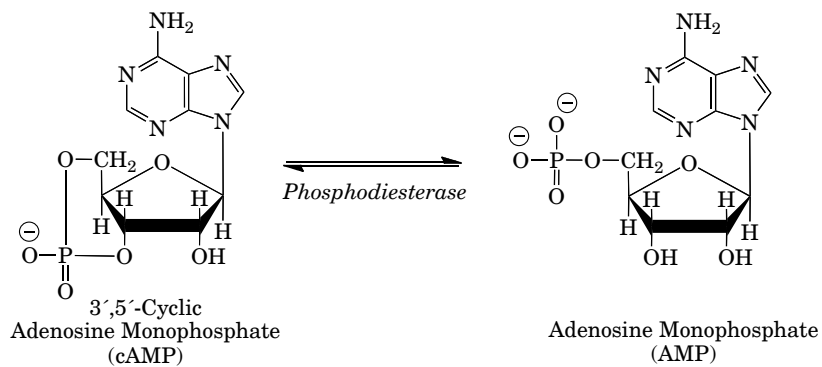
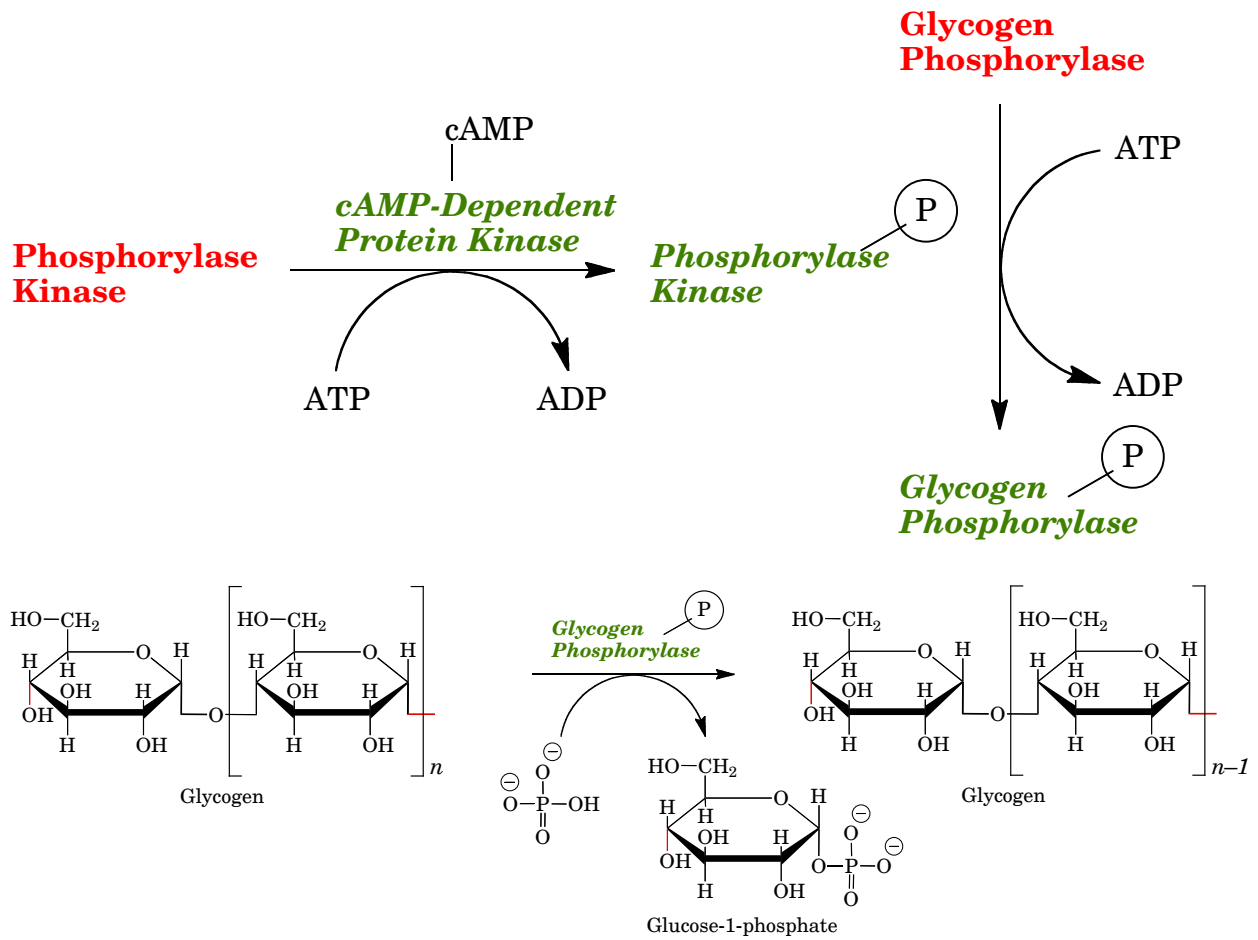
Partial List of Signaling Molecules and Their Receptors

Type of Signaling Molecule	Examples	Receptor Location	Mechanism of Action
Glycoprotein	LH, FSH	Cell surface	G-protein coupled
Polypeptide	PTH, Calcitonin	Cell surface	G-protein coupled
Polypeptide	Insulin, IGF-I, EGF	Cell surface	Tyrosine kinase
Polypeptide	Atrial Natriuretic Peptide	Cell surface	Guanylyl cyclase
Amino acid	Glutamate	Cell surface	Ion channel or G-protein coupled
Amino acid derivative	Epinephrine	Cell surface	G-protein coupled
Amino acid derivative	Triiodothyronine	Intracellular	Transcription factor
Amine	Acetylcholine	Cell surface	Ion channel or G-protein coupled
Fatty acid derivative	Prostaglandin PGE ₂	Cell surface	G-protein coupled
Steroid	Estradiol, Testosterone, Cortisol	Intracellular	Transcription factor
Steroid	Estradiol	Cell surface	Ion channel
Terpene	Retinoic acid	Intracellular	Transcription factor
Gas	Nitric Oxide	Intracellular	Guanylyl cyclase
Extracellular Ion	Calcium	Cell surface	G-protein coupled

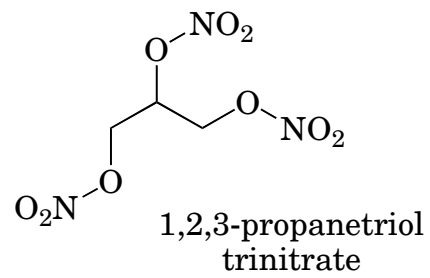
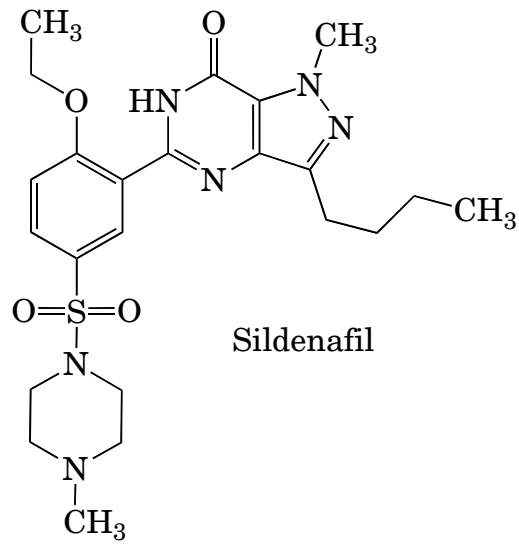
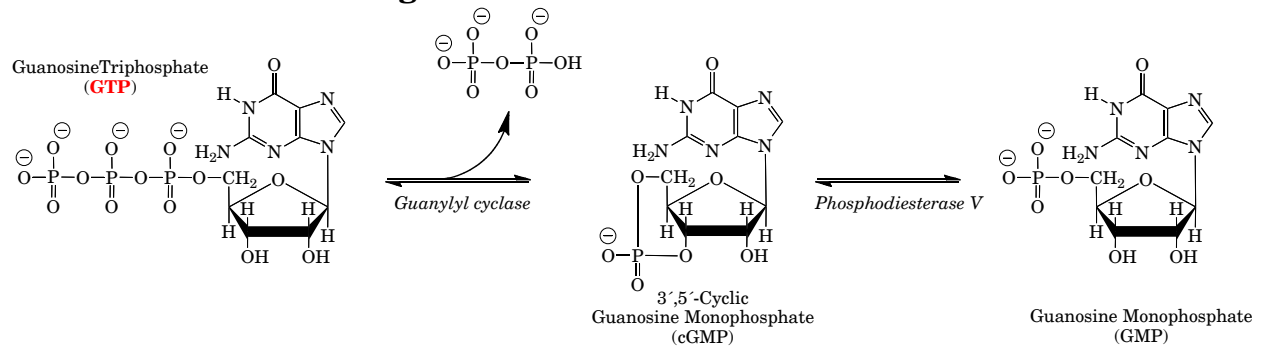


G-Protein Coupled Receptors

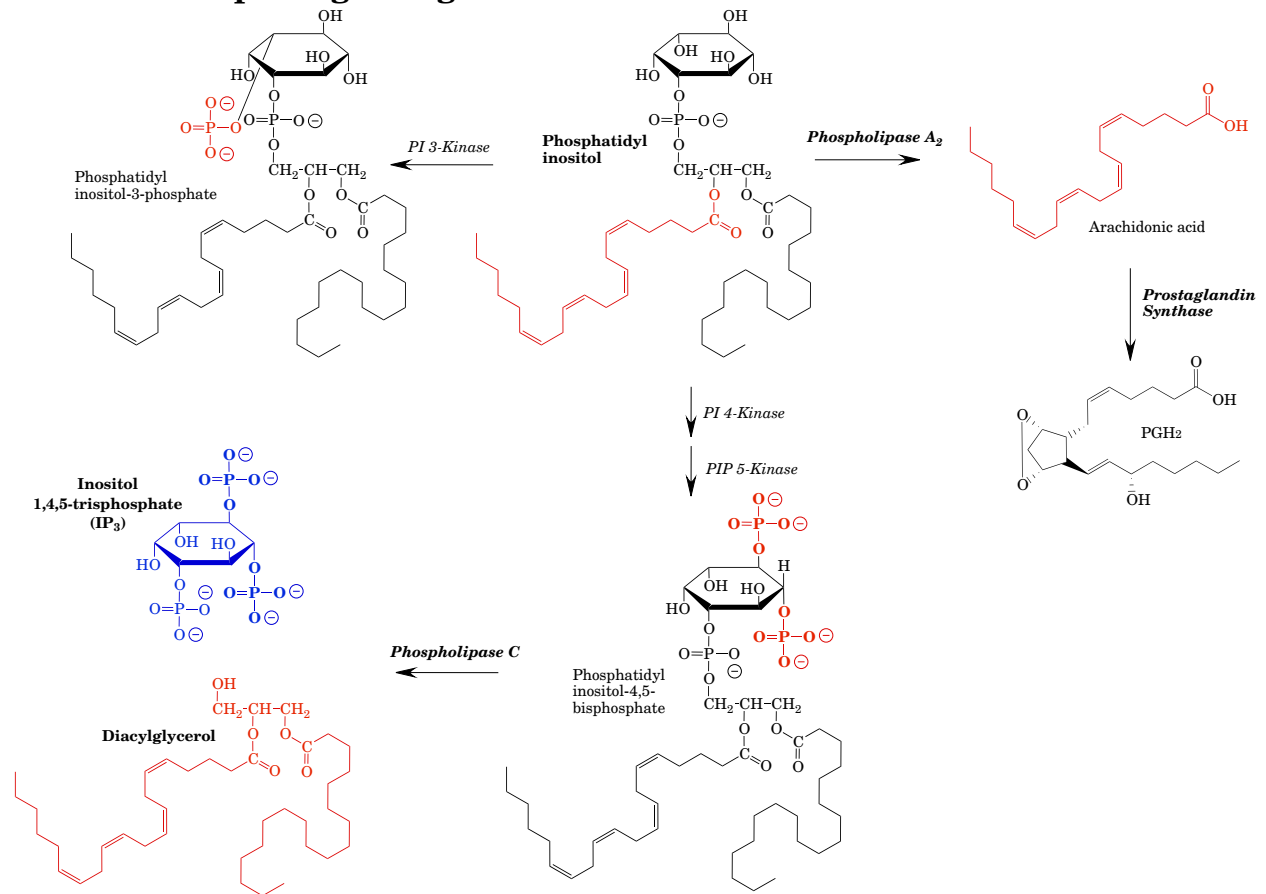




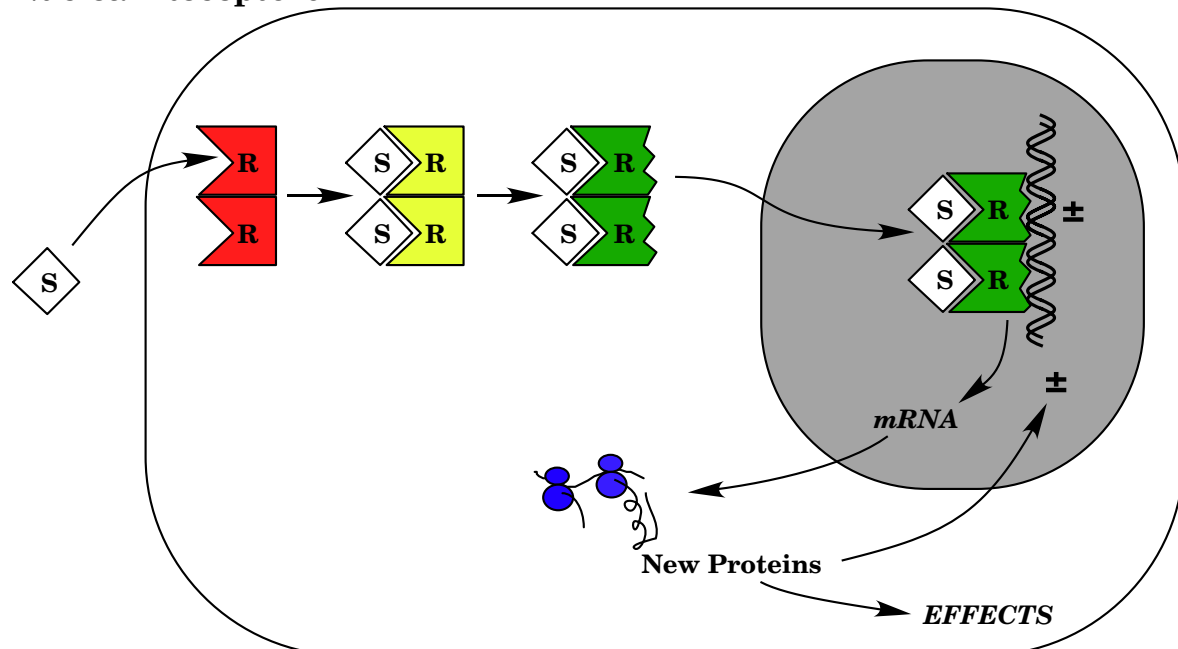
Related Second Messengers



Membrane Lipid Signaling



Nuclear Receptors



Major Metabolic Control Hormones

Hormone	Receptor	Second messenger	Mechanism	Target tissues
Insulin (51 amino acid heterodimeric peptide)	Tyrosine kinase	Phosphorylated proteins decreased cAMP	Δ Enzyme activity Gene transcription	Liver, muscle, adipose, pancreas, many others
Glucagon (29 amino acid peptide)	G-protein coupled	cAMP	Δ Enzyme activity Sometimes gene transcription	Liver, pancreas
Cortisol (steroid)	Transcription factor	Altered level of specific mRNA	Gene transcription	Nearly all
Epinephrine (tyrosine derivative)	G-protein coupled (at least four types)	cAMP decreased cAMP PI hydrolysis	Δ Enzyme activity	Liver, muscle, adipose, brain, pancreas, cardiovascular
Growth hormone (191 amino acid protein)	Cytokine family cell surface	Tyrosine kinase PI hydrolysis	Δ Enzyme activity Sometimes gene transcription	Liver, muscle, adipose; others mediated by IGF-I
Thyroid hormone (tyrosine derivative)	Transcription factor	Altered level of specific mRNA	Gene transcription	Nearly all
Androgens (steroid)	Transcription factor	Altered level of specific mRNA	Gene transcription	Muscle, gonads, brain