BHARATHIDASAN UNIVERSITY

Program: M.Sc., Biomedical Science

Course Title : Neurobiology

Pre-and Post Synaptic Receptors

Prof. Narkunaraja Shanmugam
Dept. of Biomedical Science

Pre-and Post Synaptic Receptors

Unit-III

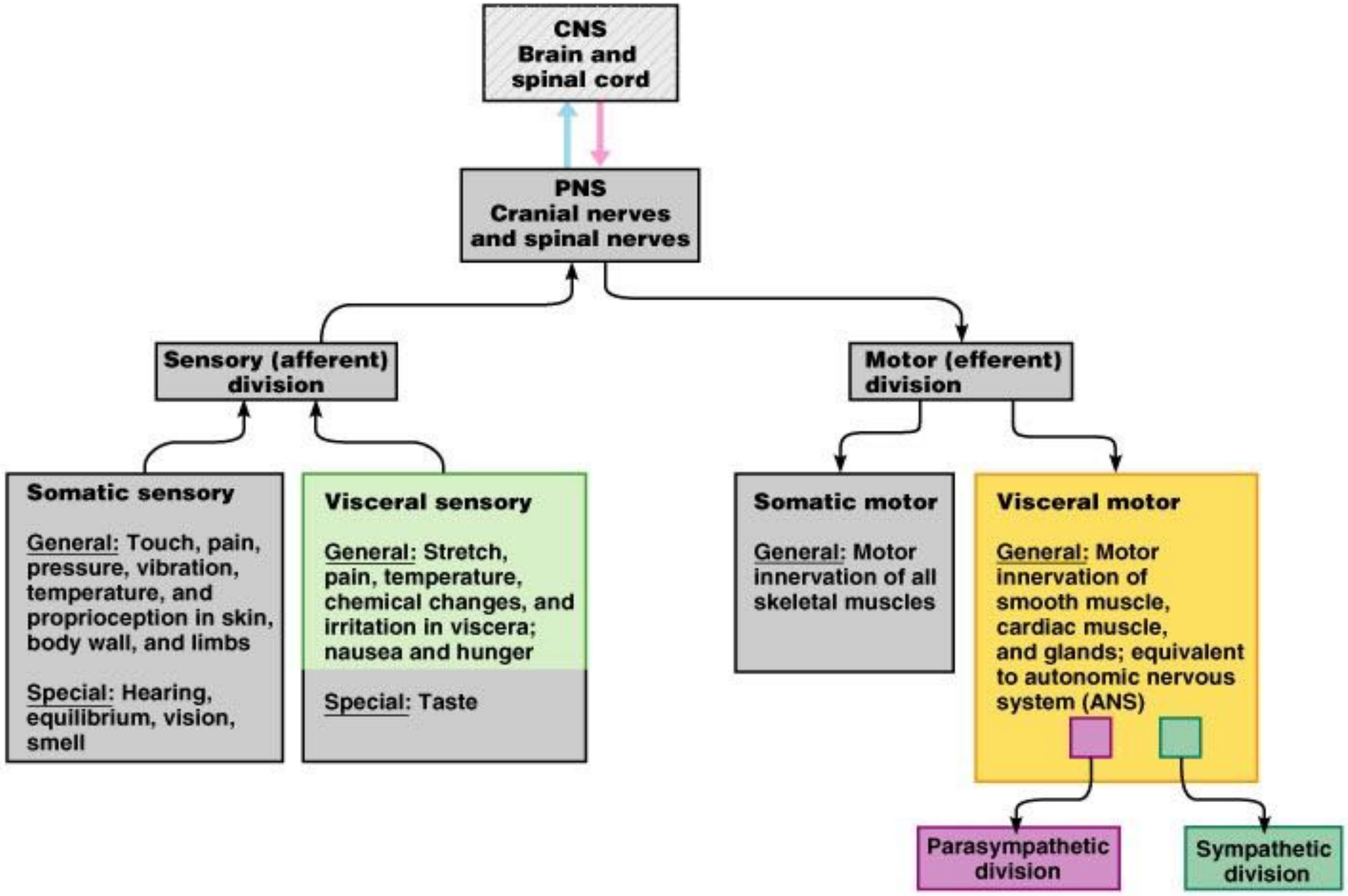
Receptor classification

- Receptors are classified in several way.
  - One of the classification is
    - Anatomical
    - Pharmacological
    - Mechanistic/Structural (molecular classification)

Anatomical classification

- This is based on the location of specific type of receptors
  - Somatic
  - Autonomic
  - Parasympathetic
  - Sympathetic
  - Post synaptic
  - Pre synaptic

The ANS and Visceral Sensory Neurons



Anatomy of Autonomic Motor Pathways

- Preganglionic neuron
- Postganglionic neuron

- Two divisions:
- Sympathetic
- Parasympathetic

Structure of the Sympathetic Division

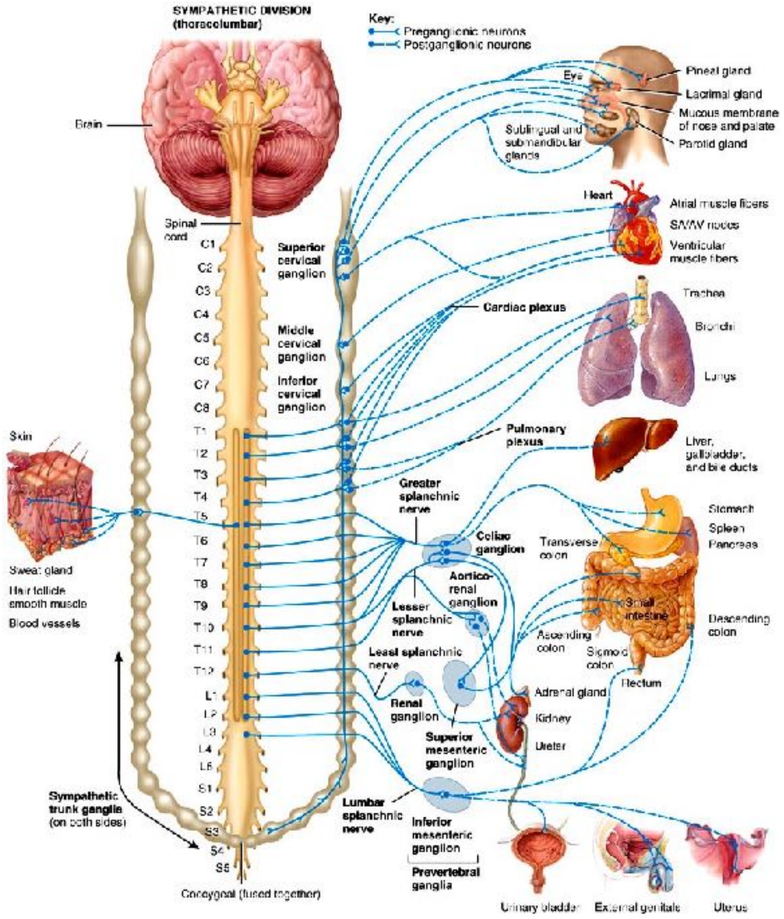
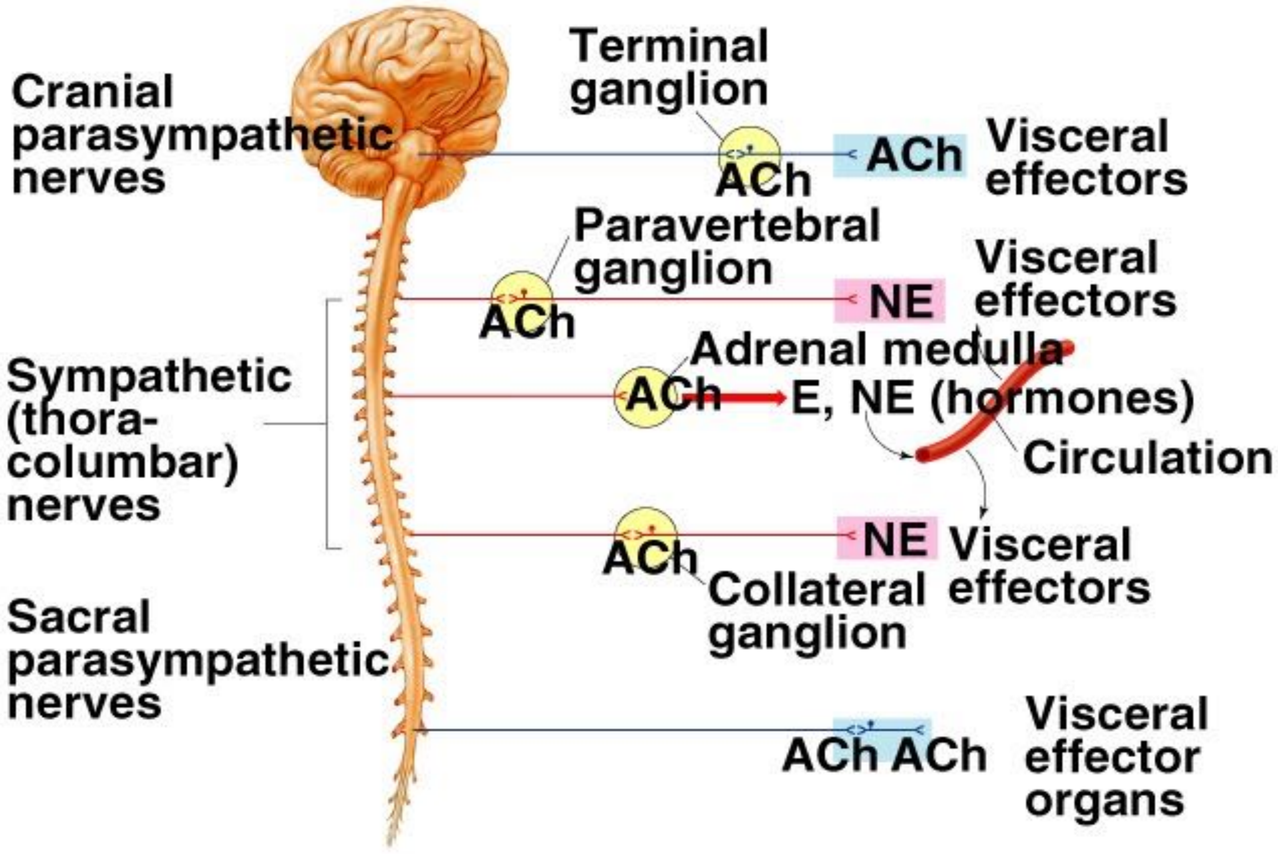


Figure 15.02 Tortora - PAP 12/e

Adrenergic and Cholinergic Synaptic Transmission



Pharmacological classification

- Receptors are classified according to transmitter groups and their response to drugs.
- Receptors that respond to the catecholamines are known as catecholaminergic or adrenergic
- Some drugs can respond better to NE than to E so they sub-classified as
- α and β–adrenergic receptors
- Even these are sub-sub-classified as $\beta 1$, $\beta 2$,$\beta 3$ etc

Pharmacological classification

- This type of system made one should learn a multitude of receptor subtypes, these subtypes are convenient for the purposes of research, therapy and the development of new drugs.
  - ex. Possible to develop a drug that will dilate bronchial smooth muscle in an asthmatic condition, bronchial smooth muscles contain $\beta 2$ adrenergic receptors only. Whereas heart has $\beta 1$ adrenergic receptor. x

- If a drug specifically designed to act on β2 adrenergic receptor (agonist) can be used for drug to treat asthma, this drug should not act on β1 adrenergic where heart has β1 adrenergic receptor this may increase the heart rate and may cause cardiac palpitations.

Mechanistic/Structural classification

- This is based on information obtained from the
  - 1.cloning and sequencing of genes of receptors
  - 2. characterization of proteins structure and bioinformatic studies.

  Based on this classification receptors are classified into 4 families of receptors

  1. Ion channel gated receptors
  2. G-protein coupled receptors (GPCRs)
  3. Membrane receptors (receptor tyrosine kinase)
  4. Cytoplasmic receptors (intracellular hormone receptor or orphan receptors)