

BSC 772

Neurochemistry/Receptor Theory

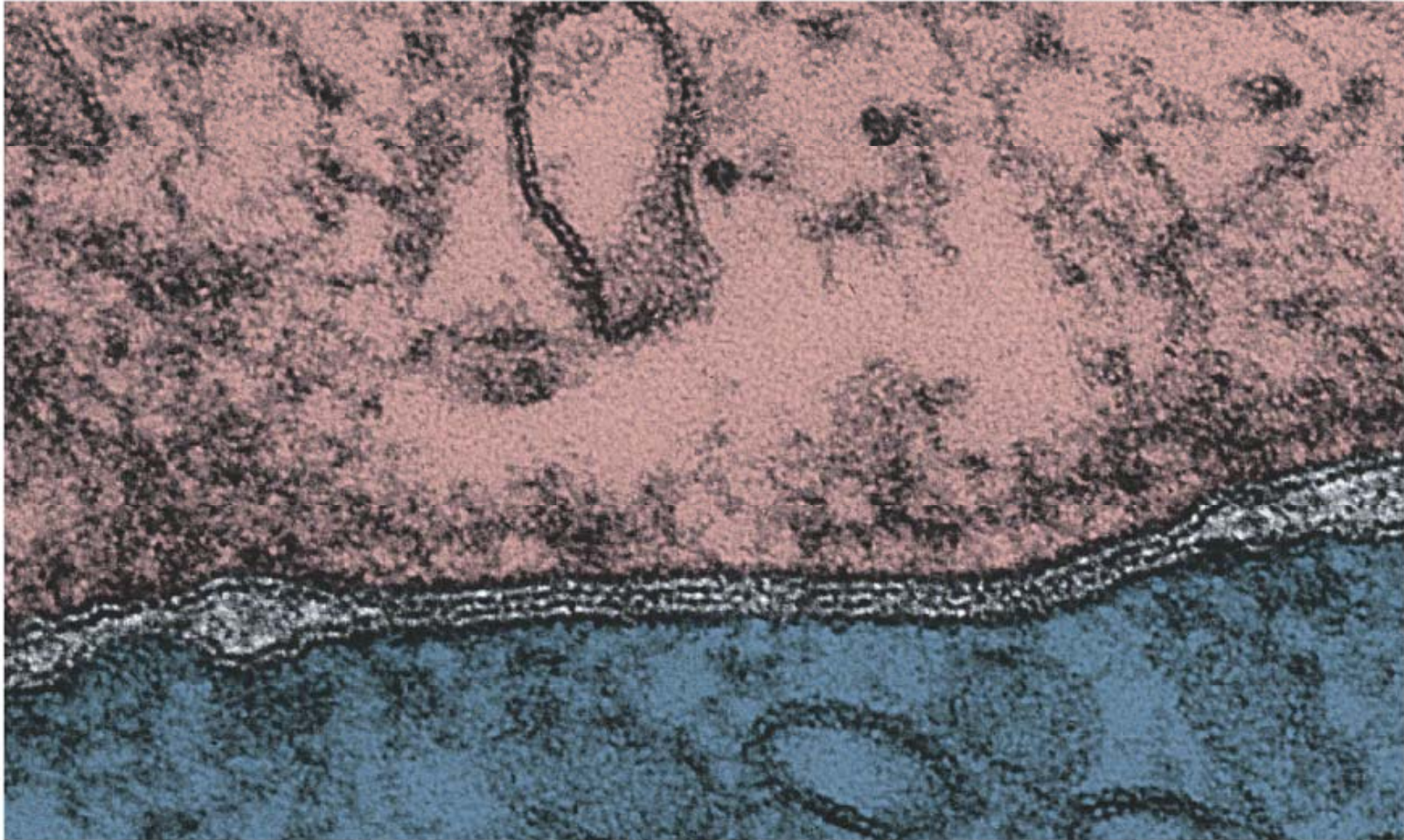
Michael Bardo
Department of Psychology



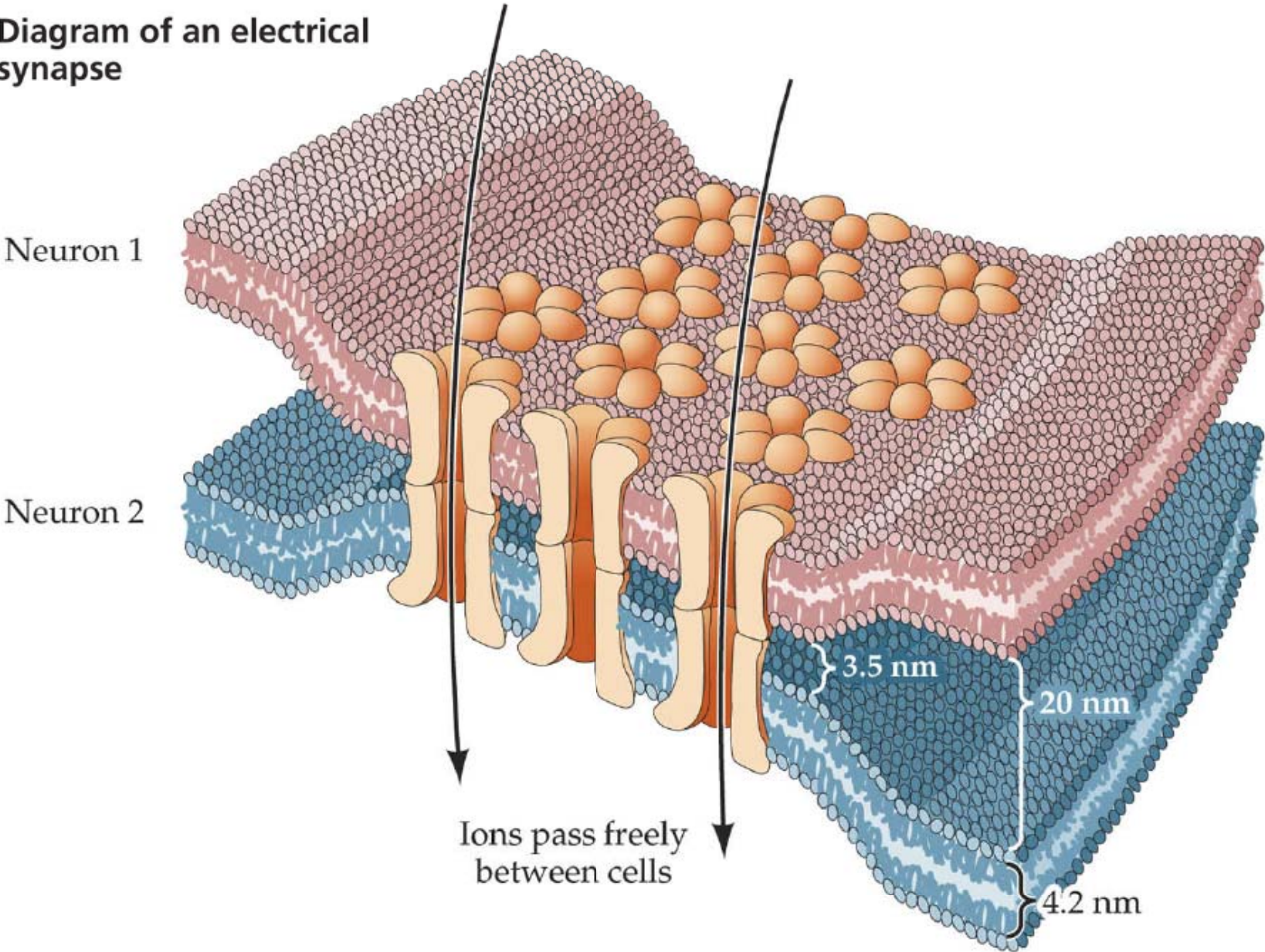
SYNAPTIC TRANSMISSION

- a. exocytosis
- b. endocytosis
- c. receptor activation
- d. neurotransmitter deactivation
- e. neurotransmitter classes
- f. receptor/drug interactions

(A) Electron micrograph of an electrical synapse

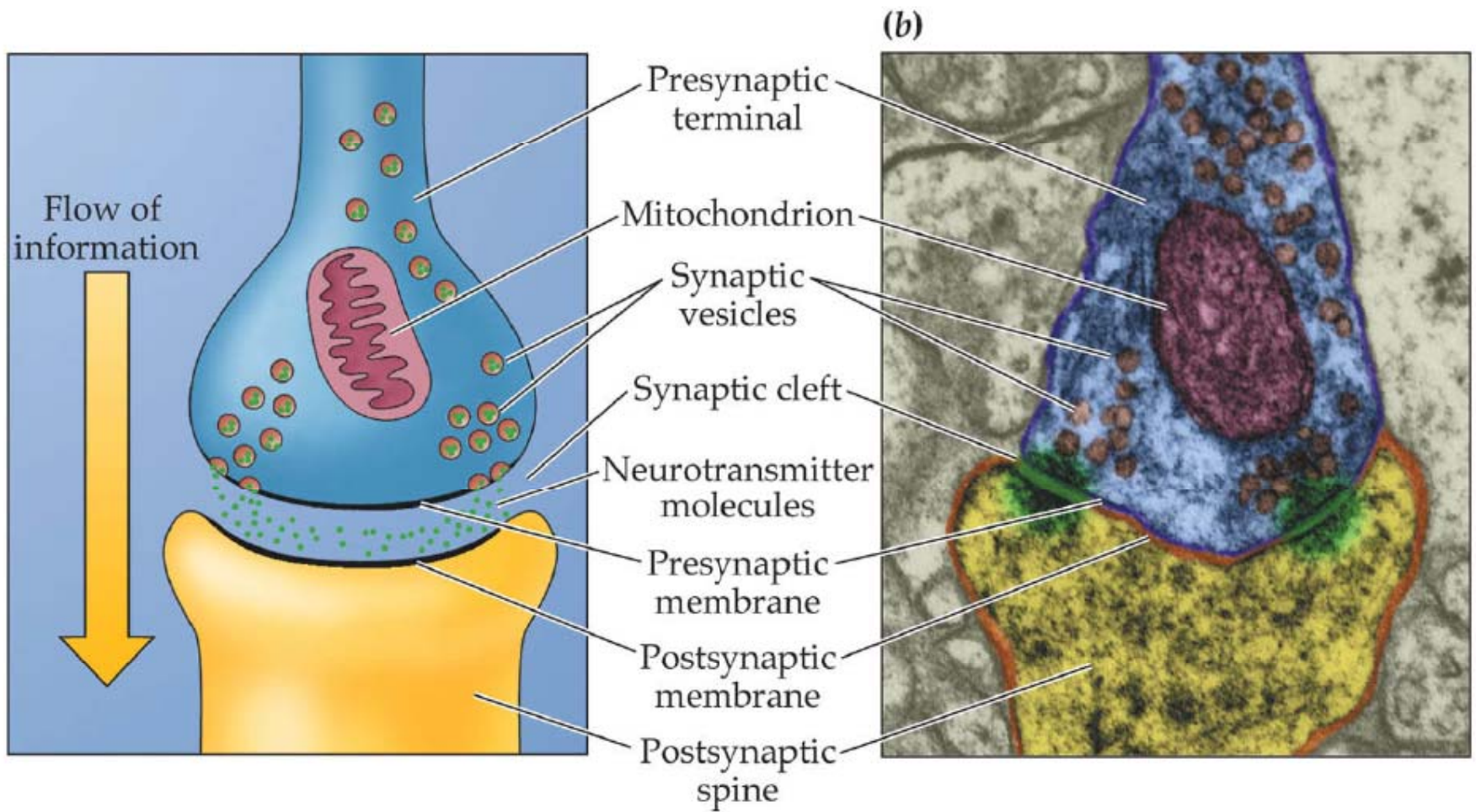


(B) Diagram of an electrical synapse

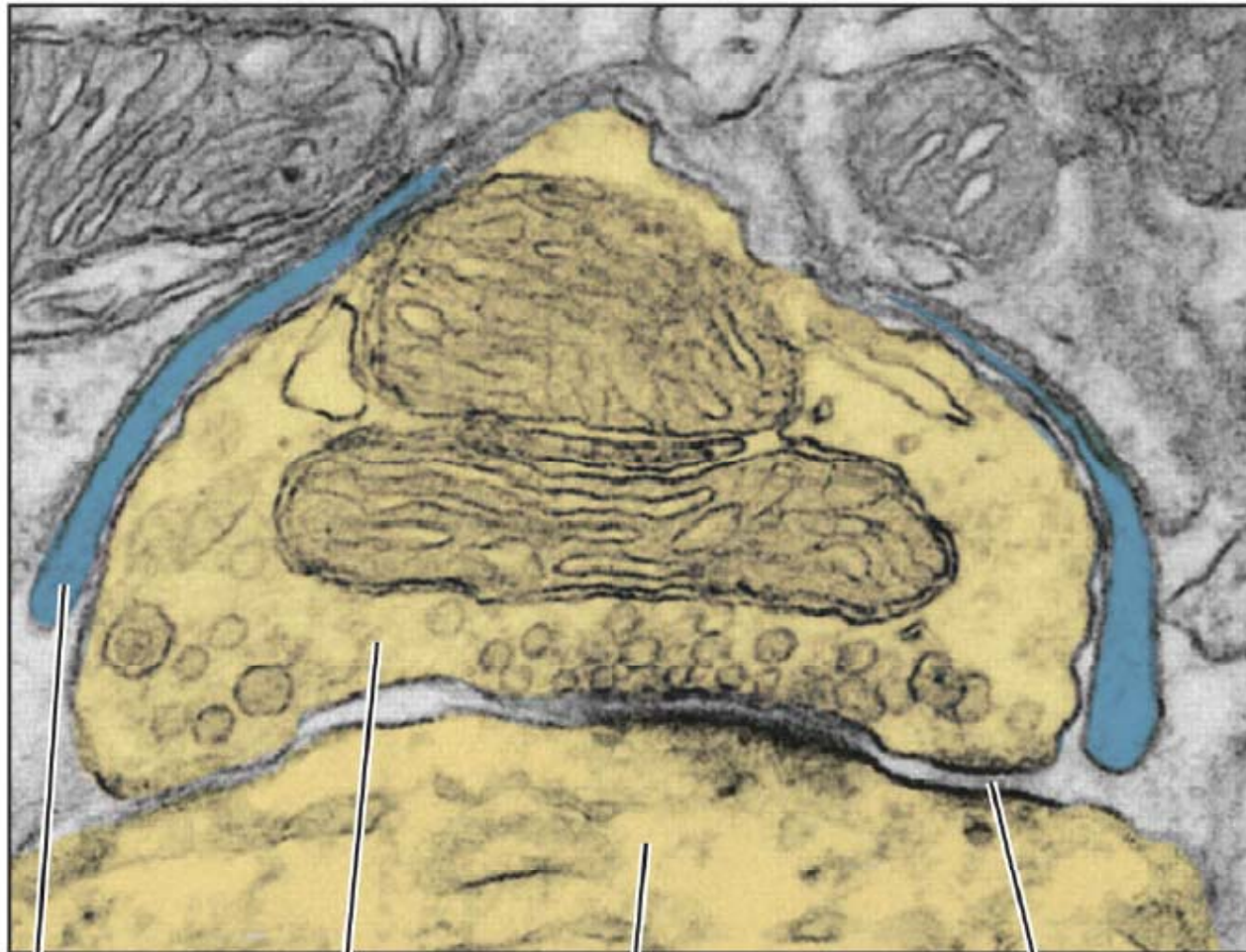


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(d)



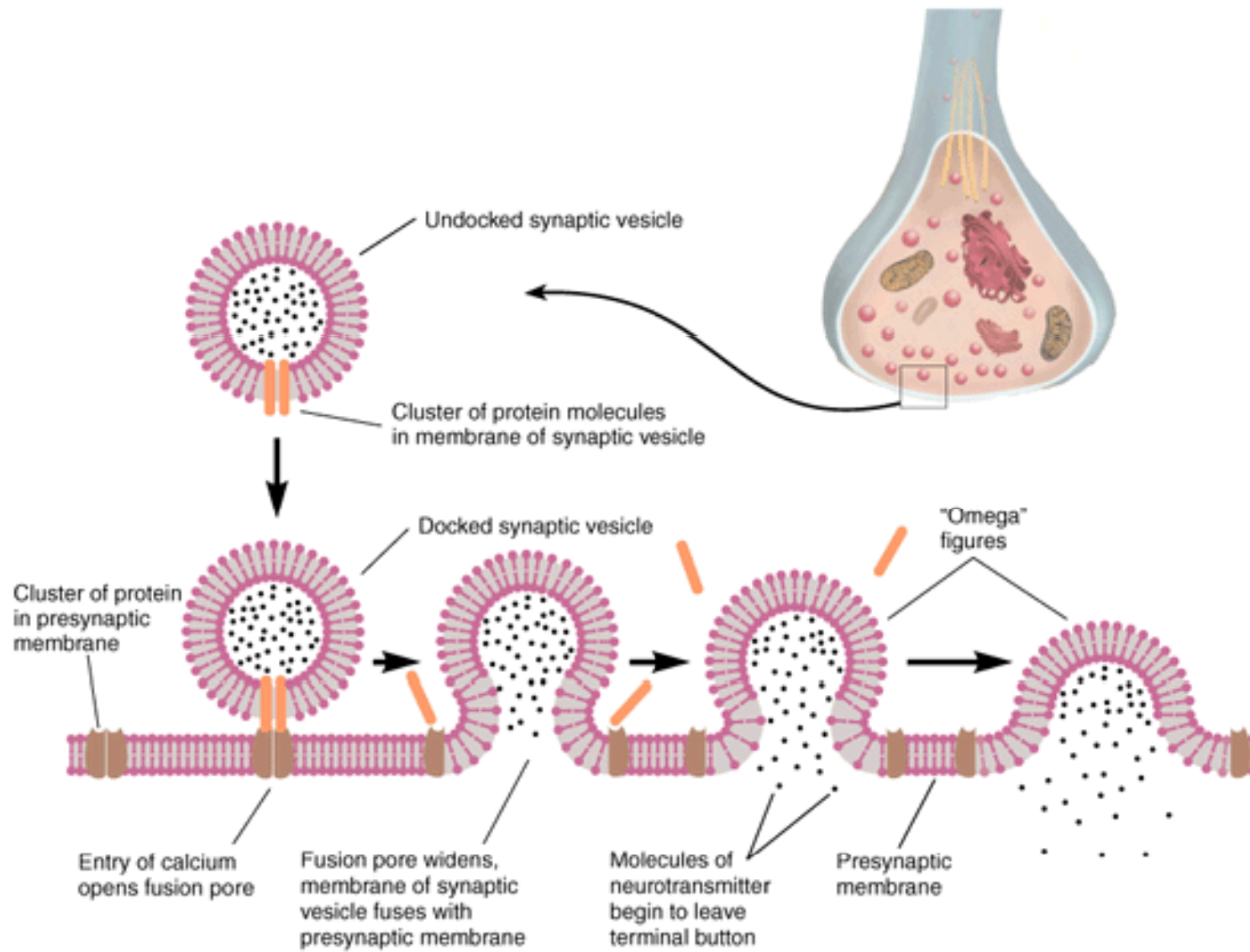
Glial cell

Axon
terminal

Postsynaptic
neuron

Synaptic
cleft

► Release of Neurotransmitter



SYNAPTIC TRANSMISSION

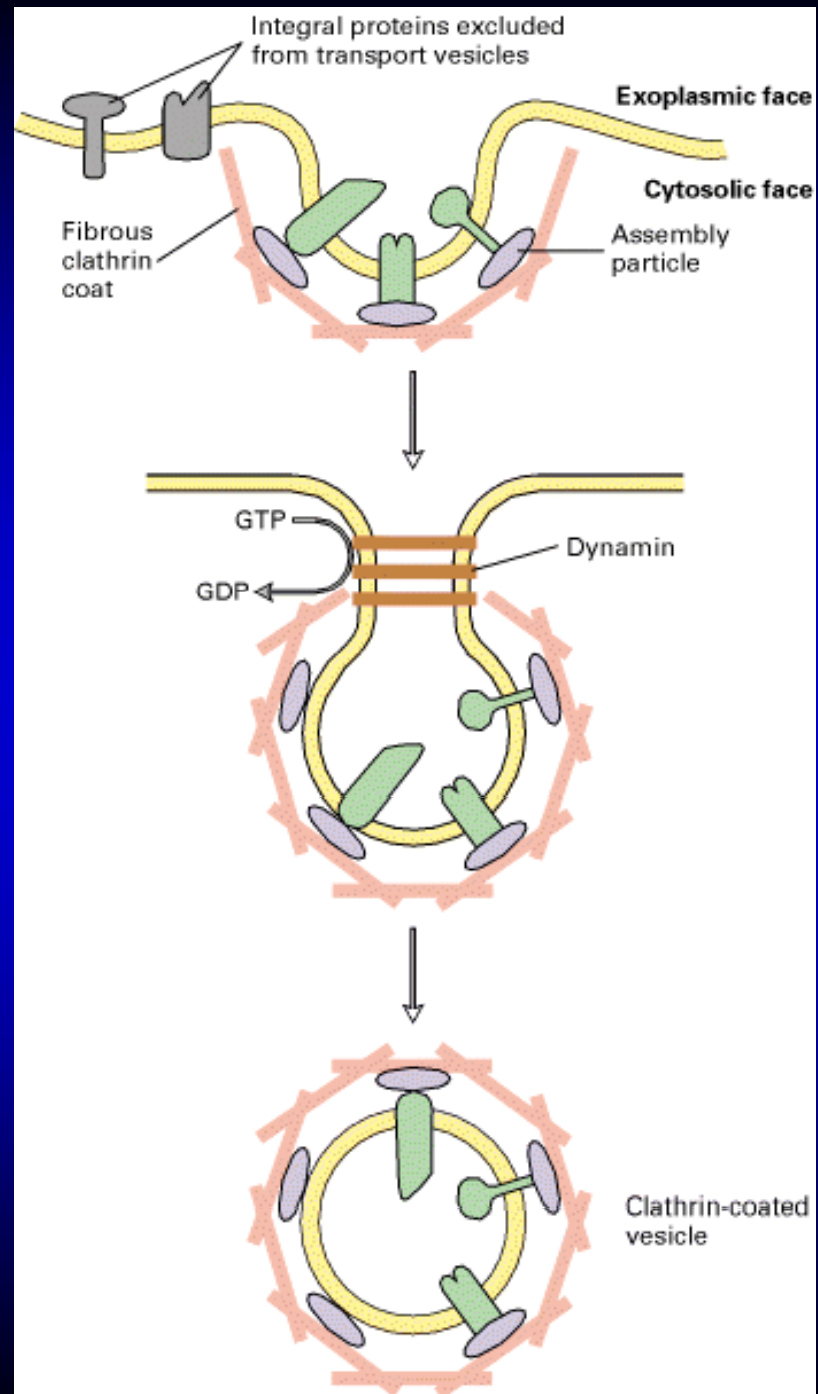
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Clathrin

Protein that forms a coat that helps shape the membrane into a bud that is pulled away from the plasma membrane. Removed after endocytosis completed.

Dynamin

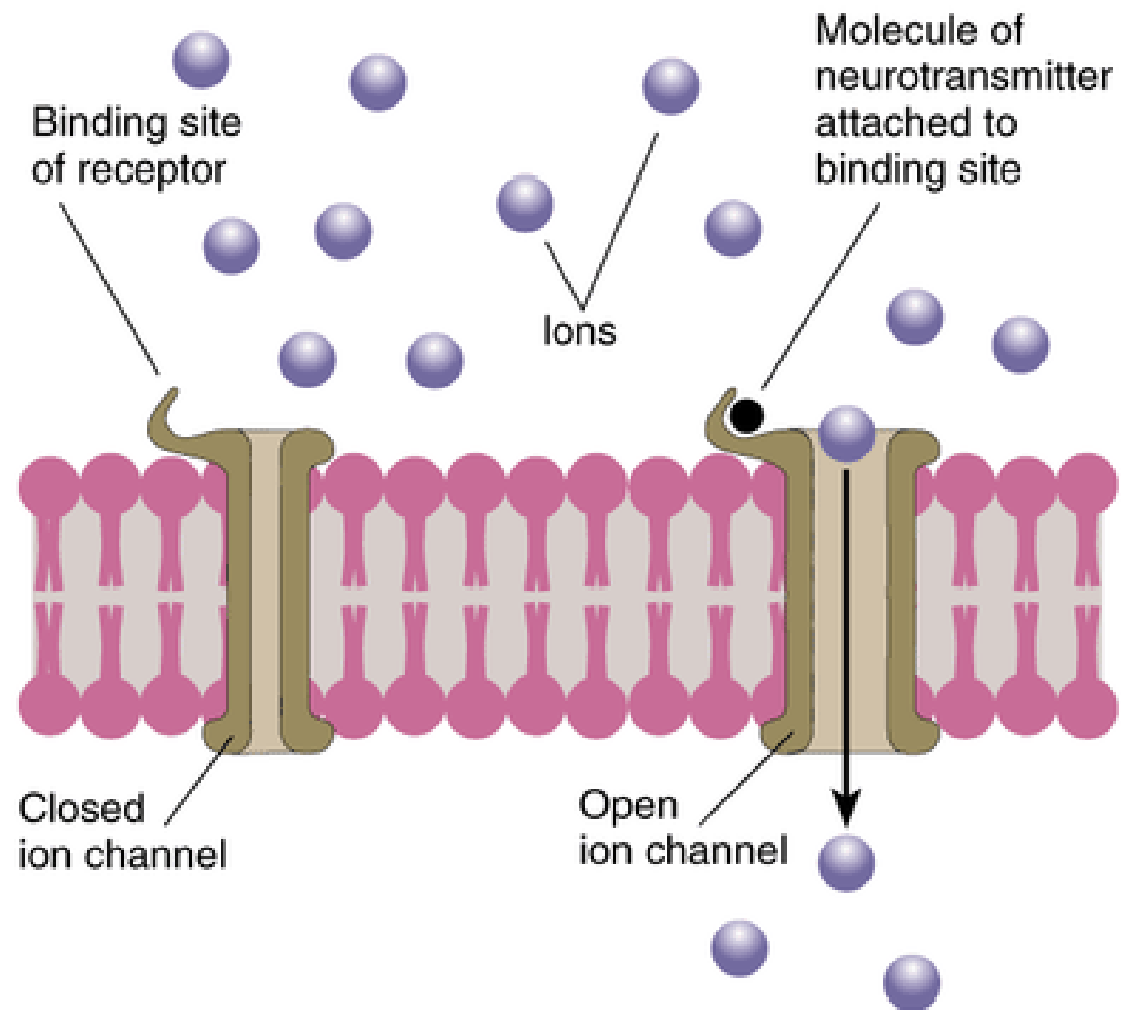
Protein that pinches off the neck of the vesicle as it buds from the plasma membrane.



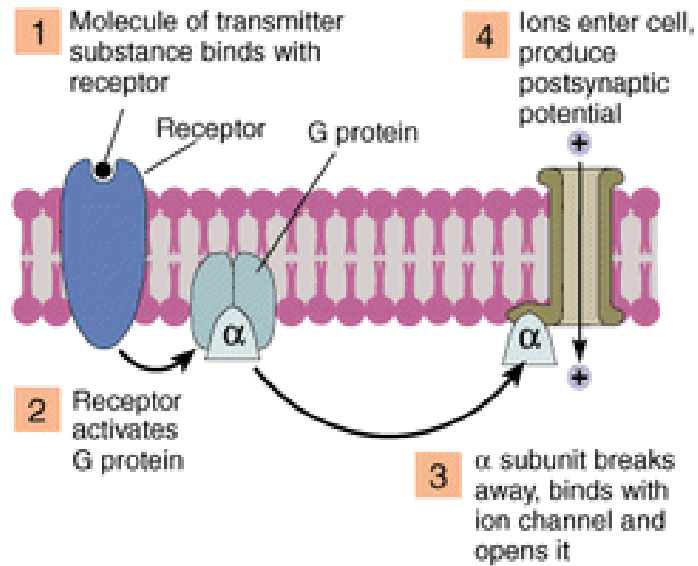
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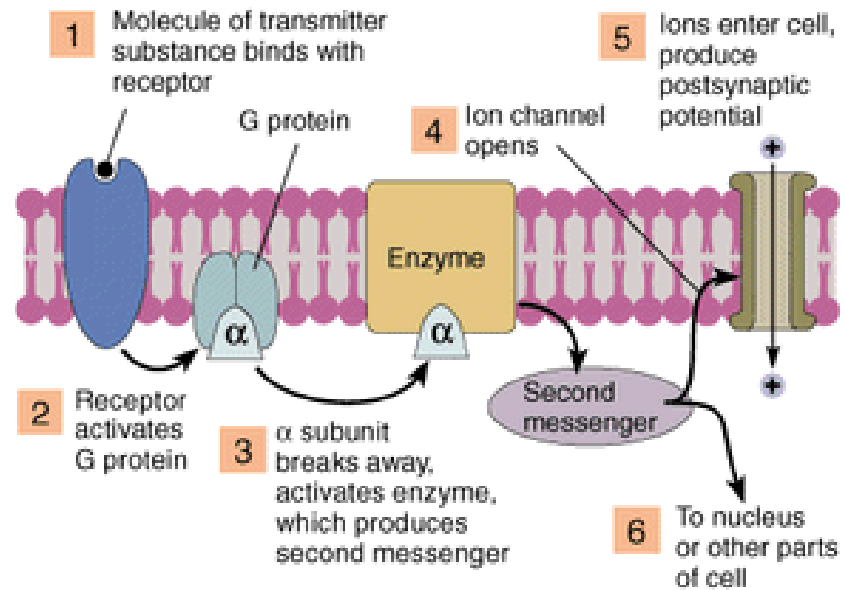
► Ionotropic Receptors



► Metabotropic Receptors



(a)

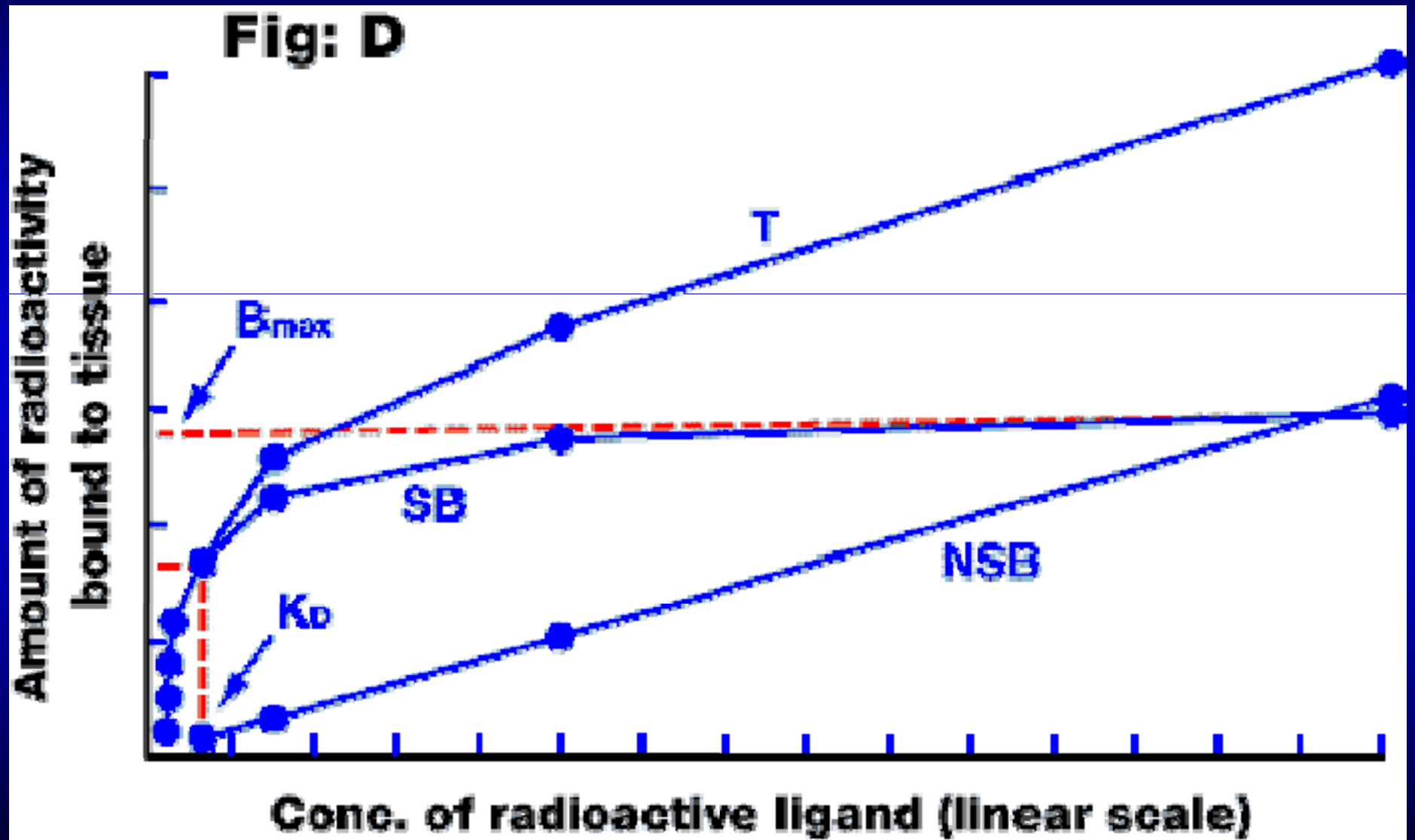


(b)

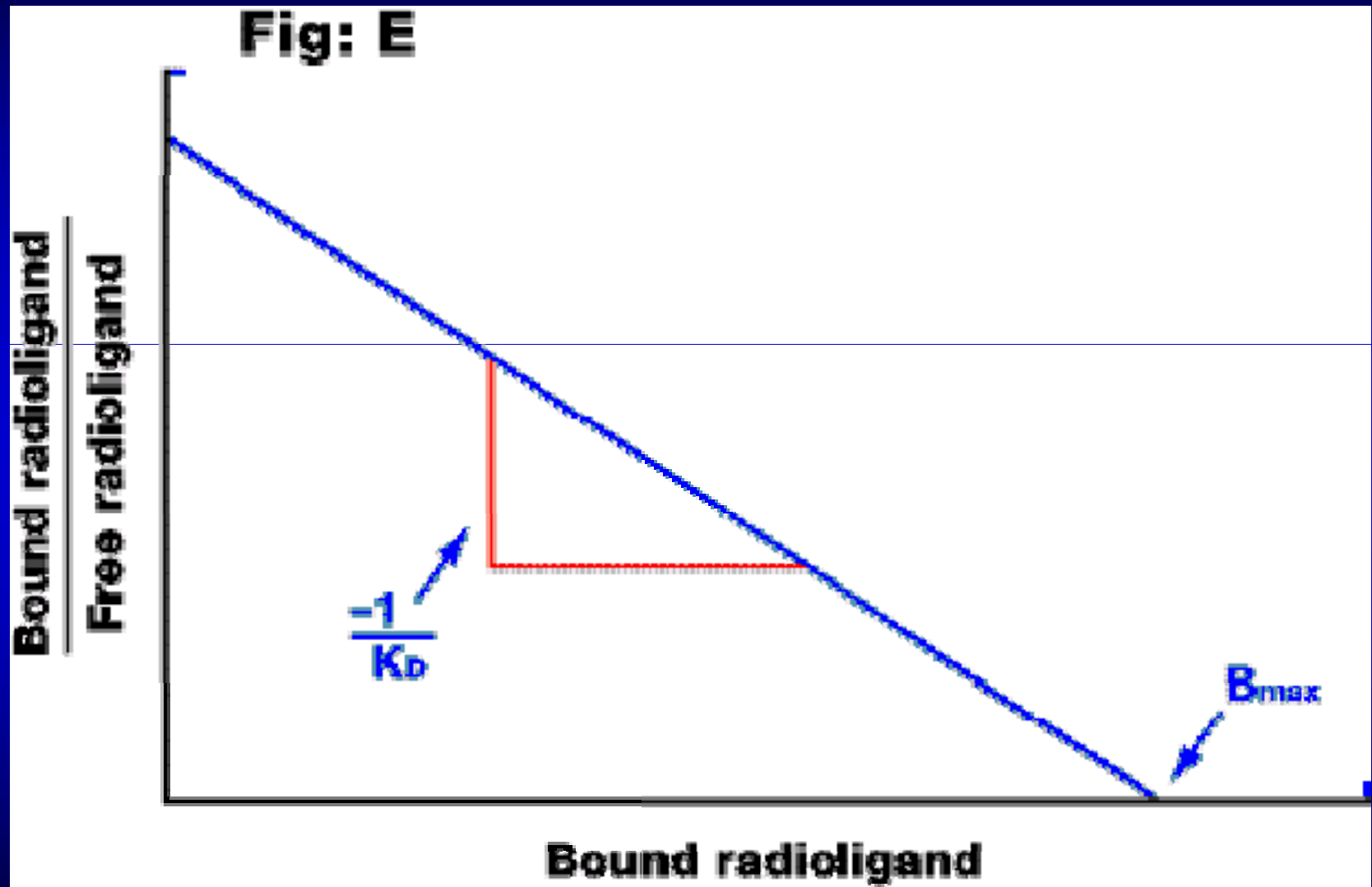
RECEPTOR-LIGAND BINDING

- Must be saturable
- Must be reversible
- Must be specific
- If it is a receptor, there must be a biological effect

Saturation



Scatchard plot

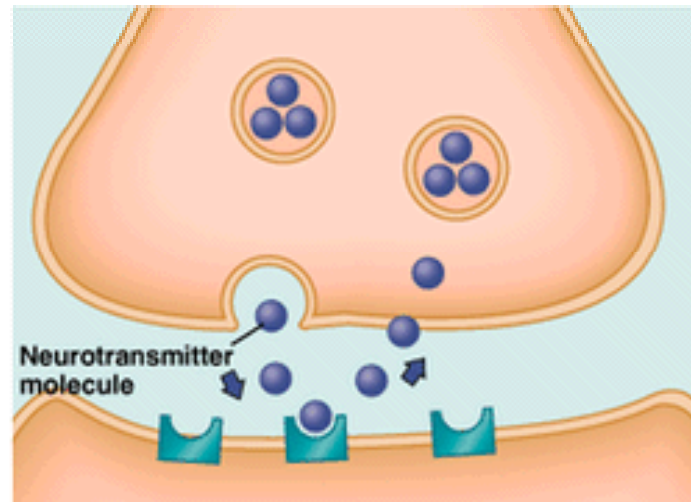


SYNAPTIC TRANSMISSION

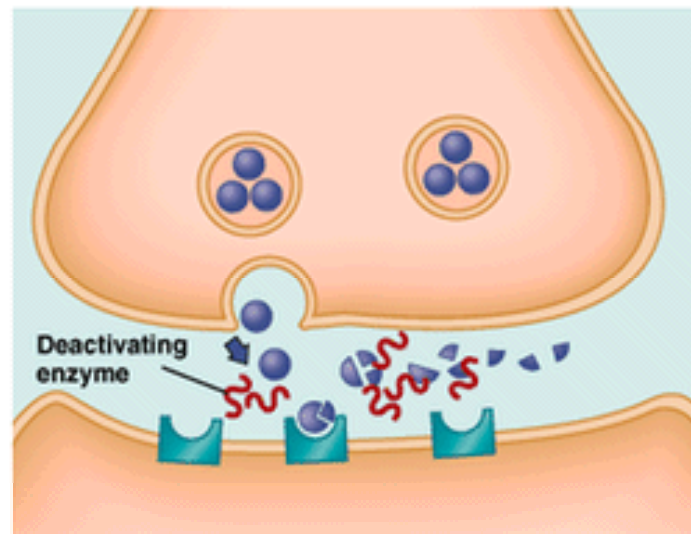
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► Reuptake and Enzymatic Degradation

Two Mechanisms of Neurotransmitter Deactivation



Reuptake



Deactivating Enzymes

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NEUROTRANSMITTER CRITERIA

- Must be localized in neuron
- Must be released with stimulation
- Must be mimicked with exogenous application
- Must be pharmacologically active at receptor

► **Classes of Neurotransmitters**

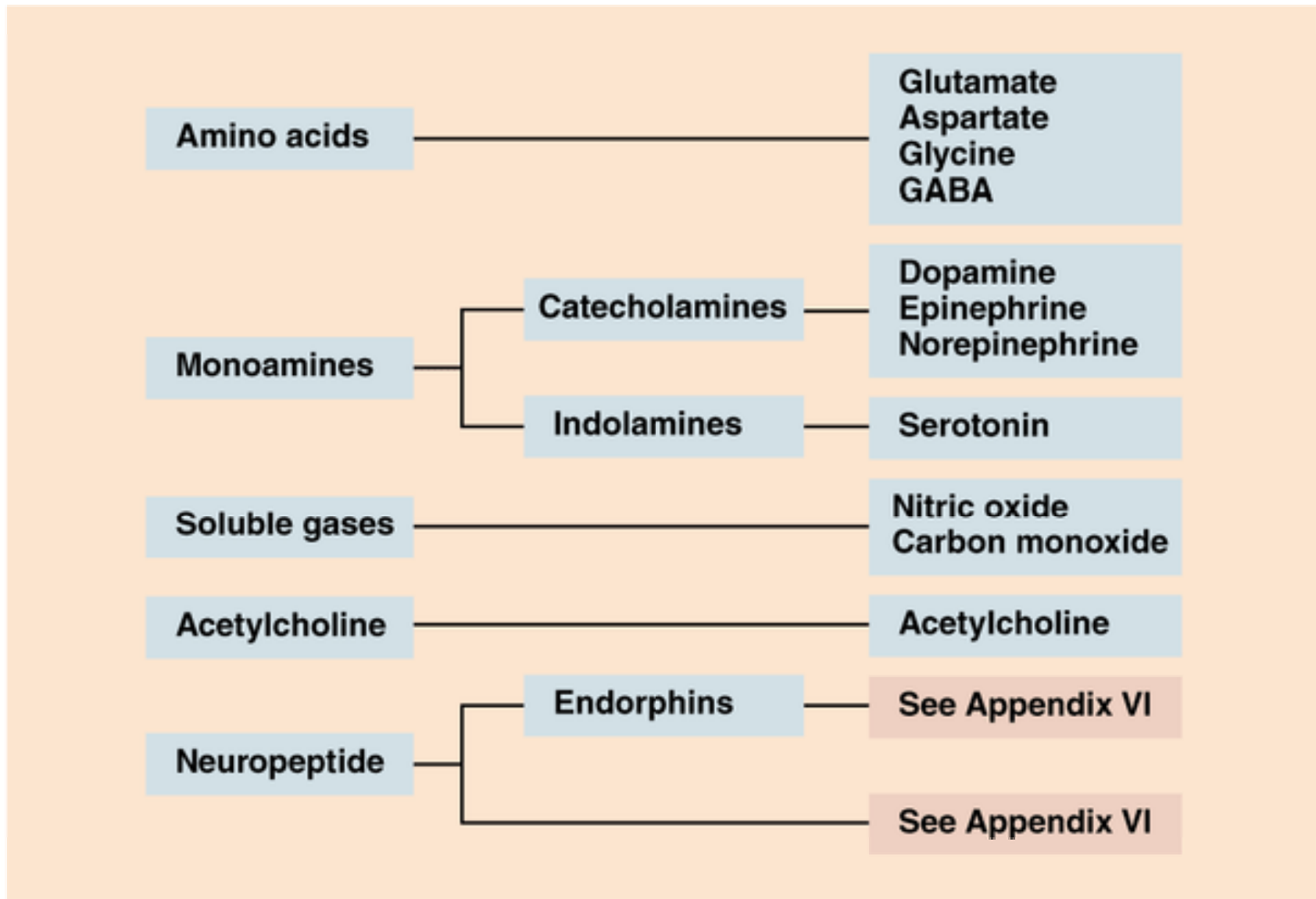


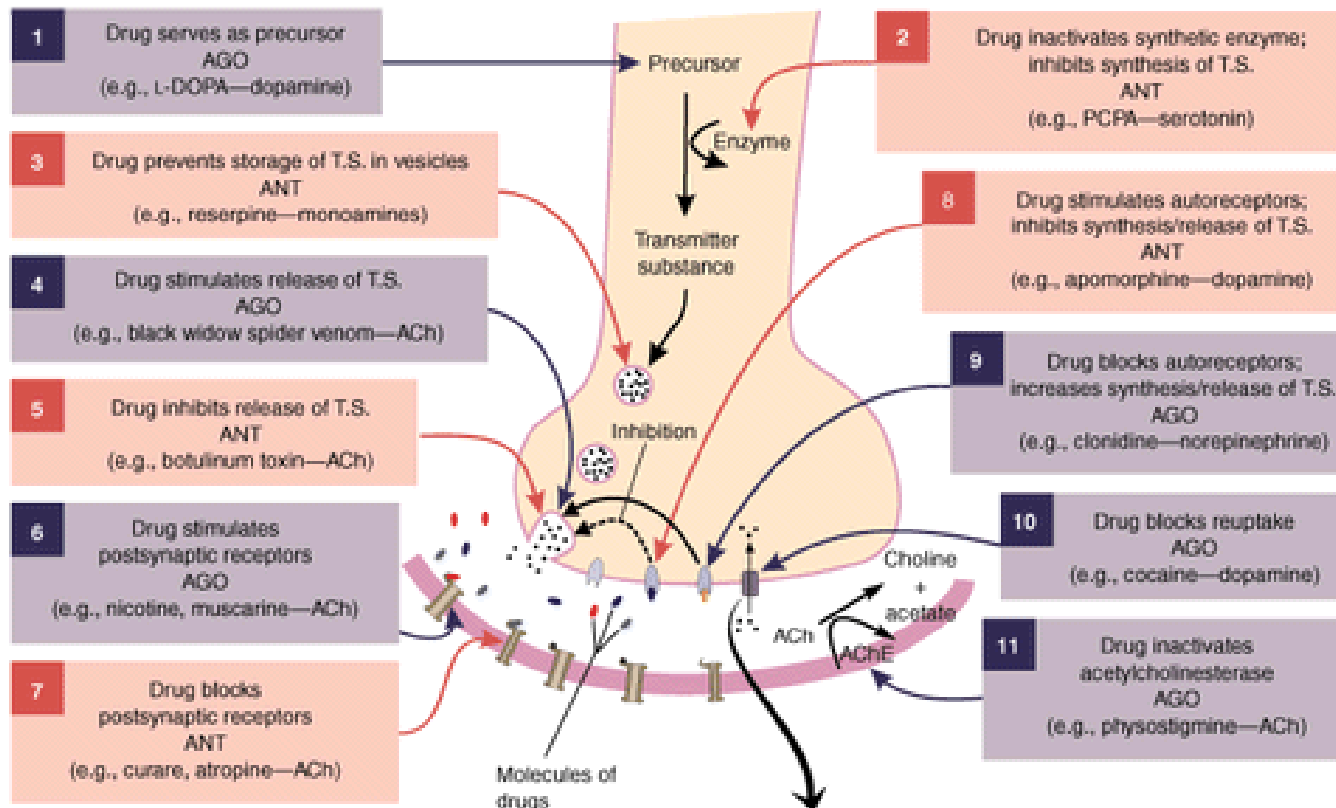
TABLE 4.1 *Some Synaptic Transmitters and Families of Transmitters (Part 2)*

Family and subfamily	Transmitter(s)
NEUROPEPTIDES	
Opioid peptides	<i>Enkephalins</i>
	Met-enkephalin
	Leu-enkephalin
	<i>Endorphins</i>
	β-endorphin
	<i>Dynorphins</i>
	Dynorphin A
PEPTIDE HORMONES	
	Oxytocin
	Substance P
	Cholecystokinin (CCK)
	Vasopressin
	Neuropeptide Y (NPY)
	Hypothalamic releasing hormones
GASES	
	Nitric oxide
	Carbon monoxide

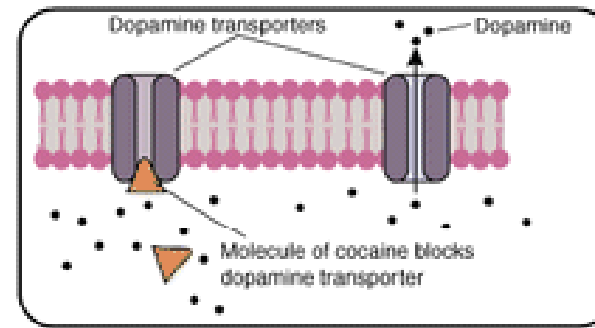
SYNAPTIC TRANSMISSION

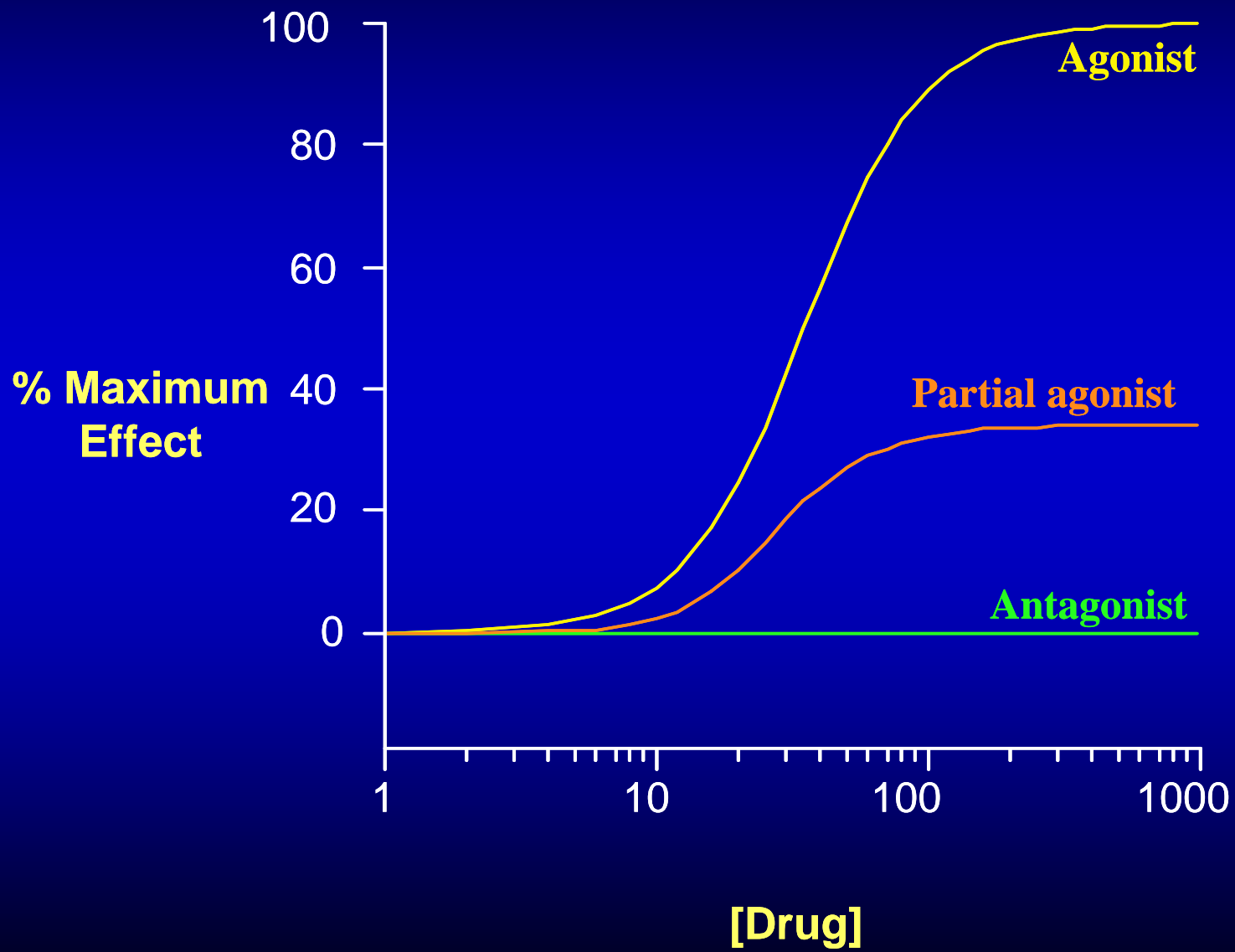
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► Summary of the Ways Drugs Affect the Synaptic Transmission

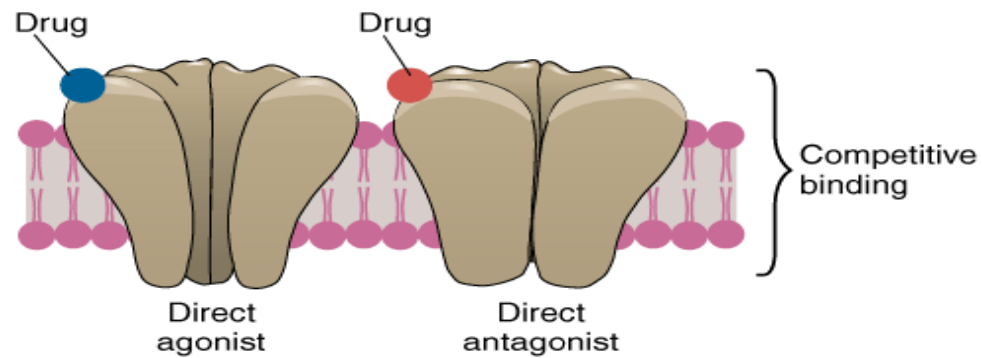


AGO = agonist
 ANT = antagonist
 T.S. = transmitter substance

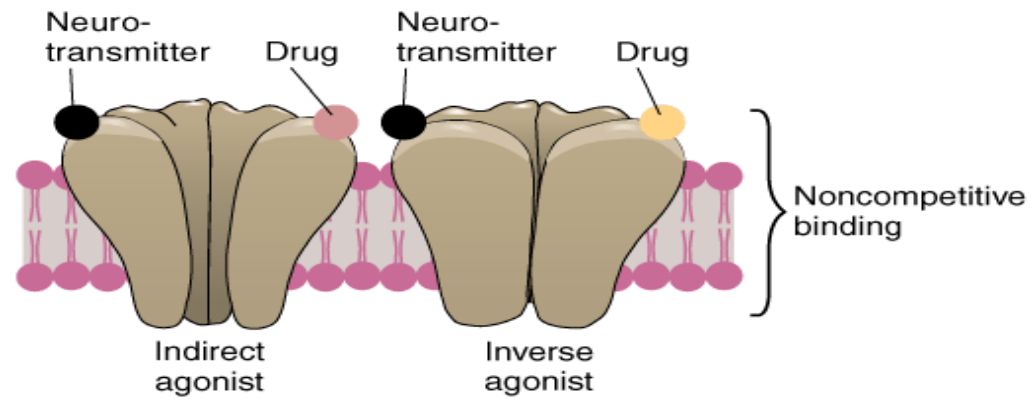




► Actions of Drugs at Binding Sites on Receptors



(a)



(b)

