BHARATHIDASAN UNIVERSITY

Program: M.Sc., Biomedical Science

Course Title : Neurobiology

Peptide Neurotransmitters

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Peptide Neurotransmitters
(Often serve hormonal functions as well)

Substance P (P for “Peptide”)
- Principal somatosensory transmitter
- First peptide transmitter discovered

Gut hormones
- e.g. angiotensin
  - neuropeptide Y
  - cholecystokinin

Releasing factors for hormones
- e.g. tryrotropin releasing hormone
  - somatotrophin, somatostatin
  - corticotropin

Opiates
- Enkephalins, Endorphins

Table 15-2 Neuroactive Mammalian Brain Peptides Categorized According to Tissue Localization. (Expanded from Krieger 1983.)

Category	Peptide
Hypothalamic releasing hormone	Thyrotropin-releasing hormone
	Gonadotropin-releasing hormone
	Somatostatin
	Corticotropin-releasing hormone
	Growth hormone-releasing hormone
Neurohypophyseal hormones	Vasopressin
	Oxytocin
Pituitary peptides	Adrenocorticotropic hormone
	β-Endorphin
	α-Melanocyte-stimulating hormone
	Prolactin
	Luteinizing hormone
	Growth hormone
	Thyrotropin
Invertebrate peptides	FMRFamide[1]
	Hydra head activator
	Proctolin
	Small cardiac peptide
	Myomodulins
	Buccalins
	Egg-laying hormone
	Bag cell peptides
Gastrointestinal peptides	Vasoactive intestinal polypeptide
	Cholecystokinin
	Gastrin
	Substance P
	Neurotensin
	Methionine-enkephalin
	Leucine-enkephalin
	Insulin
	Glucagon
	Bombesin
	Secretin
	Somatostatin
	Thyrotropin-releasing hormone
	Motilin
Heart	Atrial naturetic peptide
Other	Angiotensin II
	Bradykinin
	Sleep peptide(s)
	Calcitonin
	CGRP[2]
	Neuropeptide Y
	Neuropeptide Yy
	Galanin
	Substance K (neurokinin A)

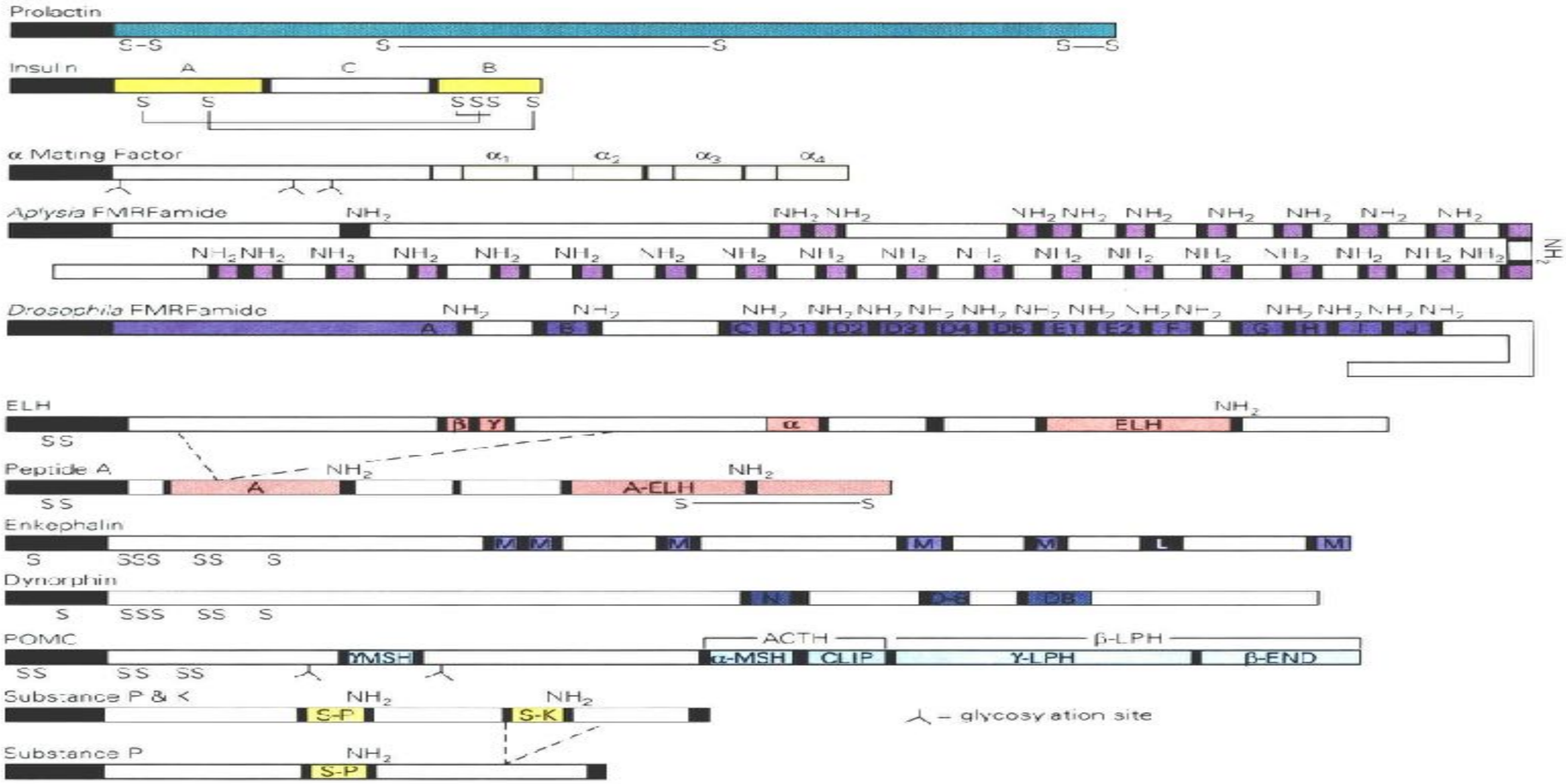
[1]Phe-Met-Arg-Phe-NH_2.
[2]Calcitonin gene-related peptide.

Table 15-3 Some Families of Neuroactive Peptides

Family	Peptide members
Opioids	Opiocortins, enkephalins, dynorphin, FMRFamide
Neurohypophyseal hormones	Vasopressin, oxytocin, neurophysins
Tachykinins	Substance P, physalaemin, kassinin, uperolein, 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

Table 15-1 Small-Molecule Transmitter Substances and Their Key Biosynthetic Enzymes

Transmitter	Enzymes	Activity
Acetylcholine	Choline acetyltransferase	Specific
Biogenic amines		
Dopamine	Tyrosine hydroxylase	Specific
Norepinephrine	Tyrosine hydroxylase and dopamine β-hydroxylase	Specific
Epinephrine	Tyrosine hydroxylase and dopamine β-hydroxylase	Specific
Serotonin	Tryptophan hydroxylase	Specific
Histamine	Histidine decarboxylase	Specificity uncertain
Amino acids		
γ-Aminobutyric acid	Glutamic acid decarboxylase	Probably specific
Glycine	Enzymes operating in general metabolism	Specific pathway undetermined
Glutamate	Enzymes operating in general metabolism	Specific pathway undetermined


Prolactin
S–S
S
S
S—S
Insulin
A
C
B
S
S
S S S
S
α Mating Factor
α1
α2
α3
α4
Aplysia FMRFamide
NH2
Drosophila FMRFamide
A
B
C
D1
D2
D3
D4
D5
E1
E2
F
G
H
I
J
ELH
β
γ
α
ELH
S S
Peptide A
A
A-ELH
S S
Enkephalin
M
M
M
M
M
L
M
S
SSS
SS
S
Dynorphin
S
SSS
SS
S
POMC
ACTH
β-LPH
γMSH
α-MSH
CLIP
γ-LPH
β-END
SS
SS
SS
Substance P & K
S-P
S-K
Substance P
S-P
– glycosylation site