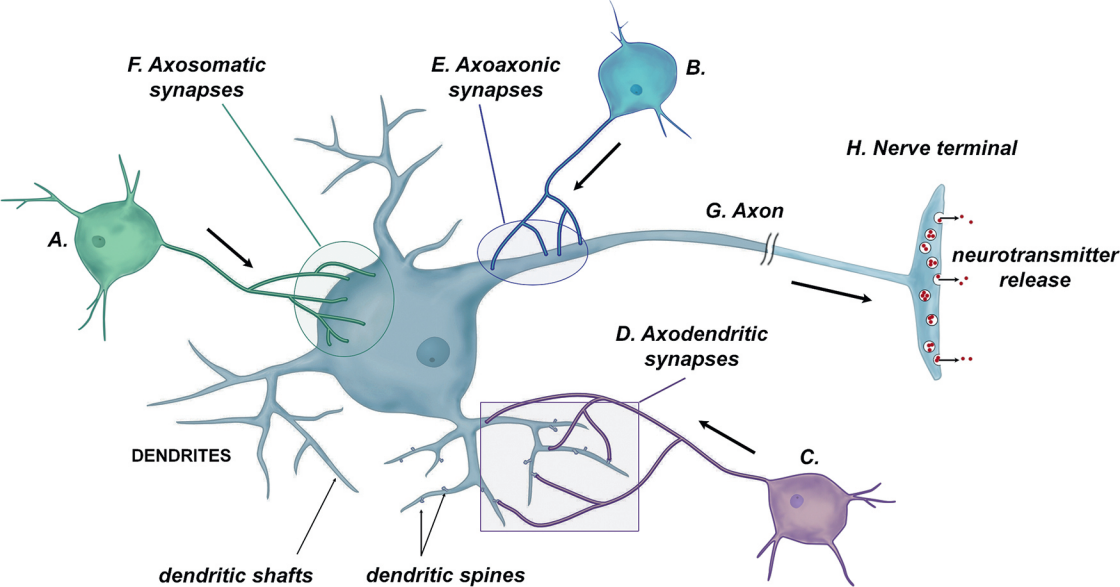
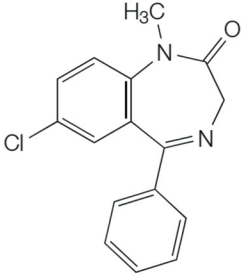
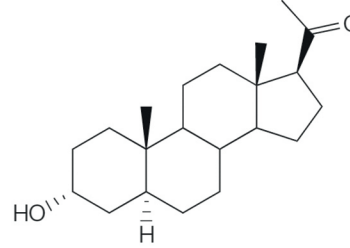
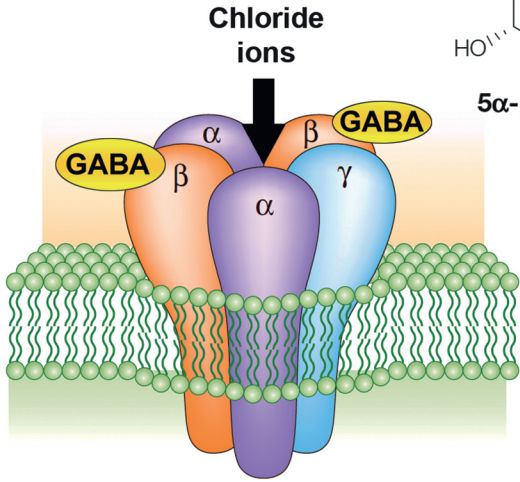

F. Axosomatic synapses
E. Axoaxonic synapses
B.
H. Nerve terminal
G. Axon
A.
neurotransmitter release
D. Axodendritic synapses
DENDRITES
C.
dendritic shafts
dendritic spines

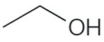


Diazepam

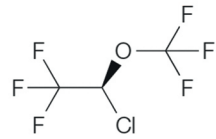


5α-pregnan-3α-ol-20-one

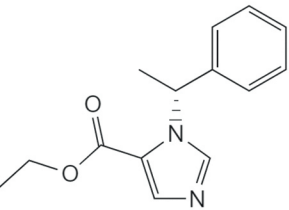




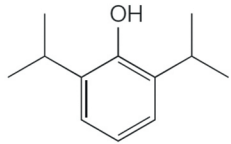
Ethanol



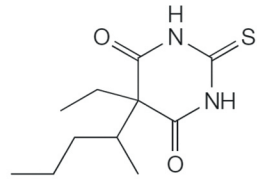
S-Isoflurane



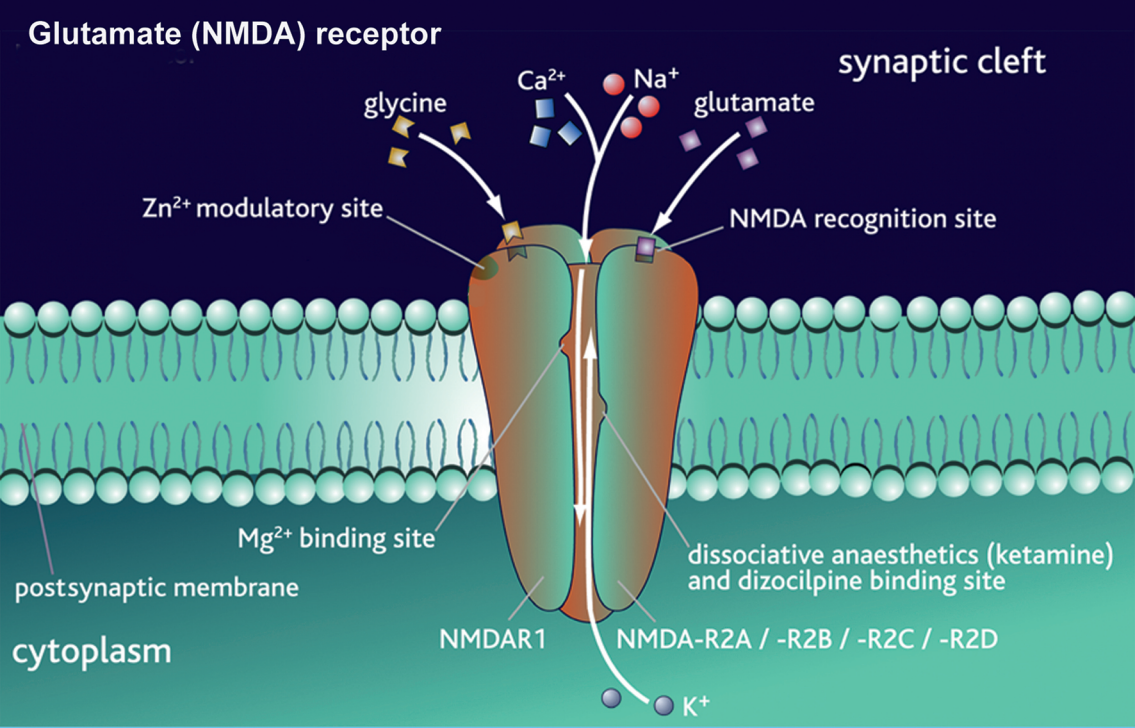
R-(+)-Etomidate

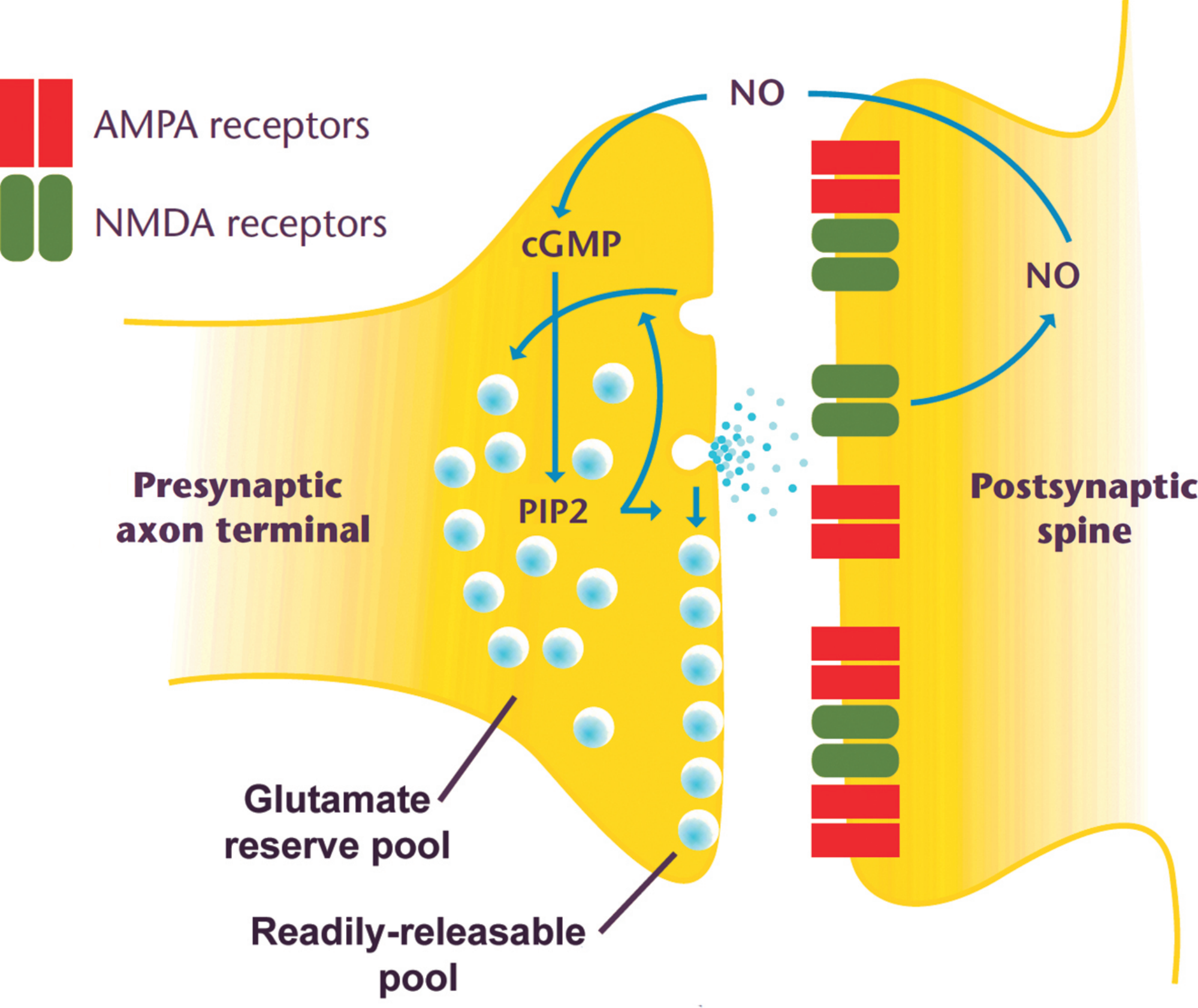


Propofol



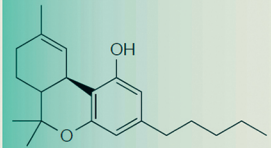
Thiopental


Glutamate (NMDA) receptor
synaptic cleft
glycine
Ca^{2+}
Na^{+}
glutamate
Zn^{2+} modulatory site
NMDA recognition site
Mg^{2+} binding site
dissociative anaesthetics (ketamine) and dizocilpine binding site
postsynaptic membrane
cytoplasm
NMDAR1
NMDA-R2A / -R2B / -R2C / -R2D
K^{+}


AMPA receptors
NMDA receptors
NO
cGMP
NO
Presynaptic
axon terminal
PIP2
Postsynaptic
spine
Glutamate
reserve pool
Readily-releasable
pool

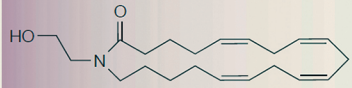
Plant-derived cannabinoid

Δ^9-Tetrahydrocannabinol (THC)

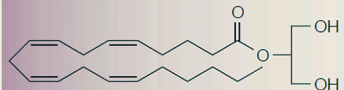


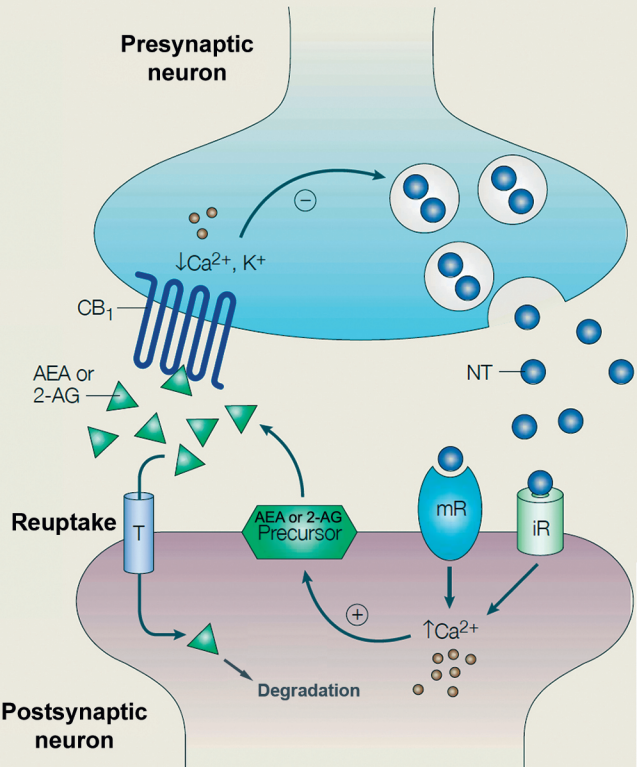
Endogenous cannabinoids

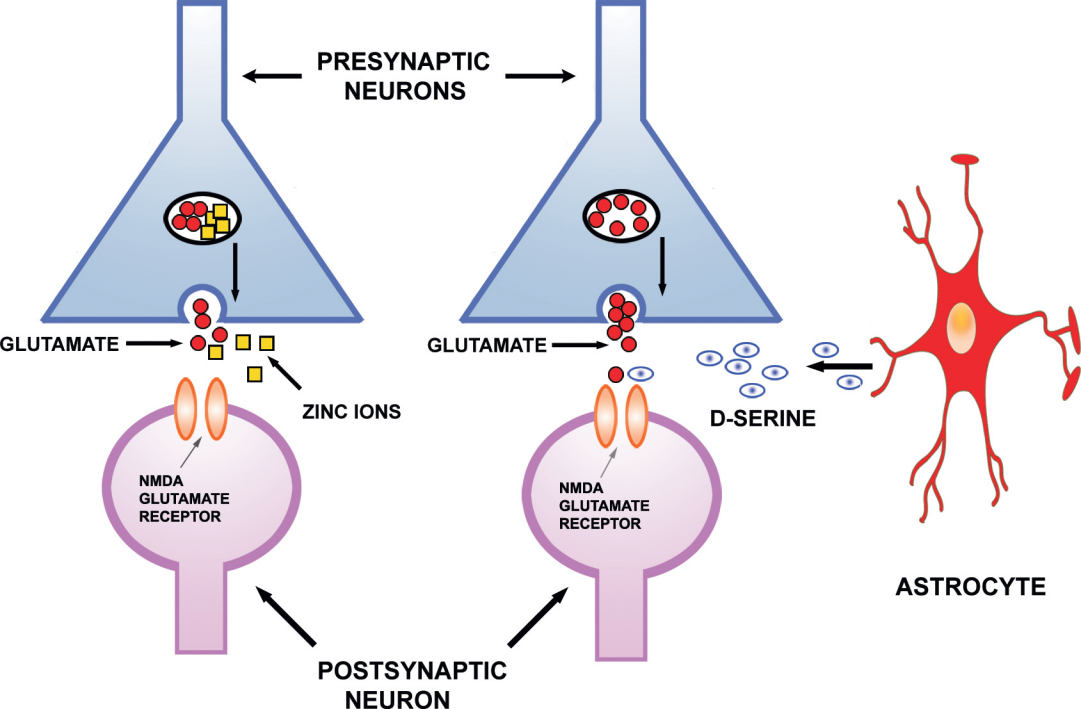
Anandamide (AEA)

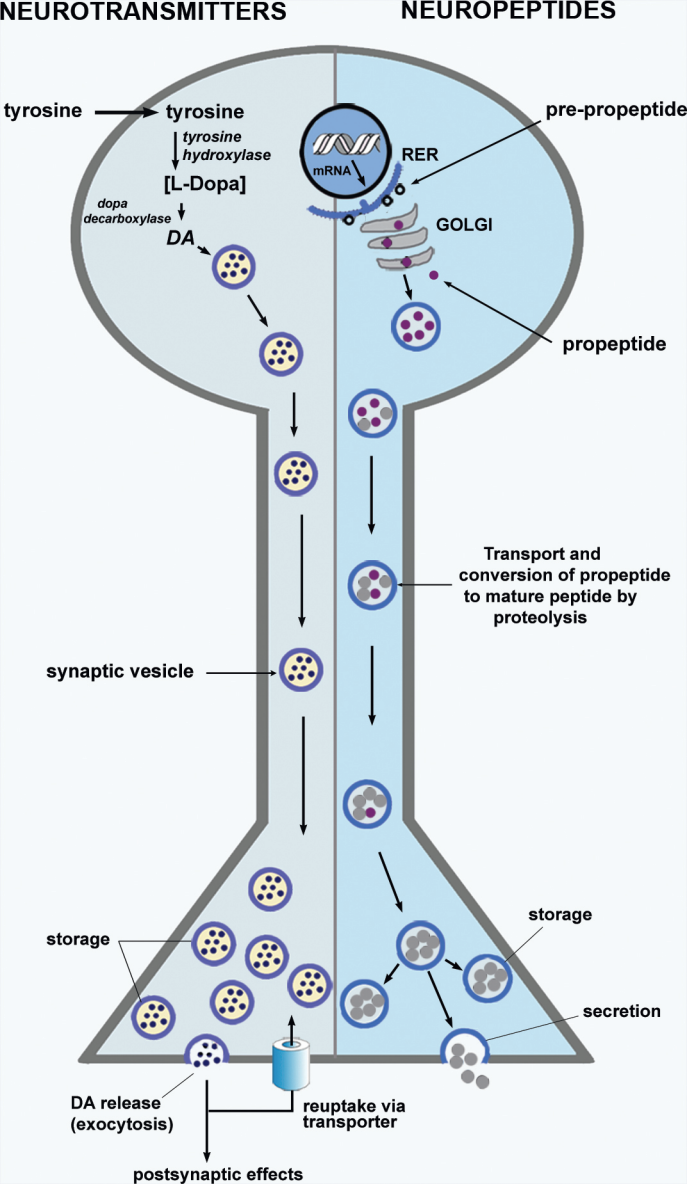


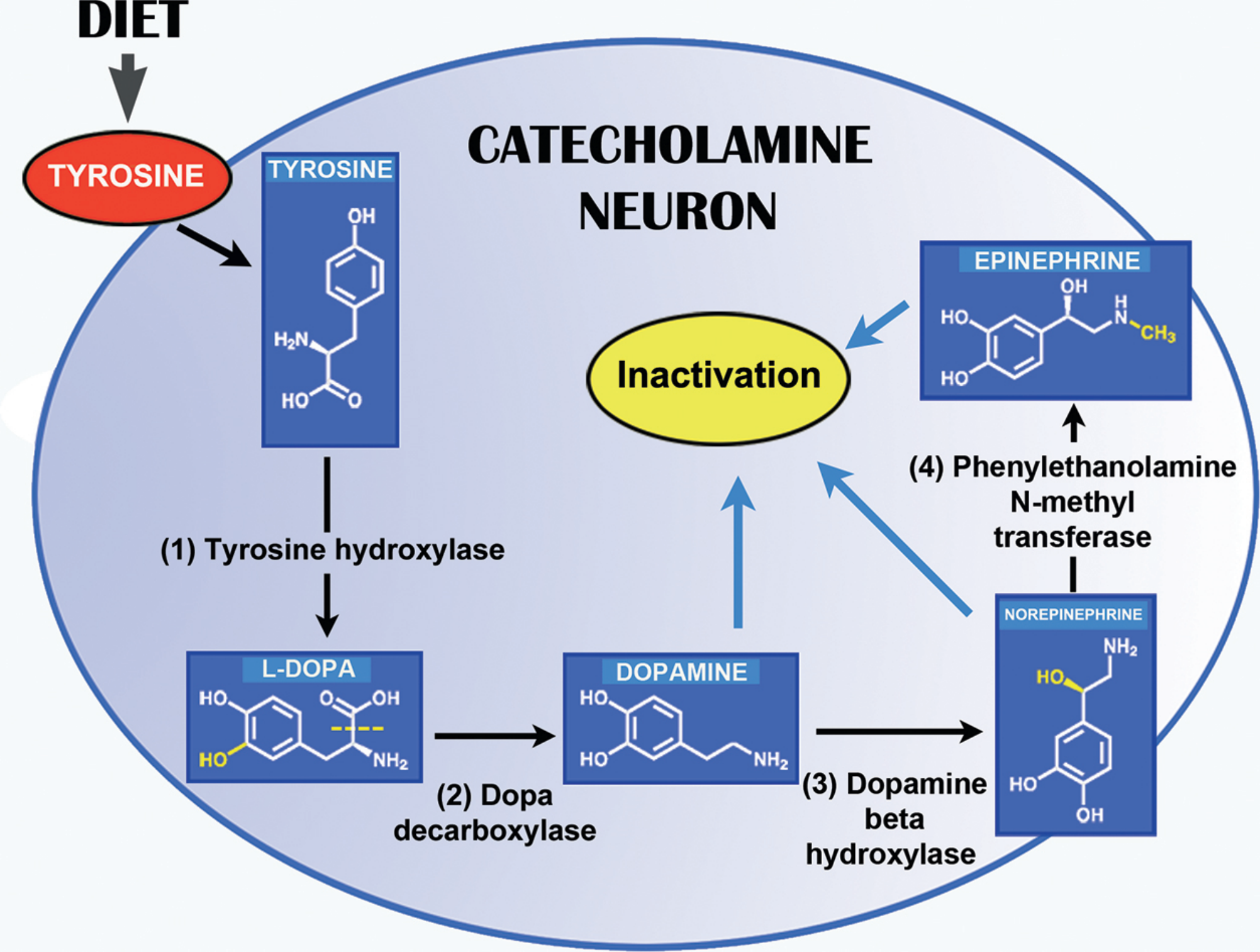
2-Arachidonoyl glycerol (2-AG)

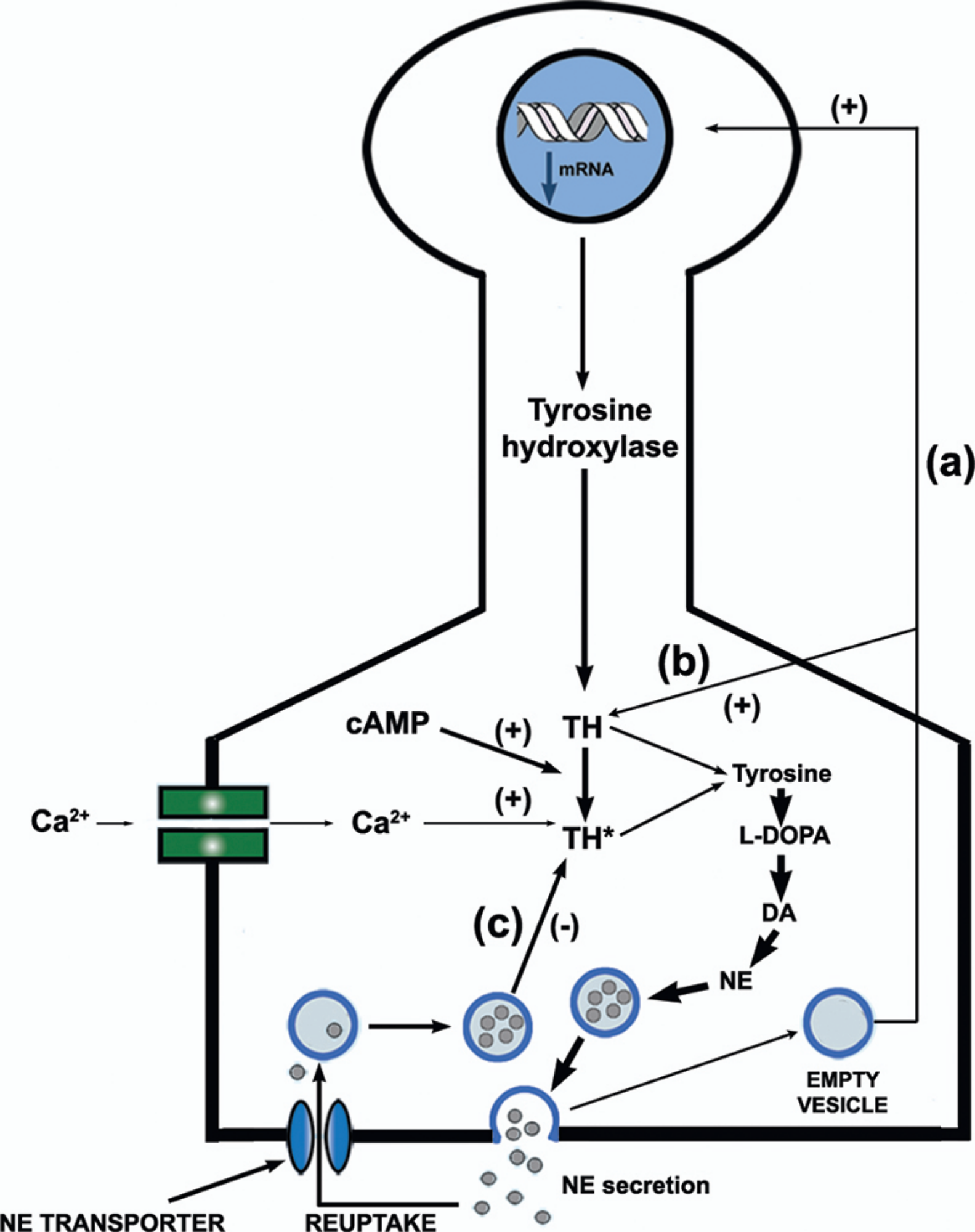


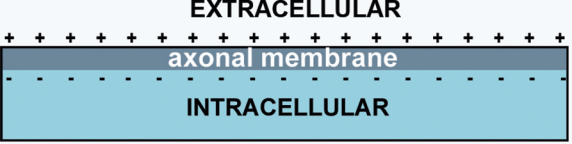



PRESYNAPTIC NEURONS
GLUTAMATE
ZINC IONS
NMDA GLUTAMATE RECEPTOR
GLUTAMATE
D-SERINE
NMDA GLUTAMATE RECEPTOR
ASTROCYTE
POSTSYNAPTIC NEURON

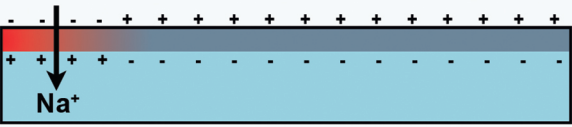

NEUROTRANSMITTERS
NEUROPEPTIDES
tyrosine
tyrosine
tyrosine hydroxylase
[L-Dopa]
dopa decarboxylase
DA
mRNA
RER
pre-propeptide
GOLGI
propeptide
Transport and conversion of propeptide to mature peptide by proteolysis
synaptic vesicle
storage
storage
secretion
DA release (exocytosis)
reuptake via transporter
postsynaptic effects


DIET
TYROSINE
CATECHOLAMINE NEURON
TYROSINE
OH
H_2N
HO
O
Inactivation
EPINEPHRINE
OH
H
N
CH_3
HO
HO
(4) Phenylethanolamine N-methyl transferase
(1) Tyrosine hydroxylase
L-DOPA
HO
O
OH
HO
NH_2
DOPAMINE
HO
HO
NH_2
(2) Dopa decarboxylase
(3) Dopamine beta hydroxylase
NOREPINEPHRINE
NH_2
HO
HO
OH

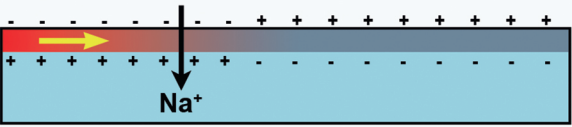

(+)
mRNA
Tyrosine hydroxylase
(a)
(b)
(+)
cAMP
(+)
TH
Tyrosine
Ca2+
(+)
Ca2+
TH*
L-DOPA
DA
(c)
(-)
NE
EMPTY VESICLE
NE secretion
NE TRANSPORTER
REUPTAKE



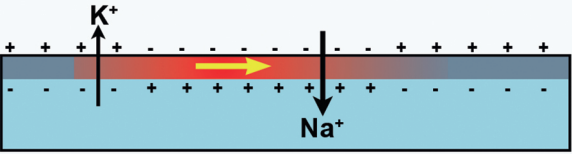
A. Resting membrane potential.



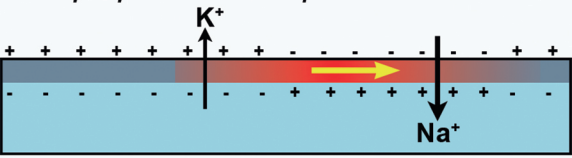
B. Action potential initiated by influx of Na+ ions: polarity of membrane reversed.



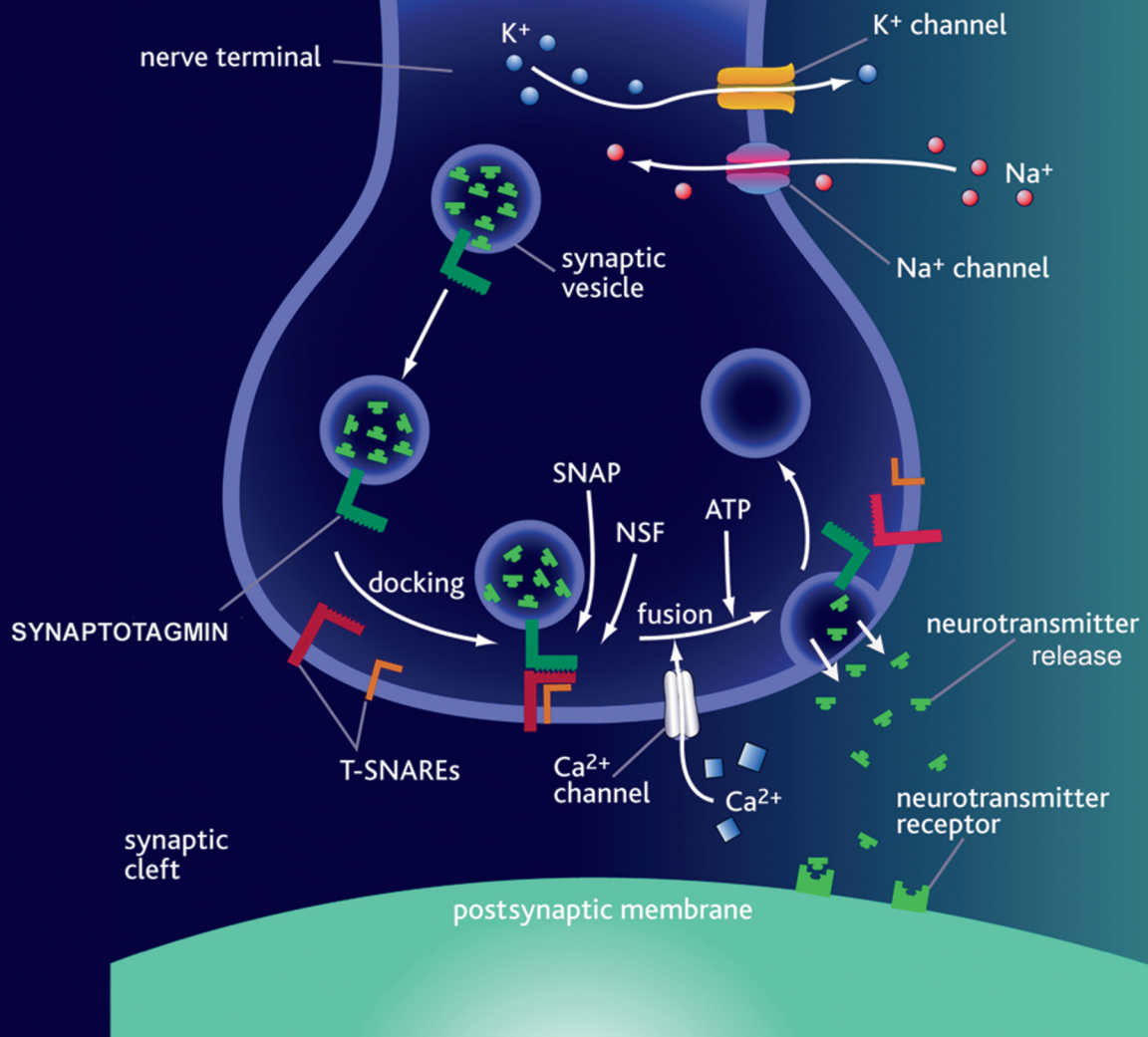
C. Polarization spreads with continued influx of Na+.

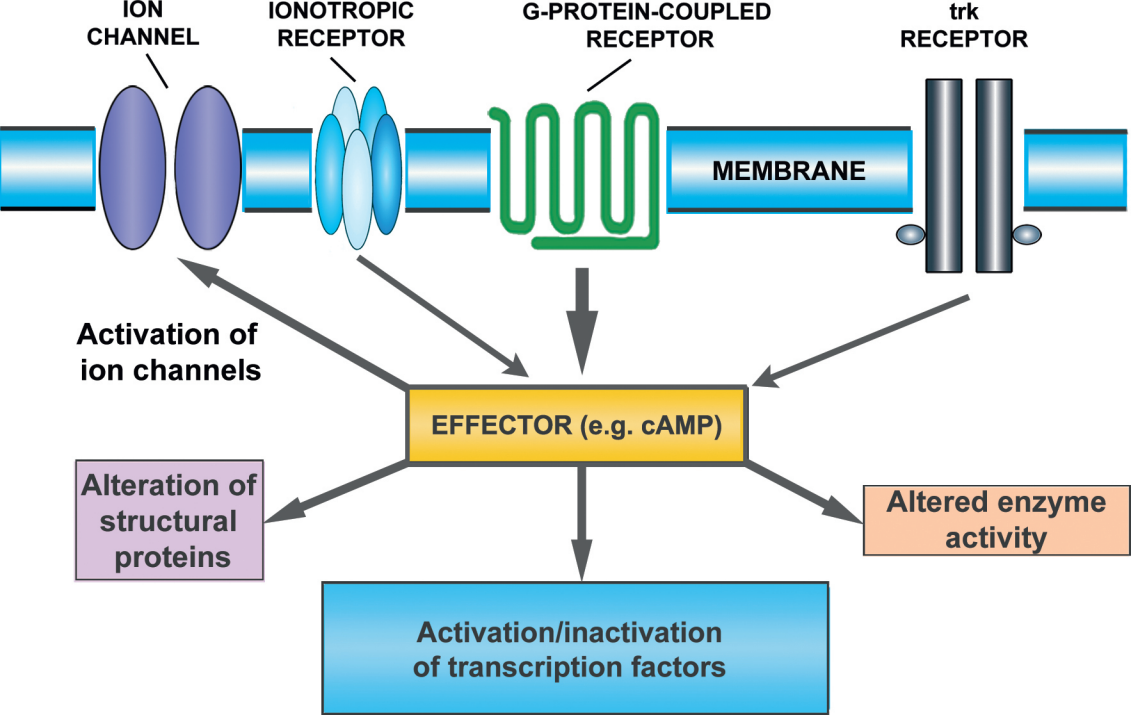


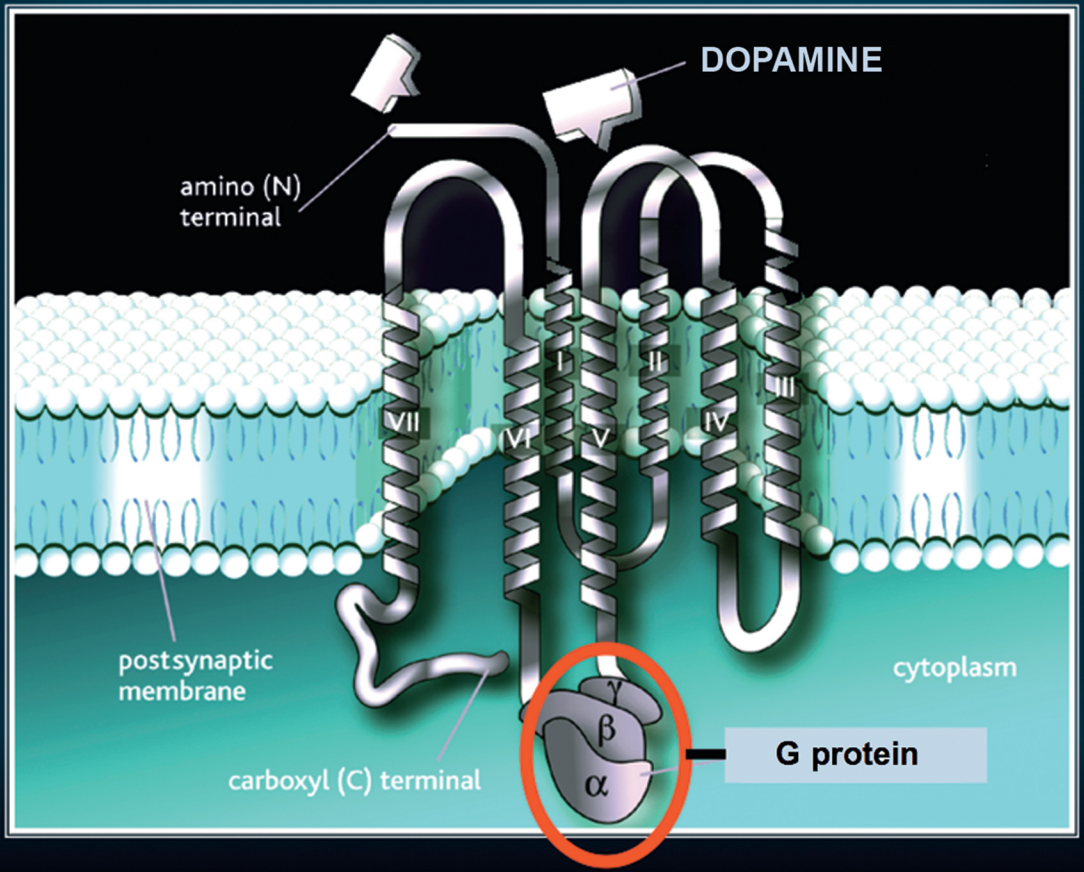
D. Action potential moves down axon and K+ ions are pumped out to restore polarization.

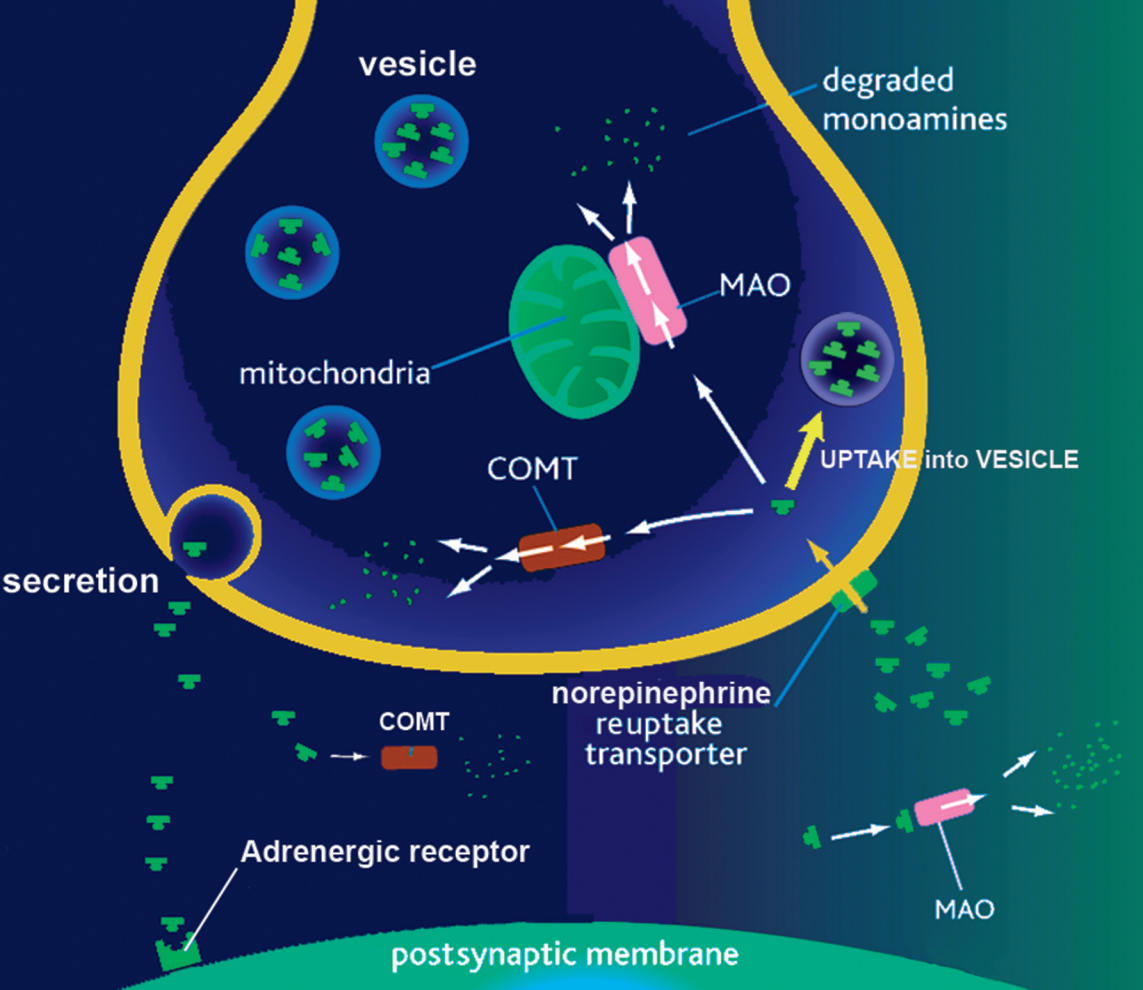


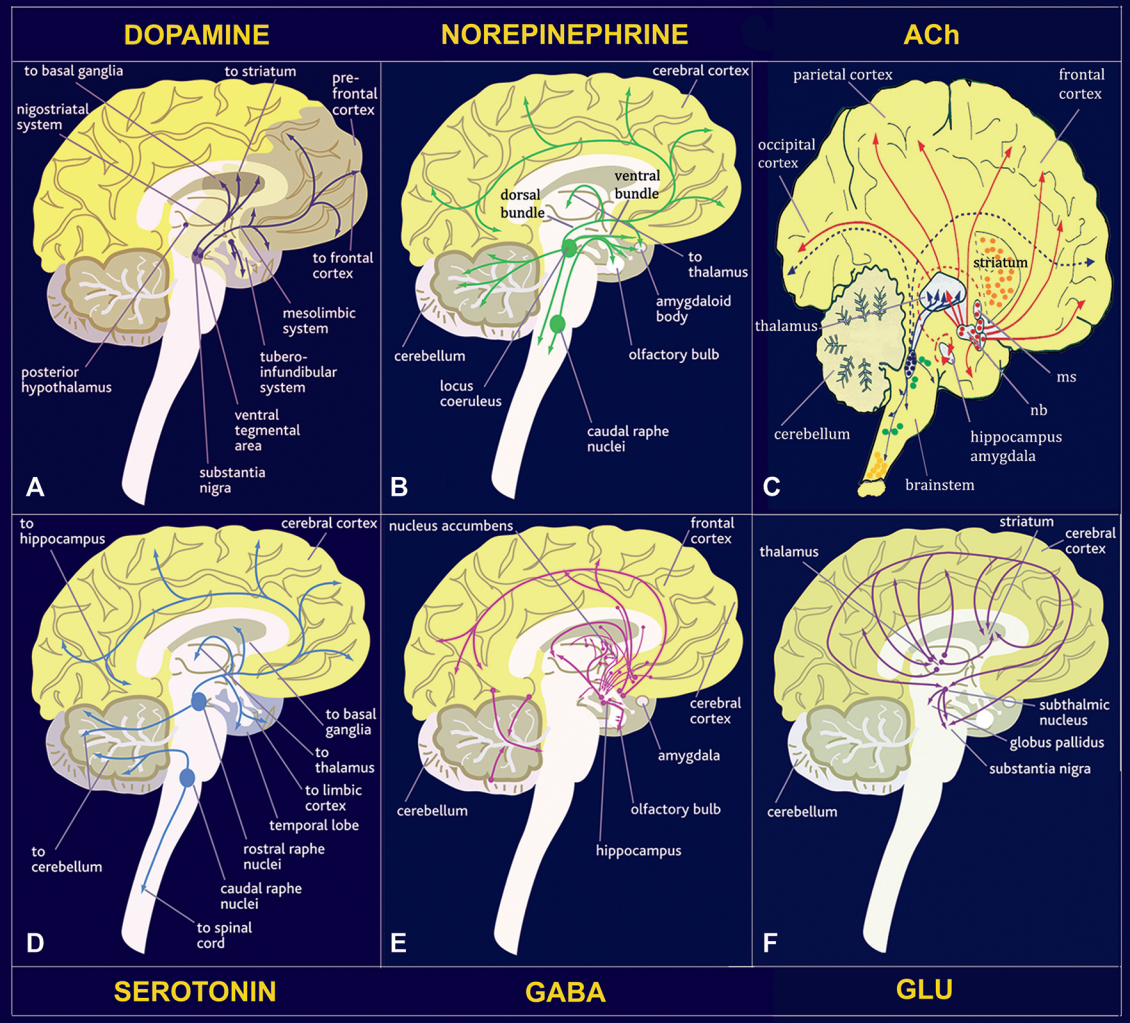
E. Action potential continues down axon.

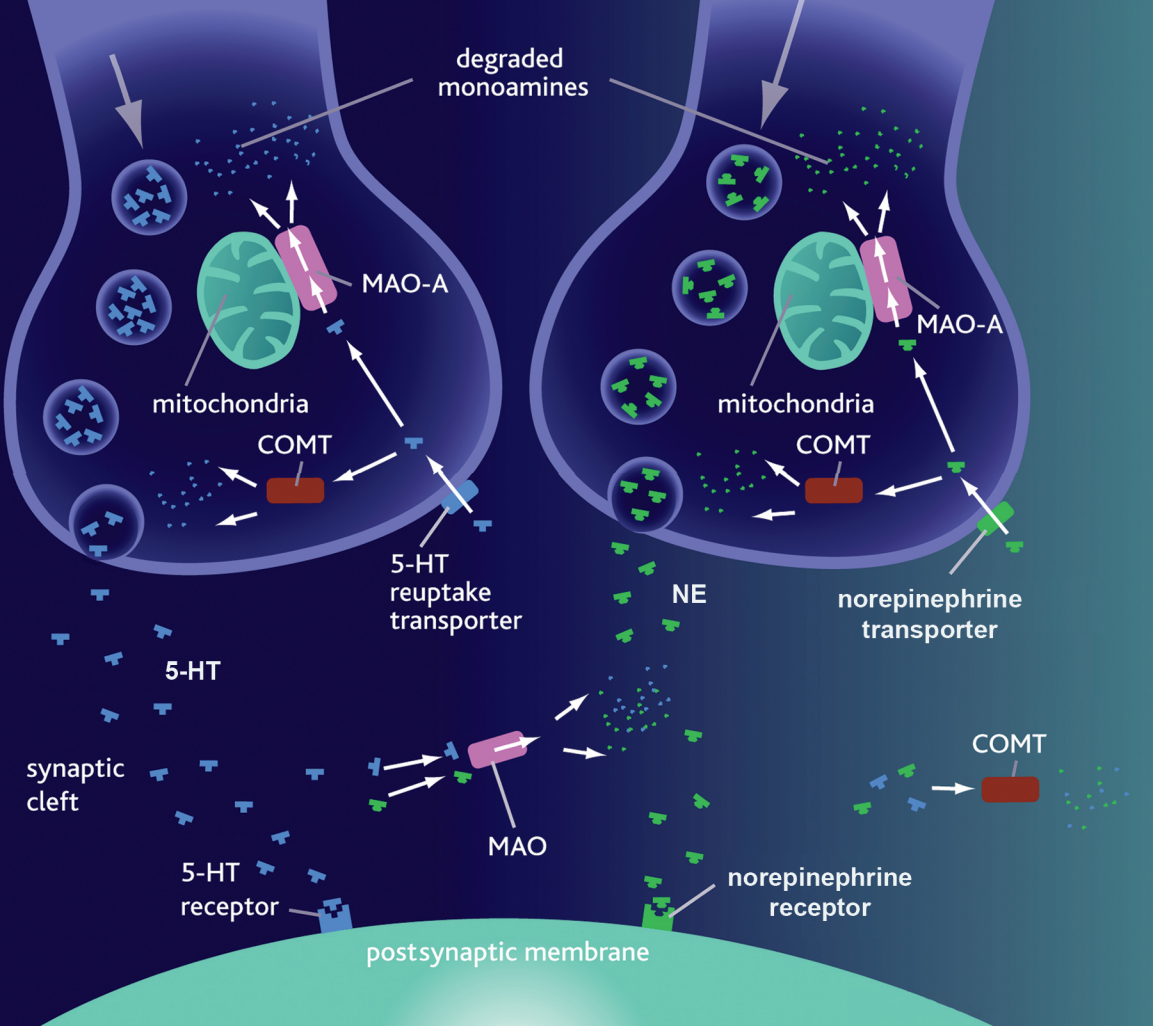

nerve terminal
K+
K+ channel
Na+
Na+ channel
synaptic vesicle
SNAP
NSF
ATP
docking
fusion
SYNAPTOTAGMIN
T-SNAREs
Ca2+ channel
Ca2+
neurotransmitter release
neurotransmitter receptor
synaptic cleft
postsynaptic membrane

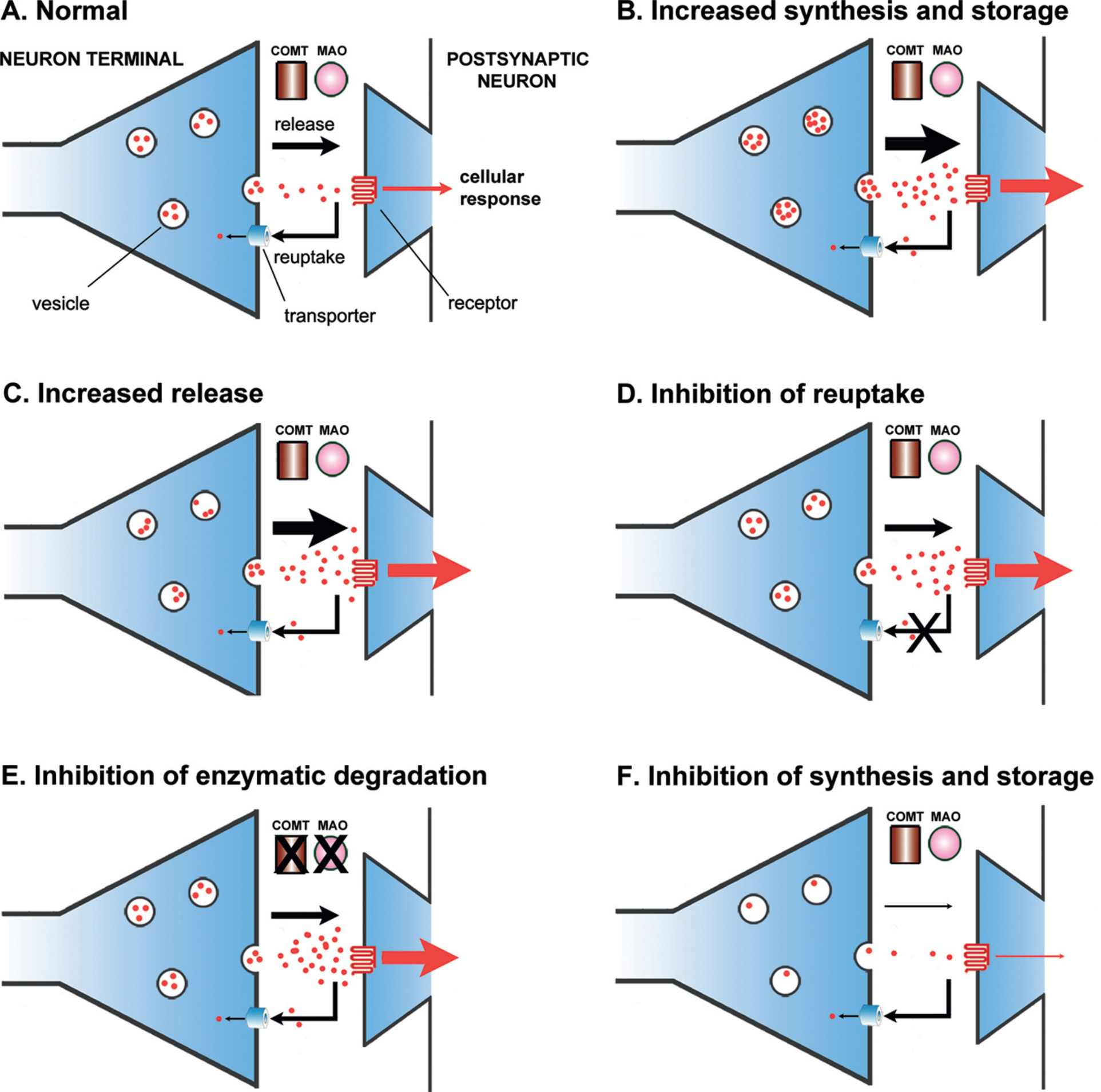

ION CHANNEL
IONOTROPIC RECEPTOR
G-PROTEIN-COUPLED RECEPTOR
trk RECEPTOR
MEMBRANE
Activation of ion channels
EFFECTOR (e.g. cAMP)
Alteration of structural proteins
Altered enzyme activity
Activation/inactivation of transcription factors

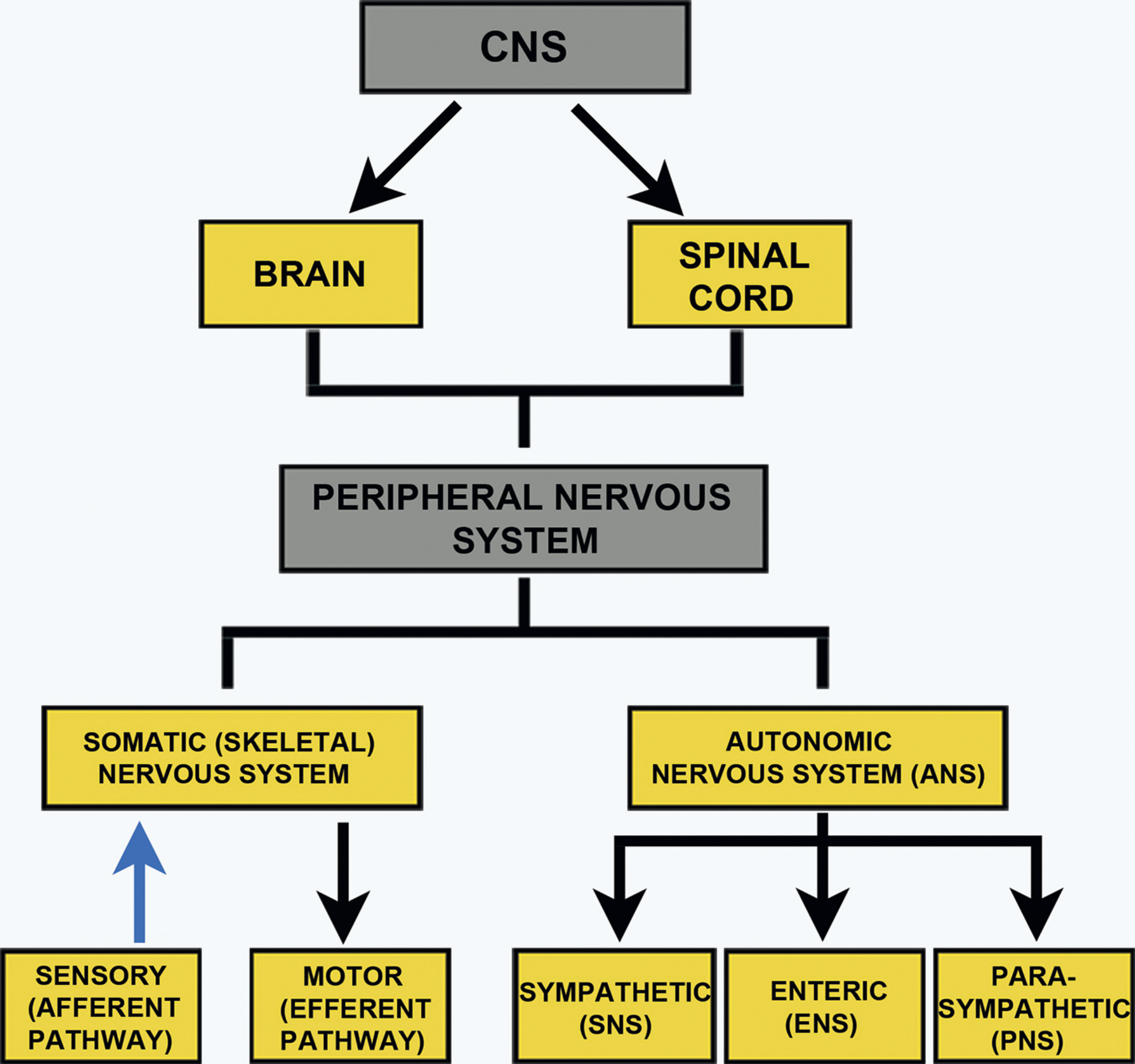

DOPAMINE
amino (N) terminal
I
II
III
IV
V
VI
VII
postsynaptic membrane
cytoplasm
carboxyl (C) terminal
γ
β
α
G protein

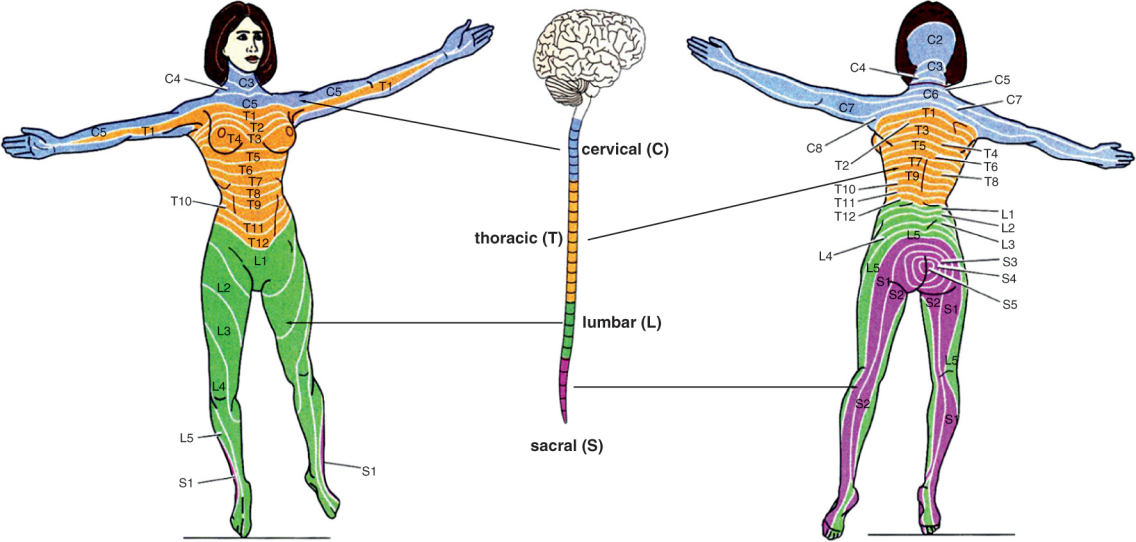

vesicle
degraded
monoamines
MAO
mitochondria
COMT
UPTAKE into VESICLE
secretion
norepinephrine
reuptake
transporter
COMT
Adrenergic receptor
MAO
postsynaptic membrane

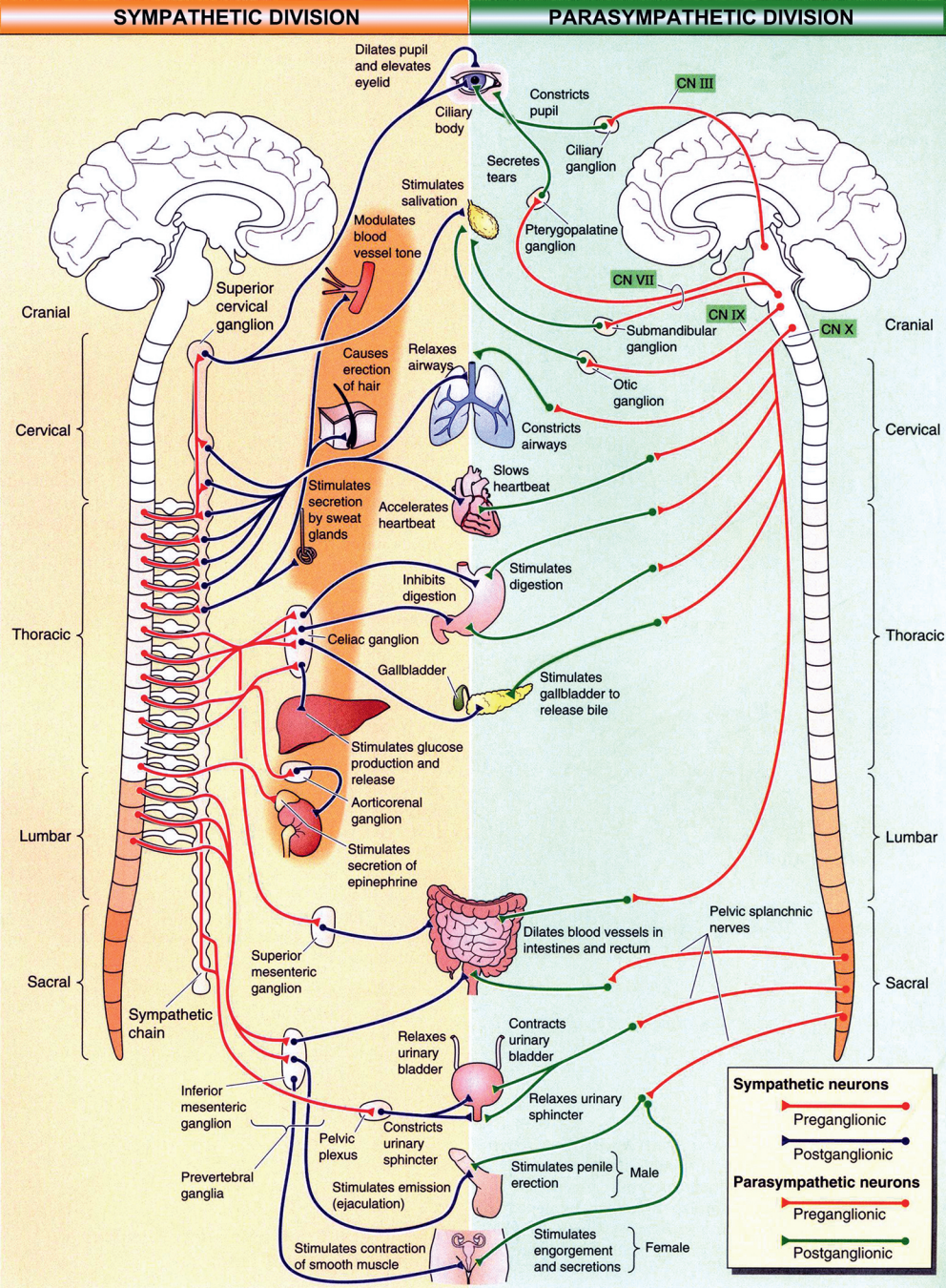

DOPAMINE
NOREPINEPHRINE
ACh
to basal ganglia
to striatum
pre-frontal cortex
nigostriatal system
to frontal cortex
mesolimbic system
tubero-infundibular system
posterior hypothalamus
ventral tegmental area
substantia nigra
A
cerebral cortex
dorsal bundle
ventral bundle
to thalamus
amygdaloid body
cerebellum
olfactory bulb
locus coeruleus
caudal raphe nuclei
B
parietal cortex
frontal cortex
occipital cortex
striatum
thalamus
ms
nb
cerebellum
hippocampus amygdala
brainstem
C
to hippocampus
cerebral cortex
to basal ganglia
to thalamus
to limbic cortex
temporal lobe
to cerebellum
rostral raphe nuclei
caudal raphe nuclei
to spinal cord
D
nucleus accumbens
frontal cortex
cerebral cortex
amygdala
cerebellum
olfactory bulb
hippocampus
E
striatum
cerebral cortex
thalamus
subthalmic nucleus
globus pallidus
substantia nigra
cerebellum
F
SEROTONIN
GABA
GLU

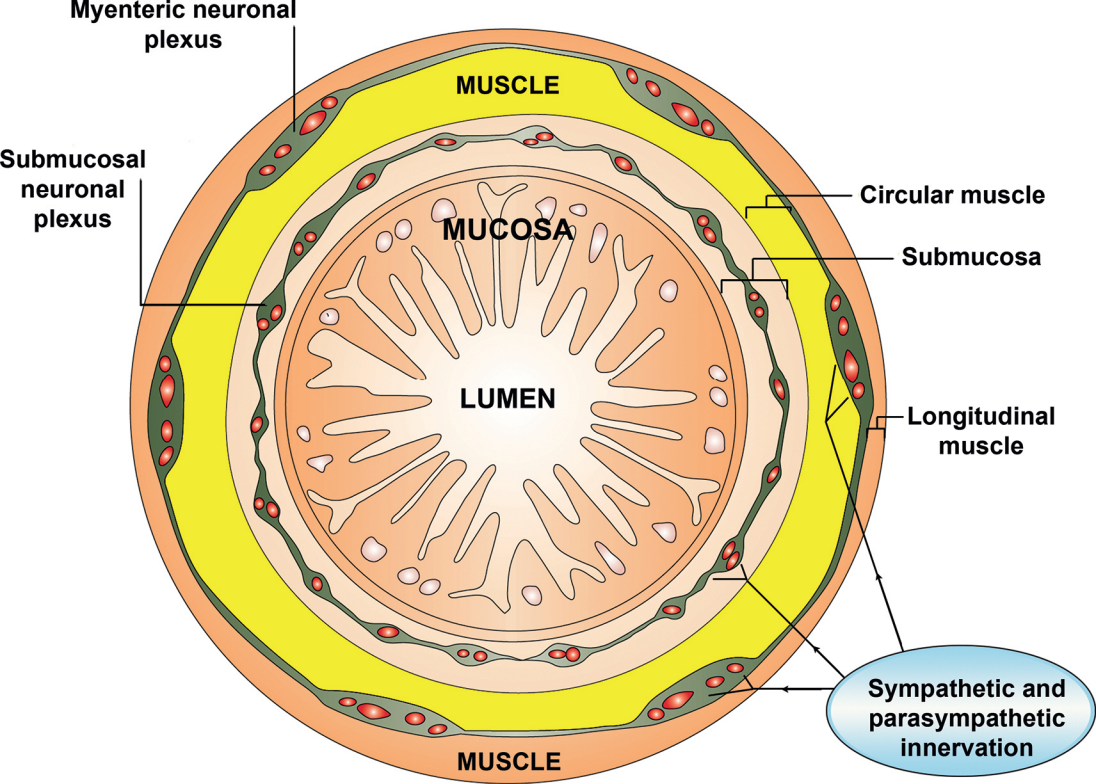

degraded
monoamines
MAO-A
mitochondria
COMT
5-HT
reuptake
transporter
MAO-A
mitochondria
COMT
NE
norepinephrine
transporter
5-HT
synaptic
cleft
MAO
COMT
5-HT
receptor
norepinephrine
receptor
postsynaptic membrane

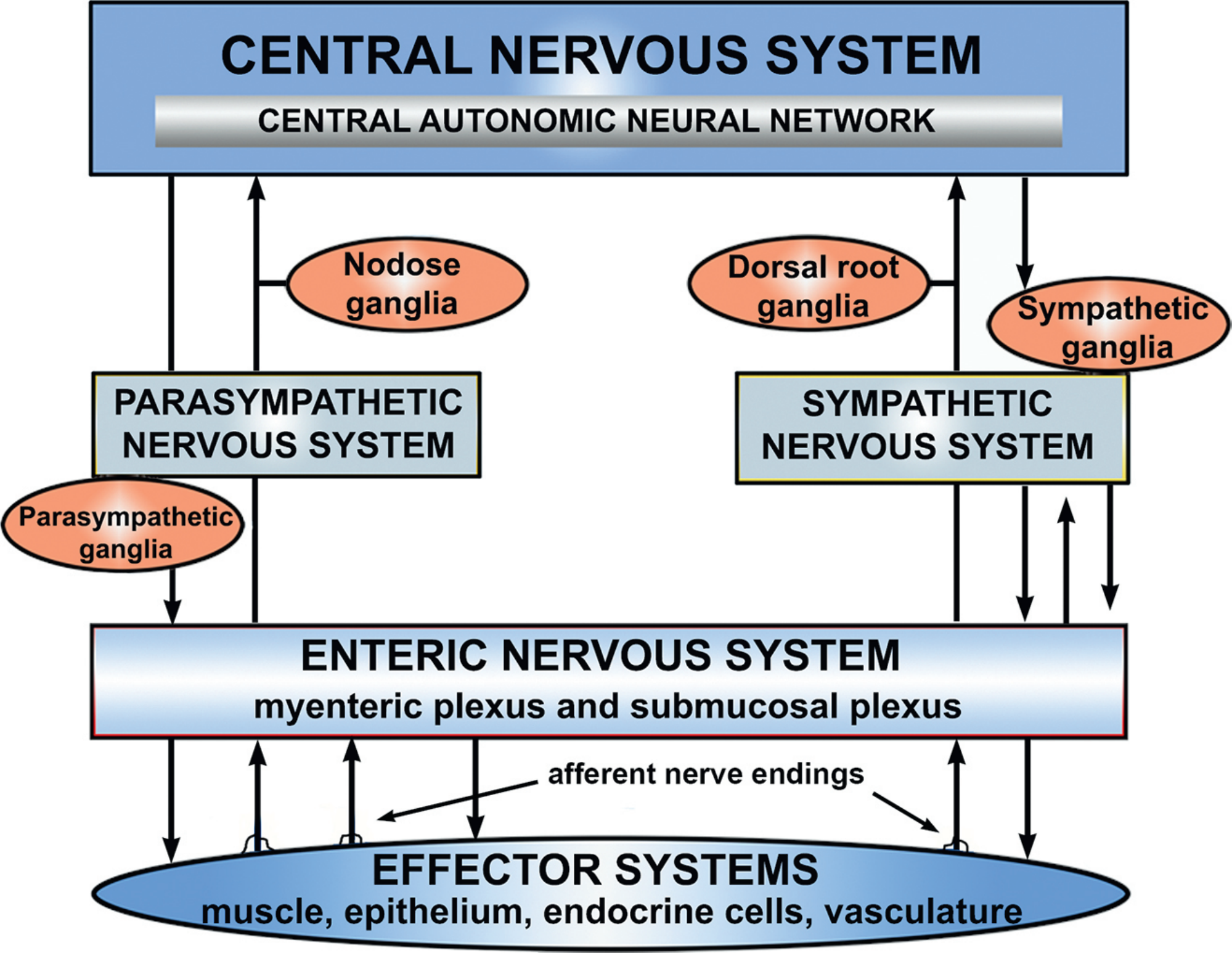

A. Normal
NEURON TERMINAL
COMT
MAO
POSTSYNAPTIC NEURON
release
cellular response
reuptake
vesicle
transporter
receptor
B. Increased synthesis and storage
C. Increased release
D. Inhibition of reuptake
E. Inhibition of enzymatic degradation
F. Inhibition of synthesis and storage


CNS
BRAIN
SPINAL CORD
PERIPHERAL NERVOUS SYSTEM
SOMATIC (SKELETAL) NERVOUS SYSTEM
AUTONOMIC NERVOUS SYSTEM (ANS)
SENSORY (AFFERENT PATHWAY)
MOTOR (EFFERENT PATHWAY)
SYMPATHETIC (SNS)
ENTERIC (ENS)
PARA-SYMPATHETIC (PNS)


C4
C3
C5
T1
C5
T1
T4
T2
T3
T5
T6
T7
T8
T9
T10
T11
T12
L1
L2
L3
L4
L5
S1
S1
cervical (C)
thoracic (T)
lumbar (L)
sacral (S)
C2
C4
C3
C5
C6
C7
C7
C8
T1
T3
T2
T5
T4
T7
T6
T9
T8
T10
T11
T12
L1
L2
L3
L4
L5
S3
S4
S5
S1
S2
S2
L5
S2
S1


SYMPATHETIC DIVISION
PARASYMPATHETIC DIVISION
Dilates pupil and elevates eyelid
Ciliary body
Constricts pupil
CN III
Ciliary ganglion
Secretes tears
Stimulates salivation
Pterygopalatine ganglion
Modulates blood vessel tone
CN VII
CN IX
CN X
Submandibular ganglion
Otic ganglion
Cranial
Superior cervical ganglion
Causes erection of hair
Relaxes airways
Constricts airways
Cervical
Slows heartbeat
Stimulates secretion by sweat glands
Accelerates heartbeat
Inhibits digestion
Stimulates digestion
Thoracic
Celiac ganglion
Gallbladder
Stimulates gallbladder to release bile
Stimulates glucose production and release
Aorticorenal ganglion
Stimulates secretion of epinephrine
Lumbar
Pelvic splanchnic nerves
Dilates blood vessels in intestines and rectum
Superior mesenteric ganglion
Sacral
Sympathetic chain
Contracts urinary bladder
Relaxes urinary bladder
Relaxes urinary sphincter
Inferior mesenteric ganglion
Pelvic plexus
Constricts urinary sphincter
Prevertebral ganglia
Stimulates penile erection
Male
Stimulates emission (ejaculation)
Stimulates contraction of smooth muscle
Stimulates engorgement and secretions
Female
Sympathetic neurons
Preganglionic
Postganglionic
Parasympathetic neurons
Preganglionic
Postganglionic


Myenteric neuronal plexus
MUSCLE
Submucosal neuronal plexus
MUCOSA
Circular muscle
Submucosa
LUMEN
Longitudinal muscle
Sympathetic and parasympathetic innervation
MUSCLE


CENTRAL NERVOUS SYSTEM
CENTRAL AUTONOMIC NEURAL NETWORK
Nodose ganglia
Dorsal root ganglia
Sympathetic ganglia
PARASYMPATHETIC NERVOUS SYSTEM
SYMPATHETIC NERVOUS SYSTEM
Parasympathetic ganglia
ENTERIC NERVOUS SYSTEM
myenteric plexus and submucosal plexus
afferent nerve endings
EFFECTOR SYSTEMS
muscle, epithelium, endocrine cells, vasculature