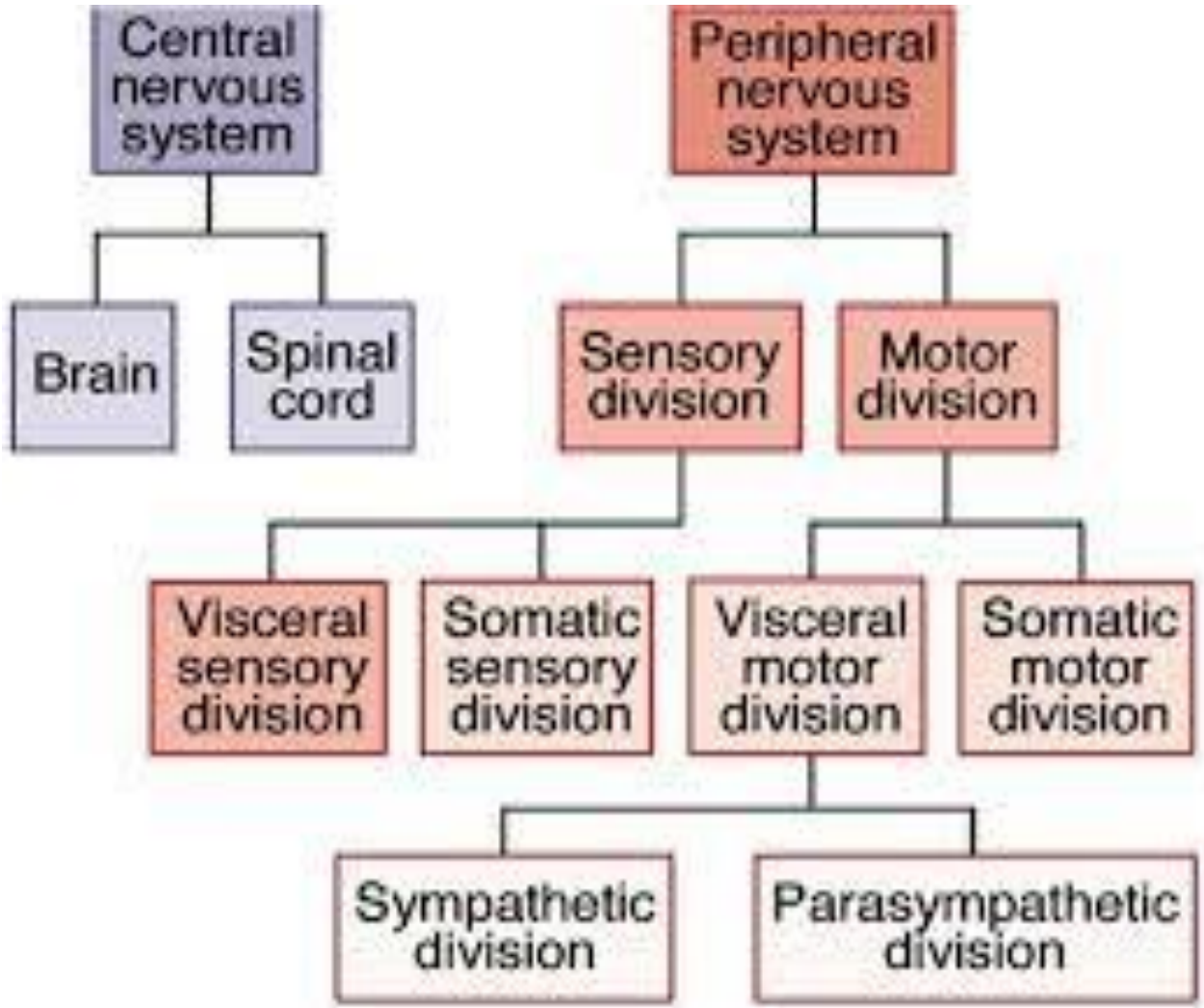
فیزیولوژی یک، جلسه هشتم

۱-معرفی دستگاه های عصبی مرکزی و محیطی

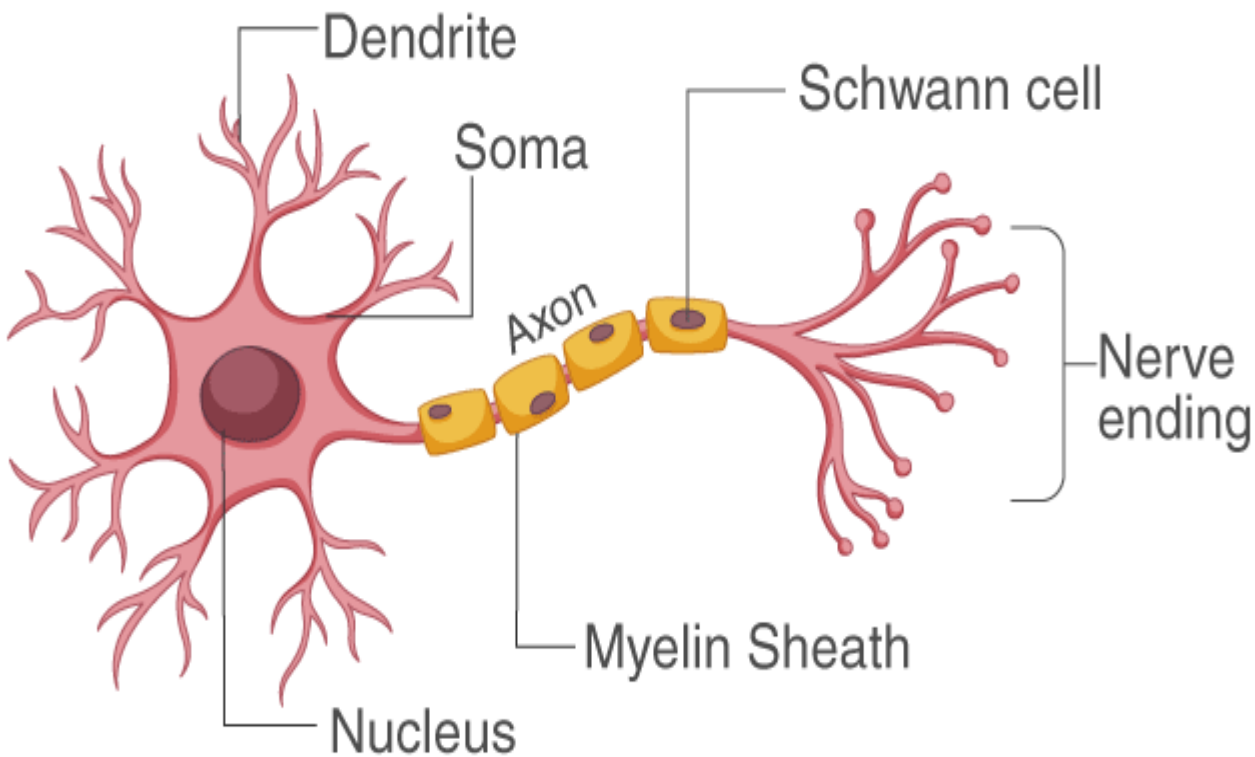
۲- سطوح سه گانه فعالیتی در دستگاه عصبی مرکزی

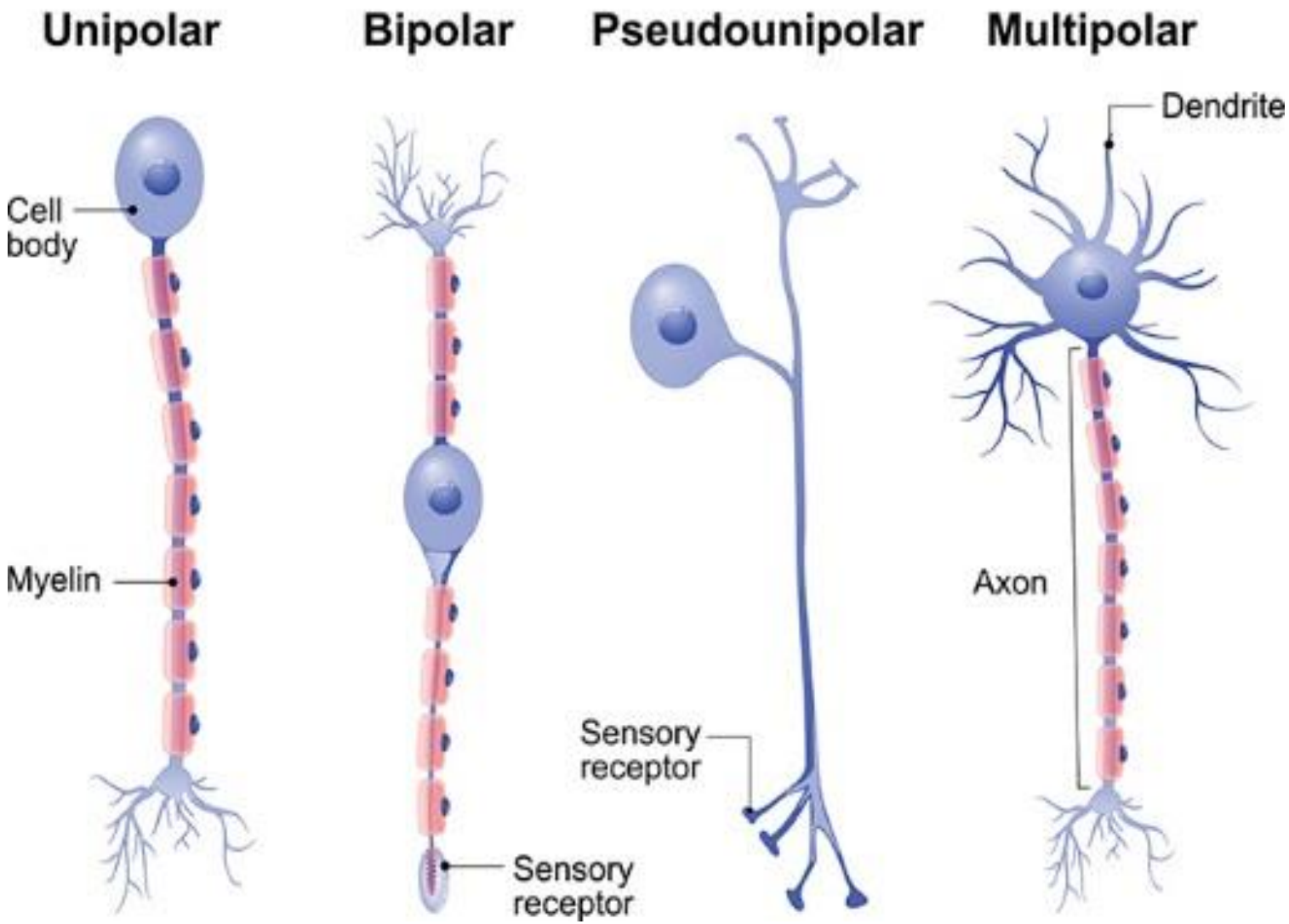
۳- عملکردهای کلی دستگاه عصبی، نورون و سلول های نوروگلی

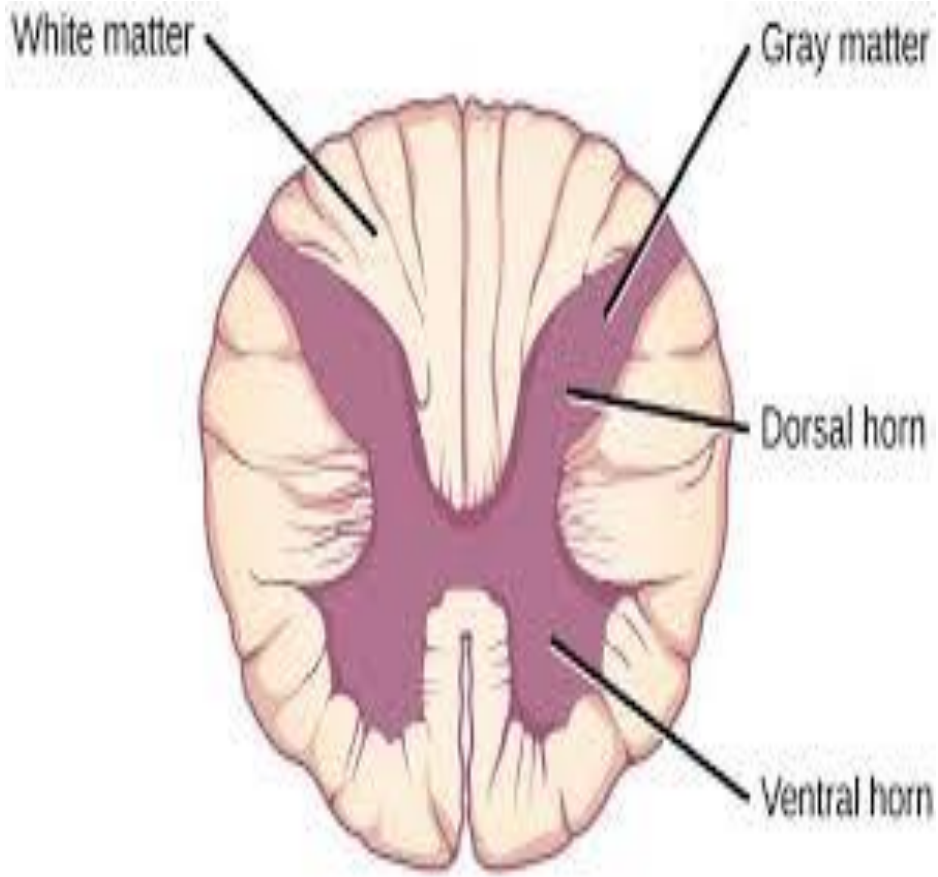
۴- رفلکس های عصبی و مدارهای نورونی

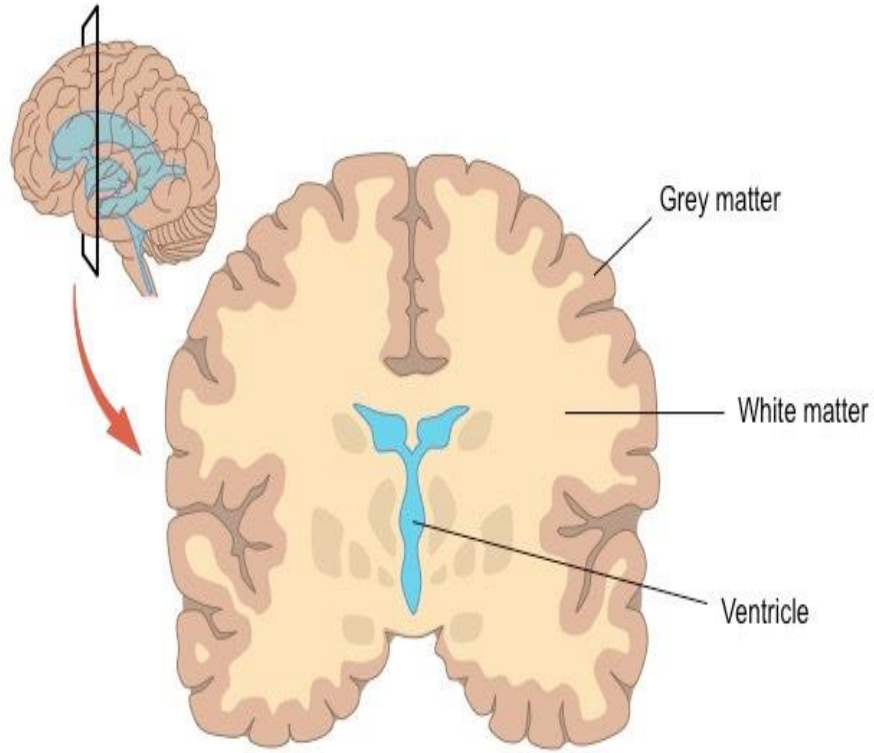

Central nervous system
Peripheral nervous system
Brain
Spinal cord
Sensory division
Motor division
Visceral sensory division
Somatic sensory division
Visceral motor division
Somatic motor division
Sympathetic division
Parasympathetic division

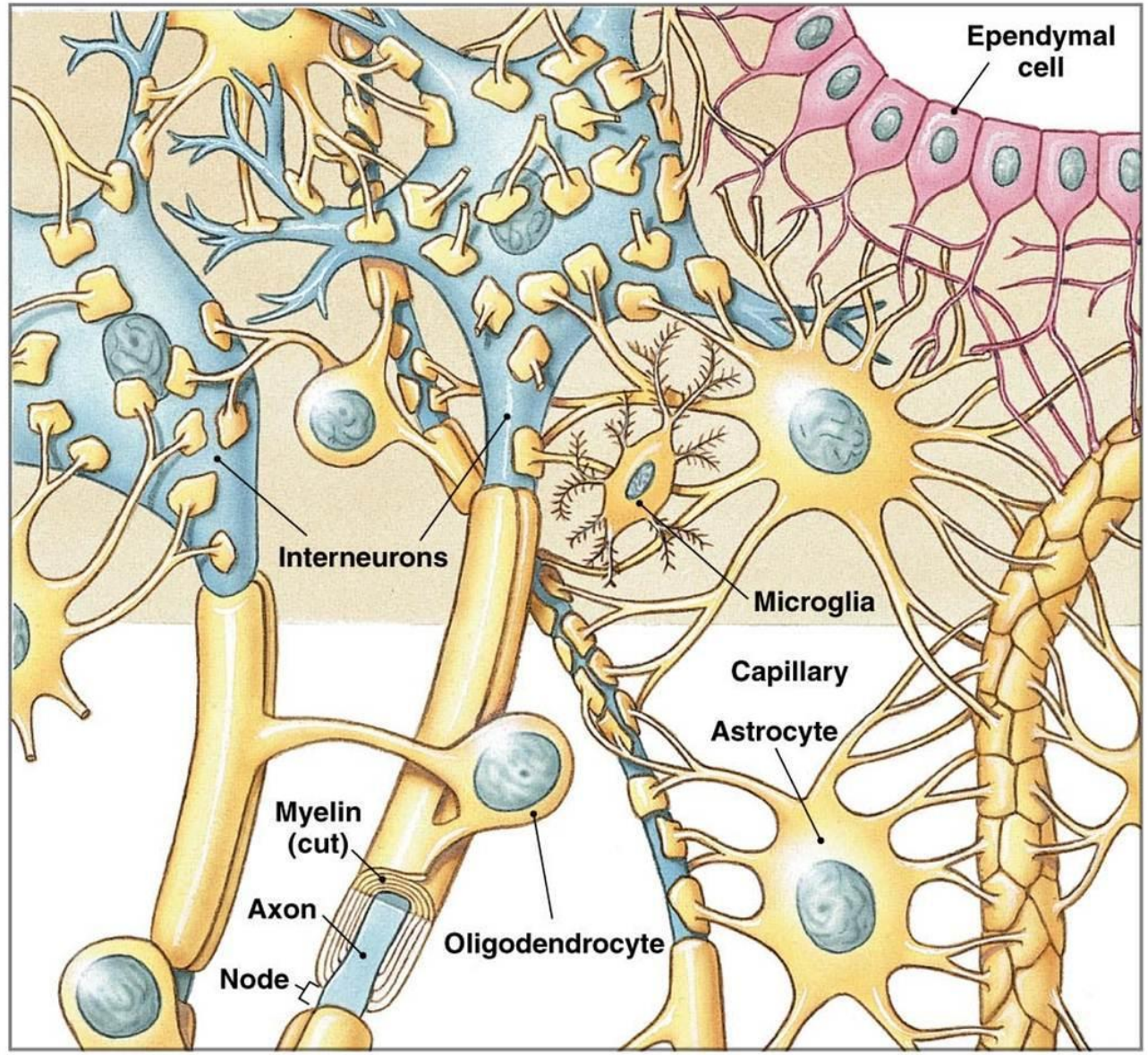
STRUCTURE OF NEURON



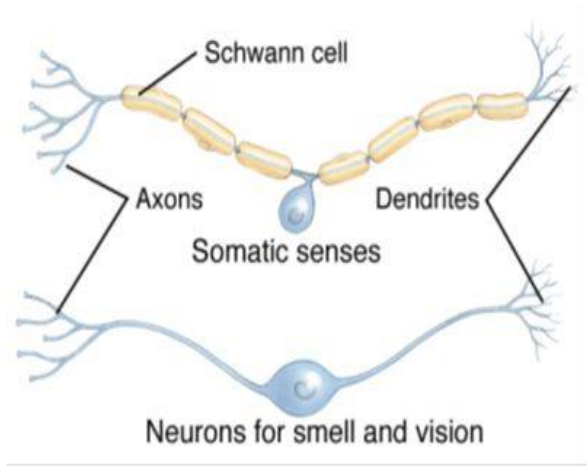

Unipolar
Bipolar
Pseudounipolar
Multipolar
Cell body
Myelin
Sensory receptor
Sensory receptor
Dendrite
Axon


White matter
Gray matter
Dorsal horn
Ventral horn

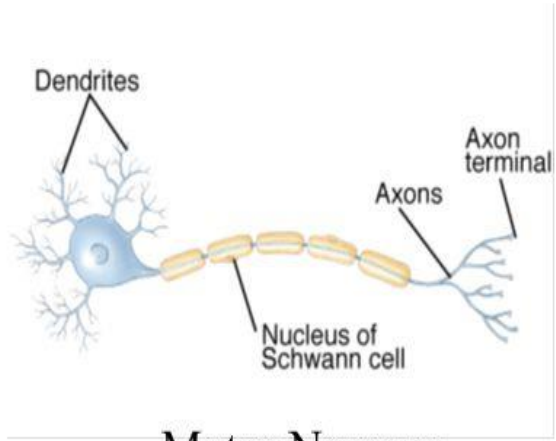

Grey matter
White matter
Ventricle


Ependymal cell
Interneurons
Microglia
Capillary
Astrocyte
Myelin (cut)
Axon
Node
Oligodendrocyte

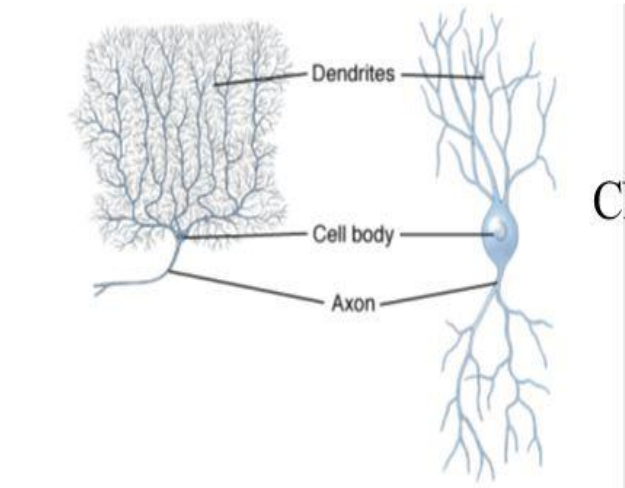
Three Functional Types of Neurons



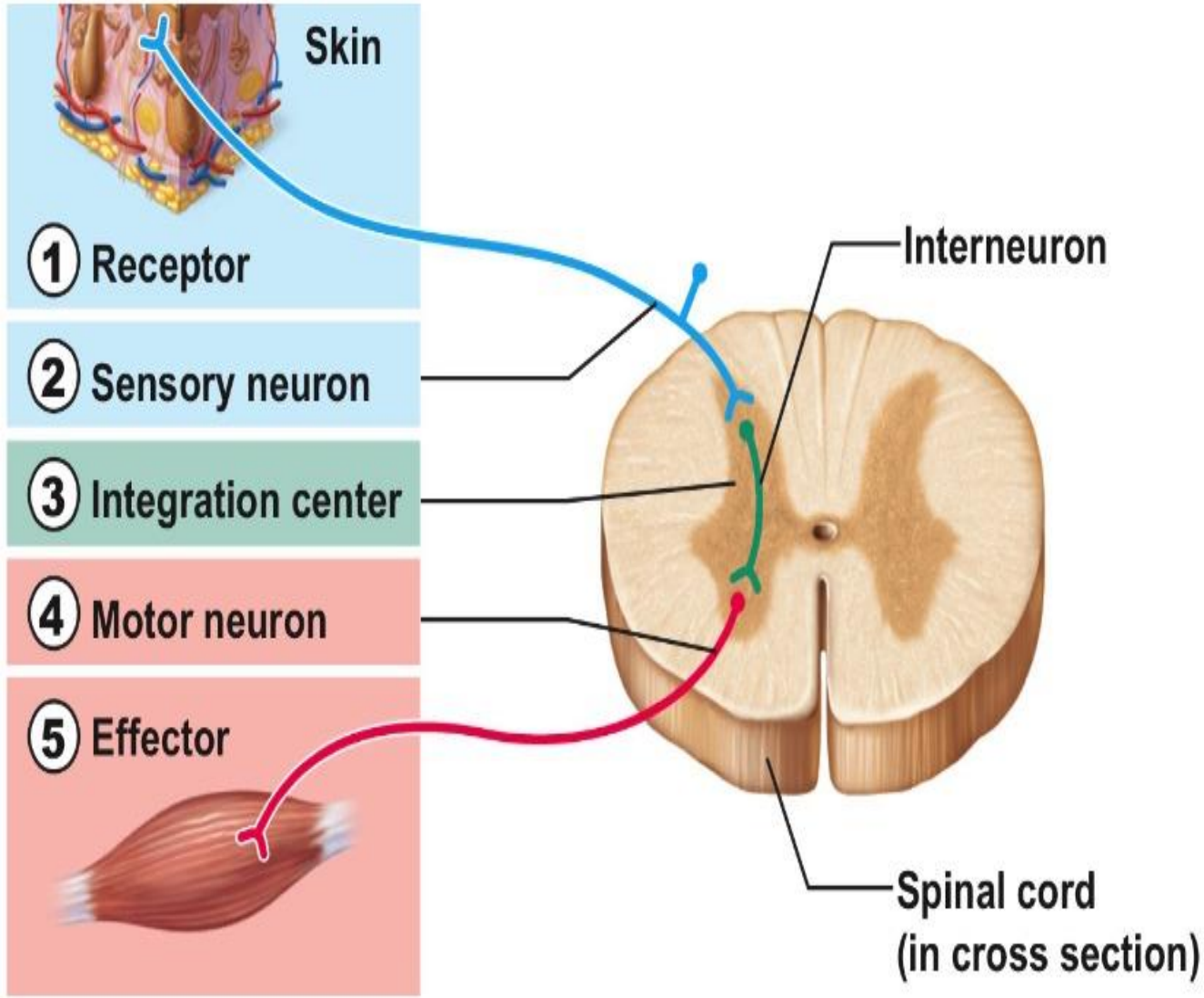
Sensory Neurons

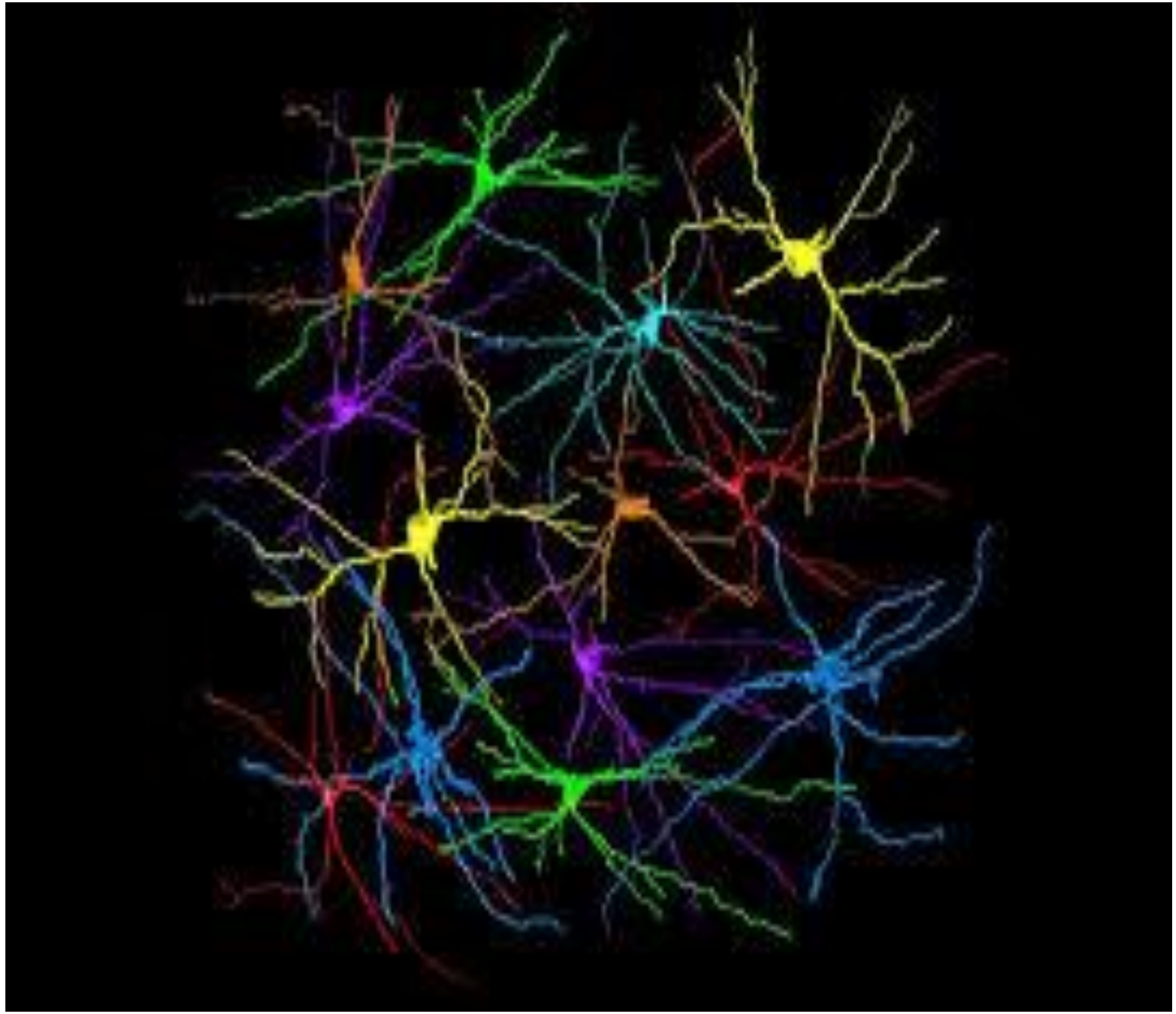


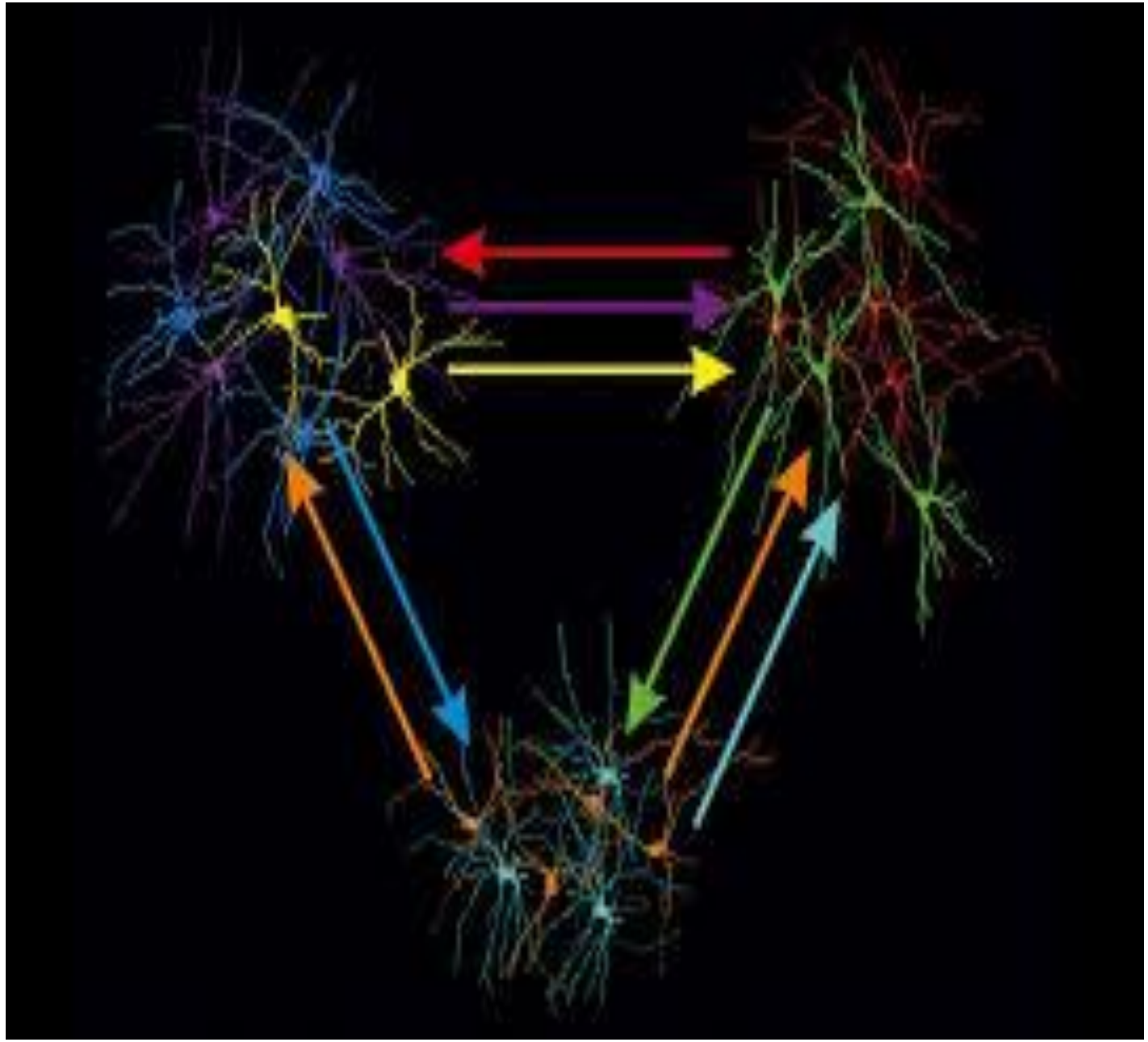
Motor Neurons



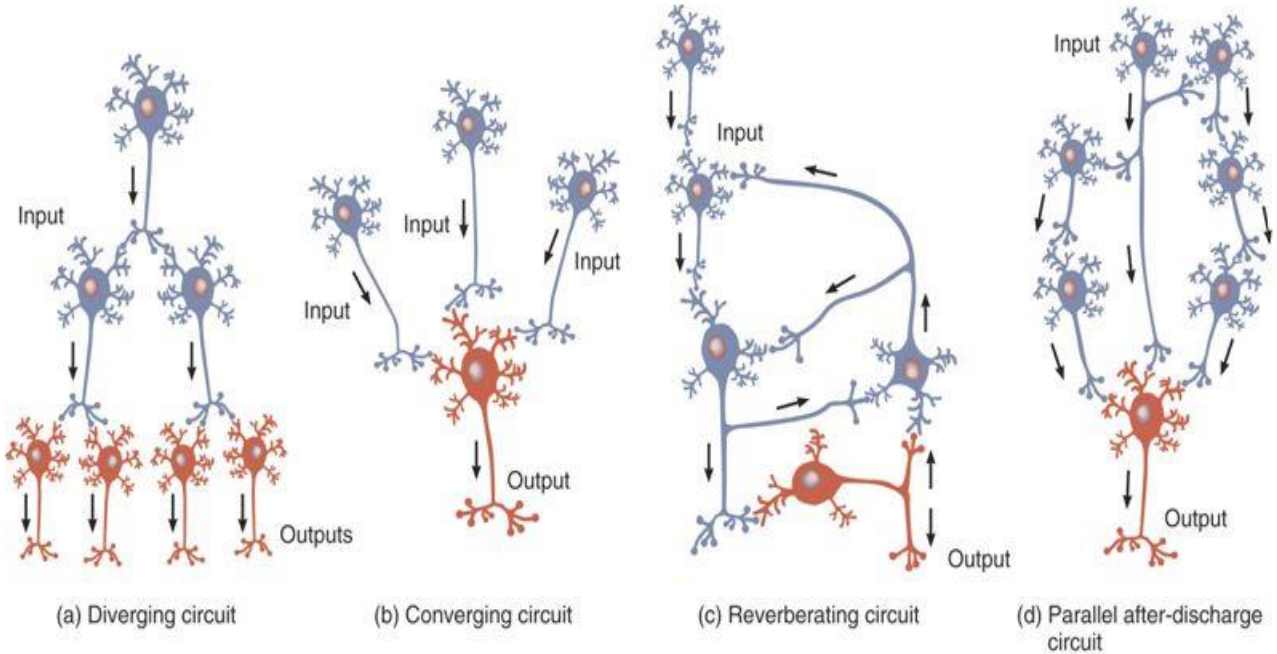
CNS Interneurons


Skin
1 Receptor
2 Sensory neuron
3 Integration center
4 Motor neuron
5 Effector
Interneuron
Spinal cord
(in cross section)





Neuronal Circuits



(a) Diverging circuit (b) Converging circuit (c) Reverberating circuit (d) Parallel after-discharge circuit

- Diverging -- single cell stimulates many others
- Converging -- one cell stimulated by many others
- Reverberating -- impulses from later cells repeatedly stimulate early cells in the circuit (short-term memory)
- Parallel-after-discharge -- single cell stimulates a group of cells that all stimulate a common postsynaptic cell (math problems)

فیزیولوژی یک، جلسه نهم

مقایسه کارکرد های حسی دستگاه عصبی

گیرنده های حسی

مسیرهای عصبی حسی پیکری

Categories

- Somatic Senses
  - Touch
  - Pressure
  - Temperature
  - Pain
- Special Senses
  - Smell
  - Taste
  - Hearing
  - Equilibrium
  - vision

Somatic senses

fine touch, deep touch, pressure, temp, pain, joint and muscle position, muscle stretch

Visceral senses

pH, O_2, CO_2, OsM, glucose, blood pressure, lung inflation, stomach stretch

Special senses

olfaction, gustation, hearing, equilibrium, vision

Definition of Sensory Receptors:

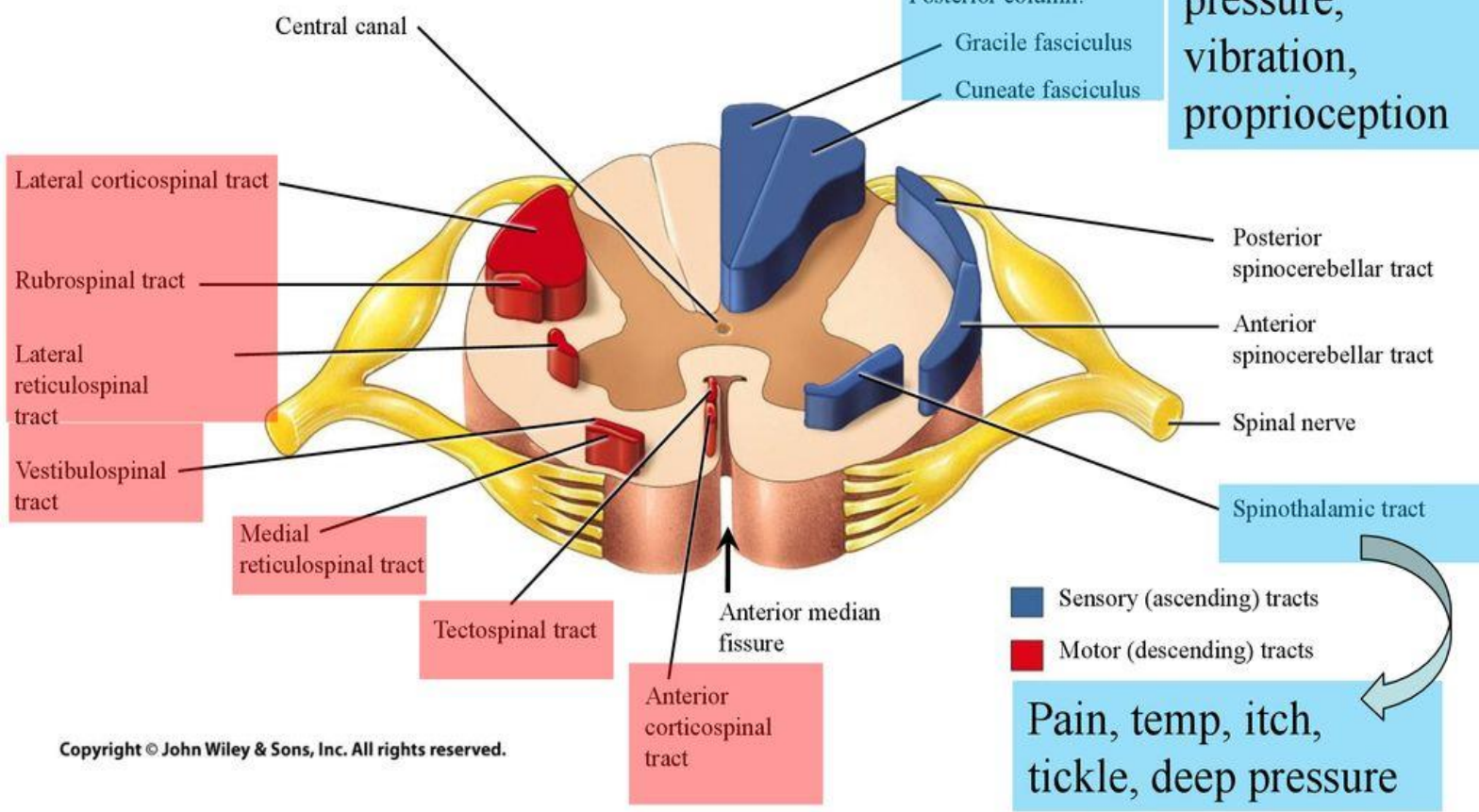
- Receptors are specialized cells / nerve endings which respond to stimuli.
- These generate impulses which inform CNS about changes in internal & external environment.
- Receptors are transducers, which convert various forms of energy into action potential or electrical energy.

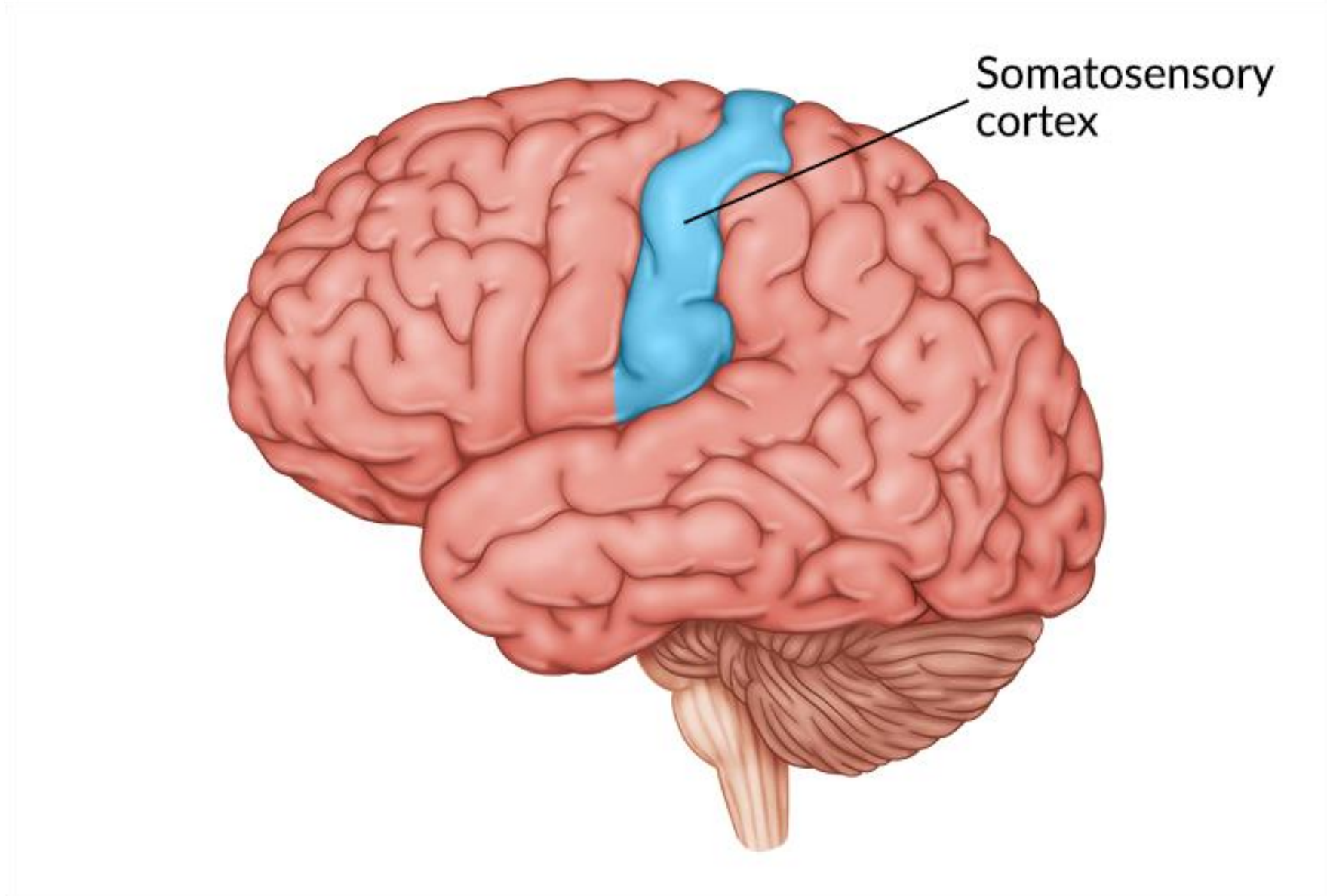
Types of Sensory Receptors

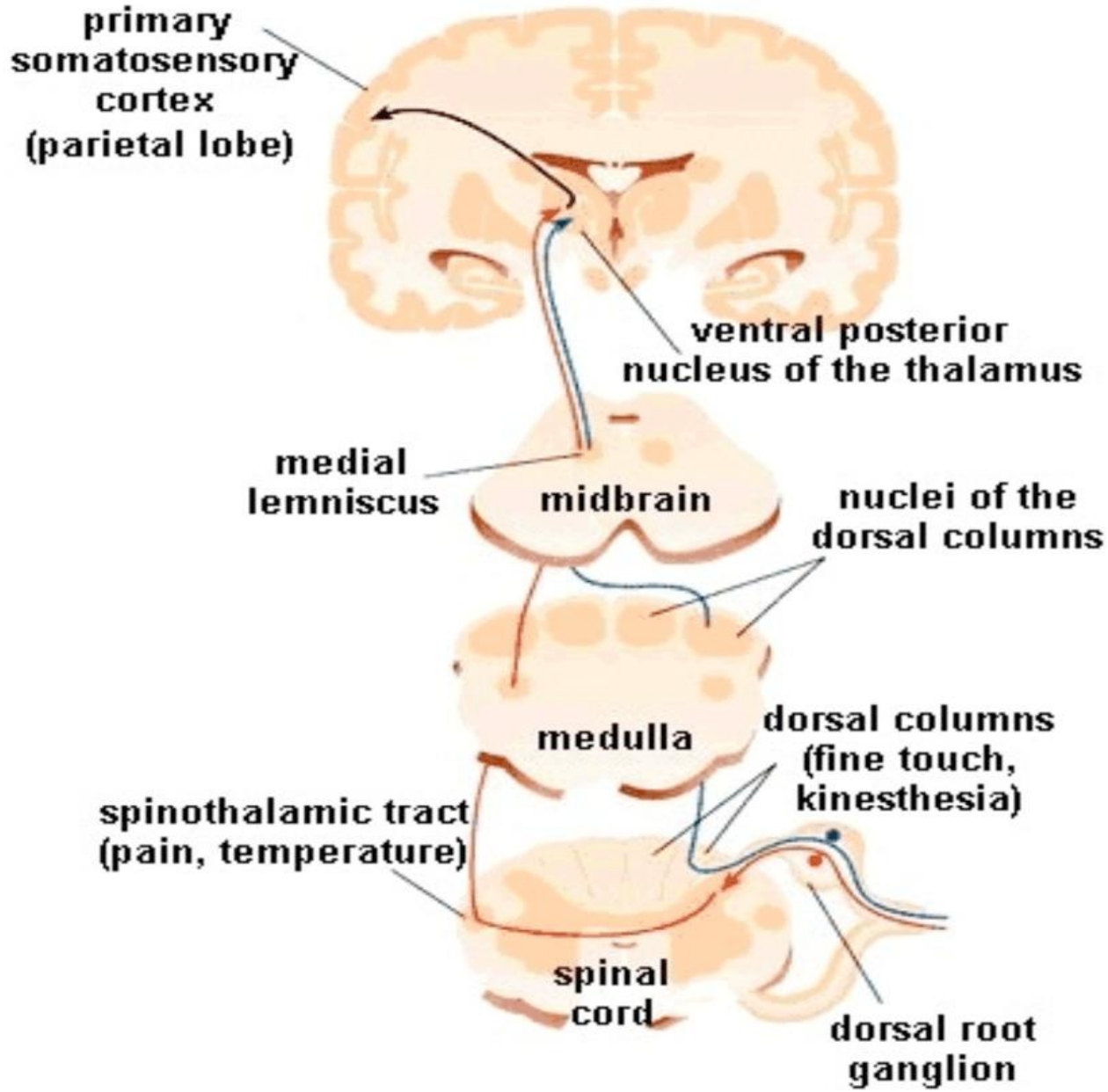
- Based on energy transduced, sensory receptors fall into five categories:
  - Mechanoreceptors
  - Chemoreceptors
  - Electromagnetic receptors
  - Thermoreceptors
  - Pain receptors

Major Sensory and Motor Tracts

Direct and Indirect Motor Pathways




Somatosensory
cortex


primary somatosensory cortex (parietal lobe)
ventral posterior nucleus of the thalamus
medial lemniscus
midbrain
nuclei of the dorsal columns
medulla
dorsal columns (fine touch, kinesthesia)
spinothalamic tract (pain, temperature)
spinal cord
dorsal root ganglion

فیزیولوژی یک، جلسه دهم

کارکردهای حرکتی دستگاه عصبی

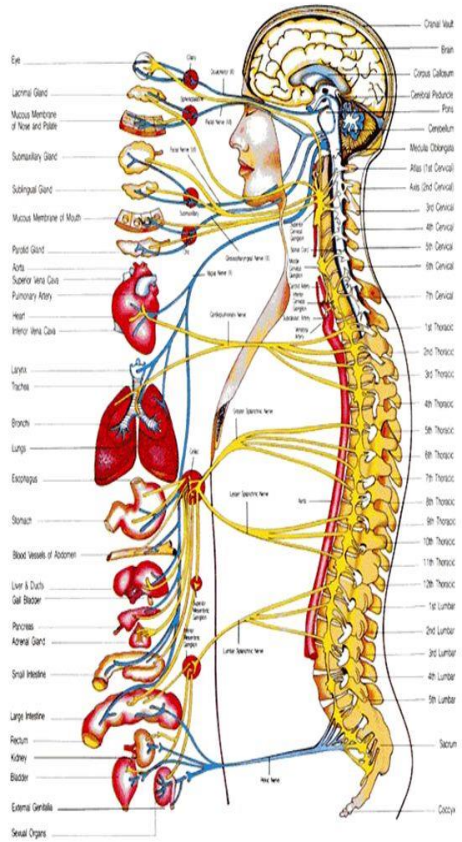
مسیرهای حرکتی هرمی و خارج هرمی

تعادل

Motor Functions

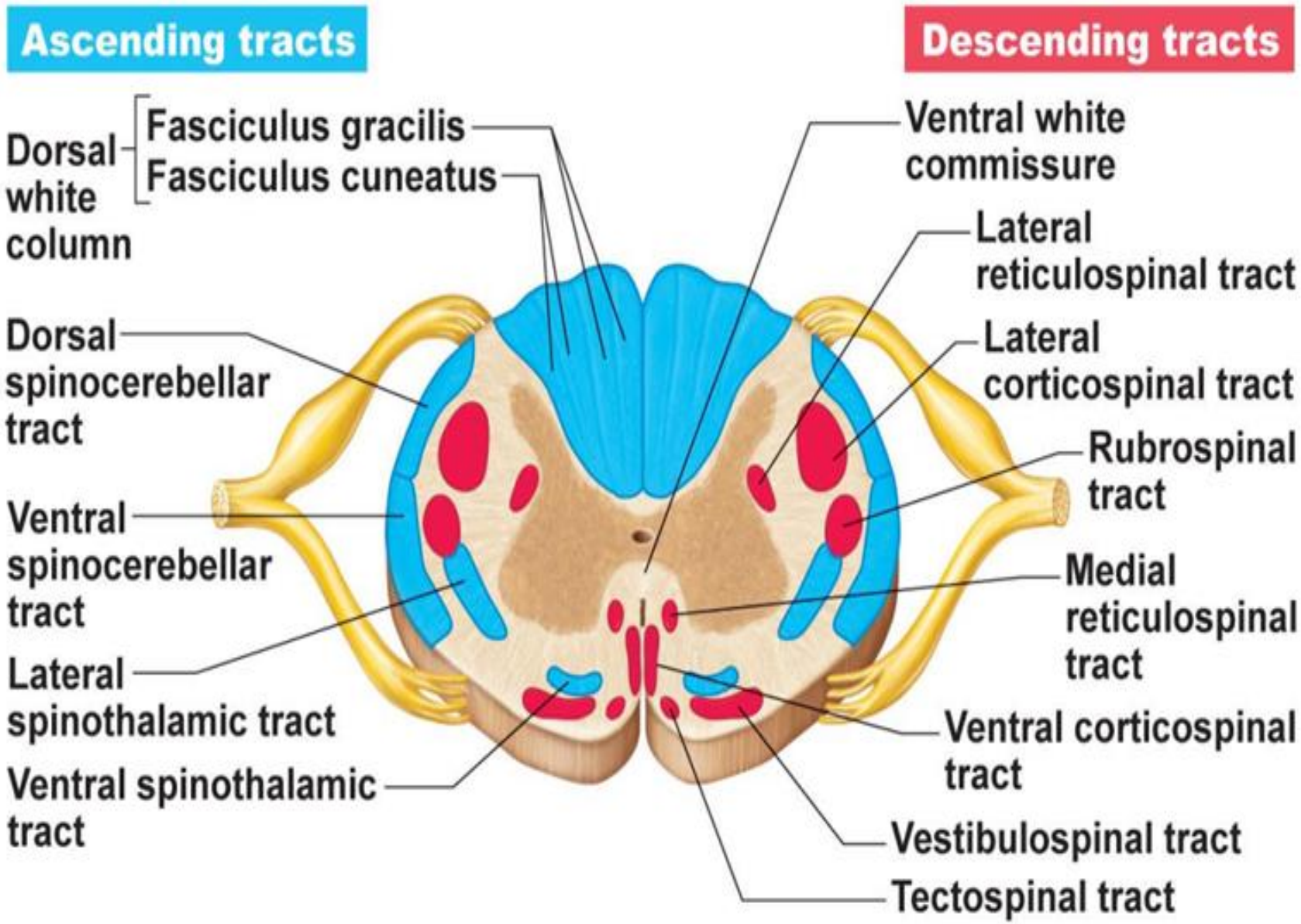
Somatic Nervous System - skeletal (voluntary)

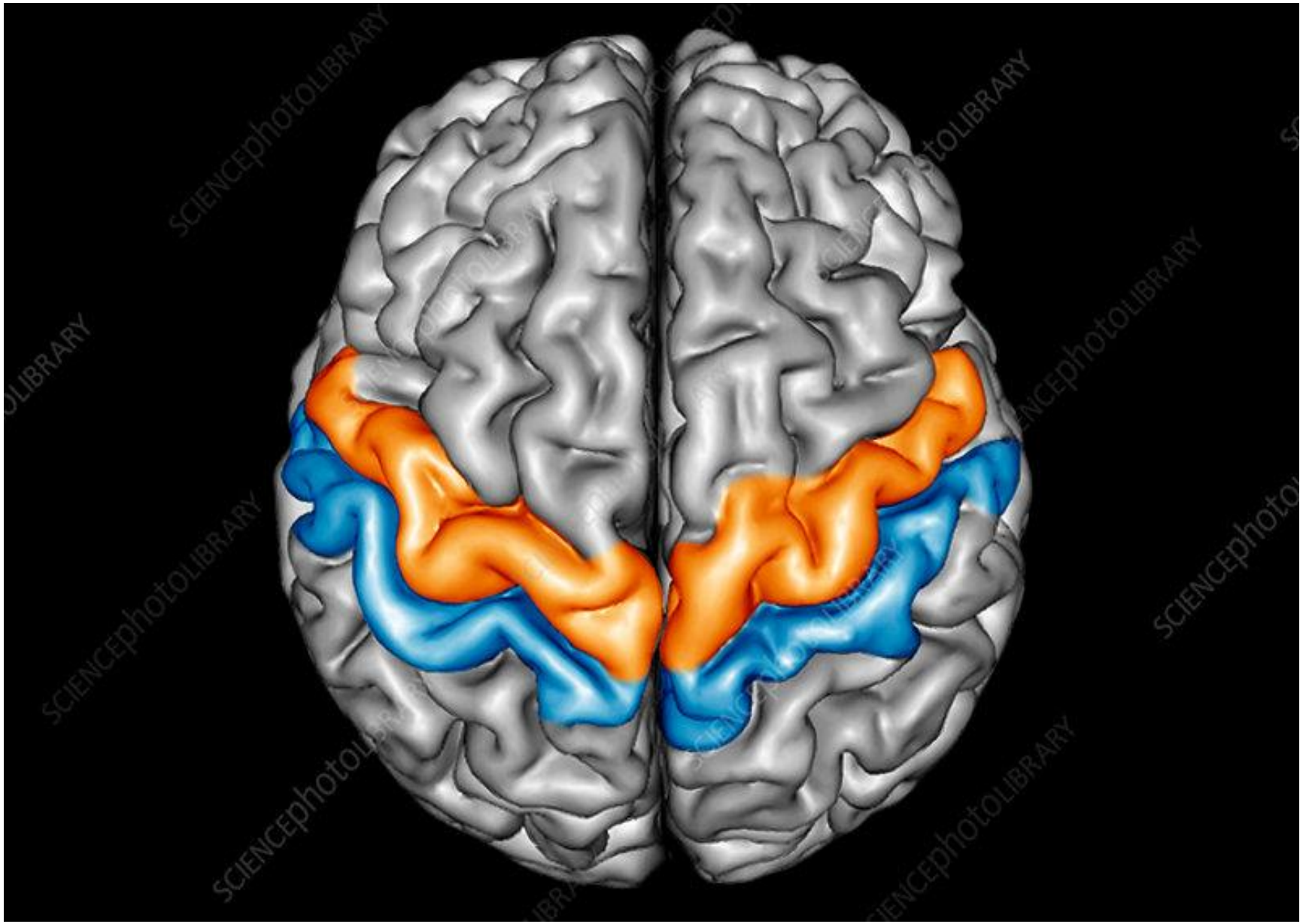
Autonomic Nervous System - smooth muscles, glands (involuntary)

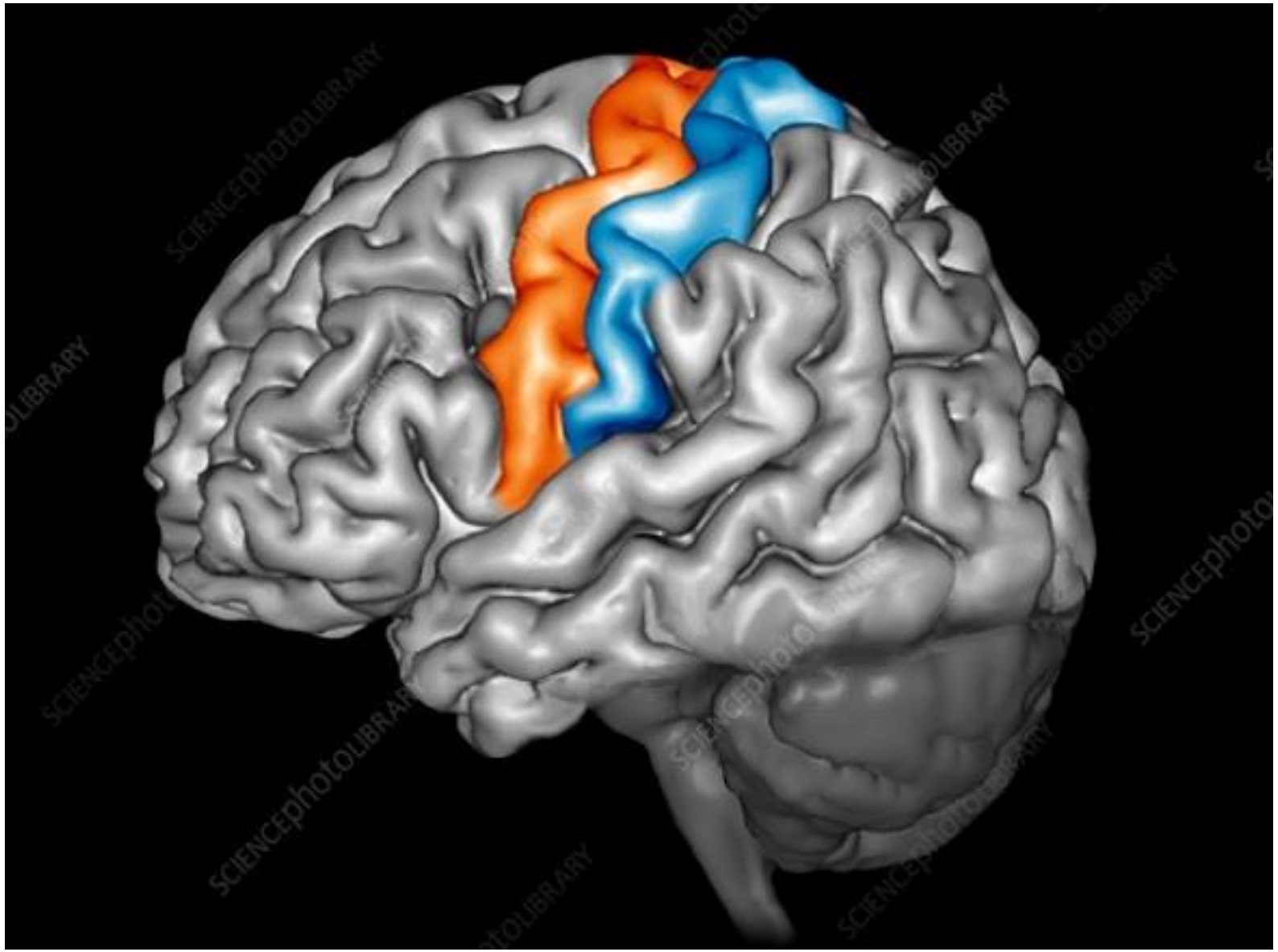


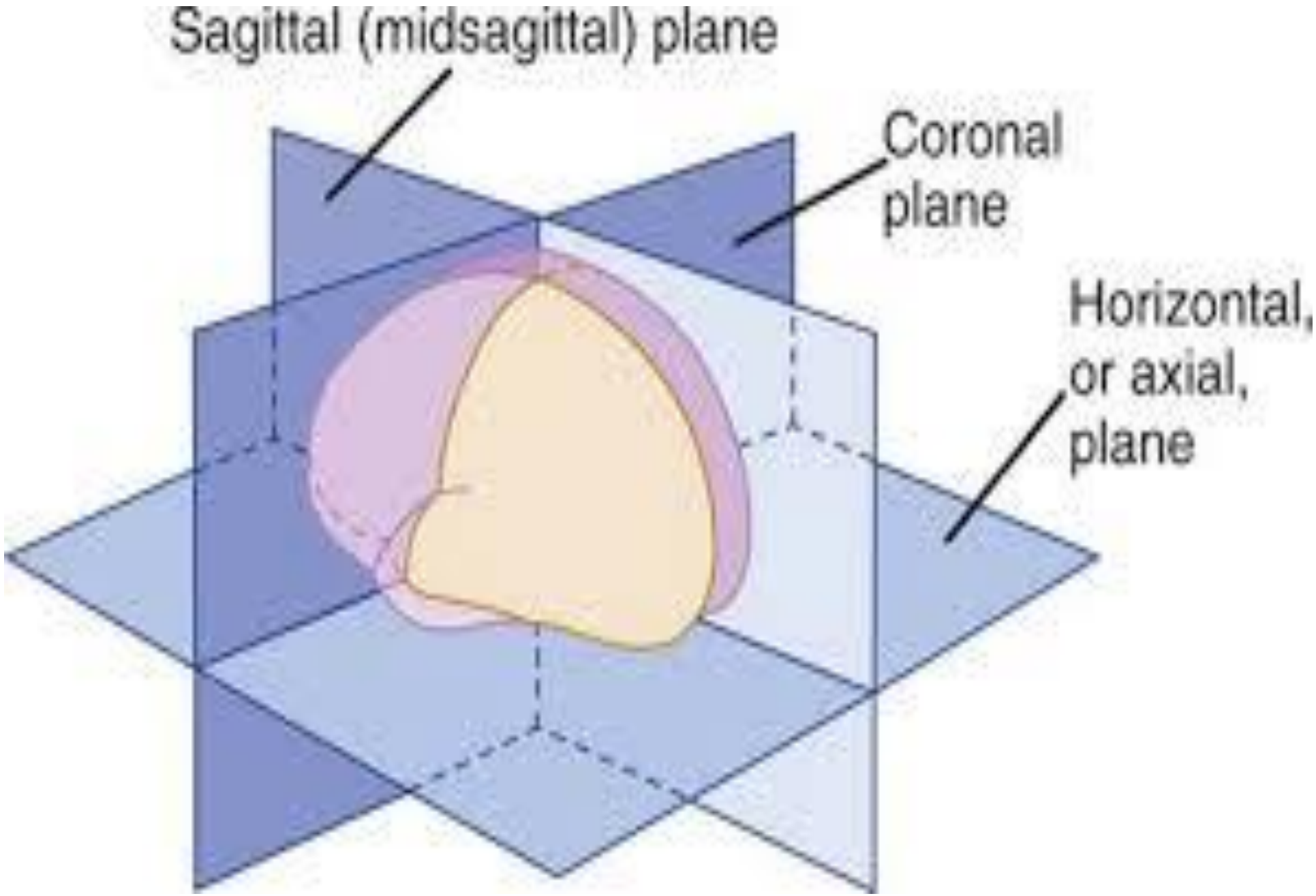
Somatic Motor Pathways

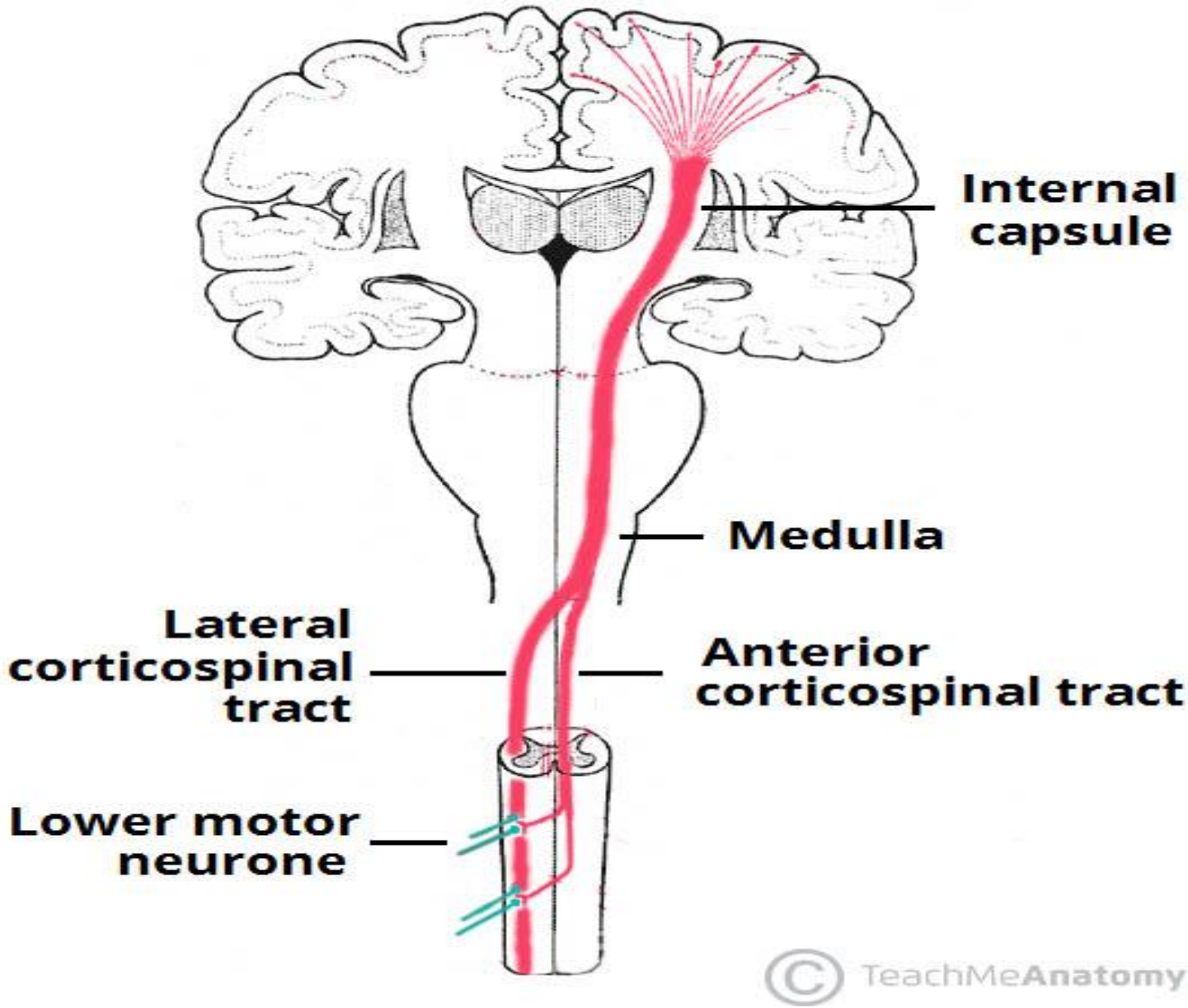
- The somatic nervous system (SNS) is also called the *somatic motor system*. It controls contractions of skeletal muscles (discussed next)
- The autonomic nervous system (ANS) is also called the *visceral motor system*. It controls visceral effectors, such as smooth muscle, cardiac muscle, and glands (covered in Ch. 16)

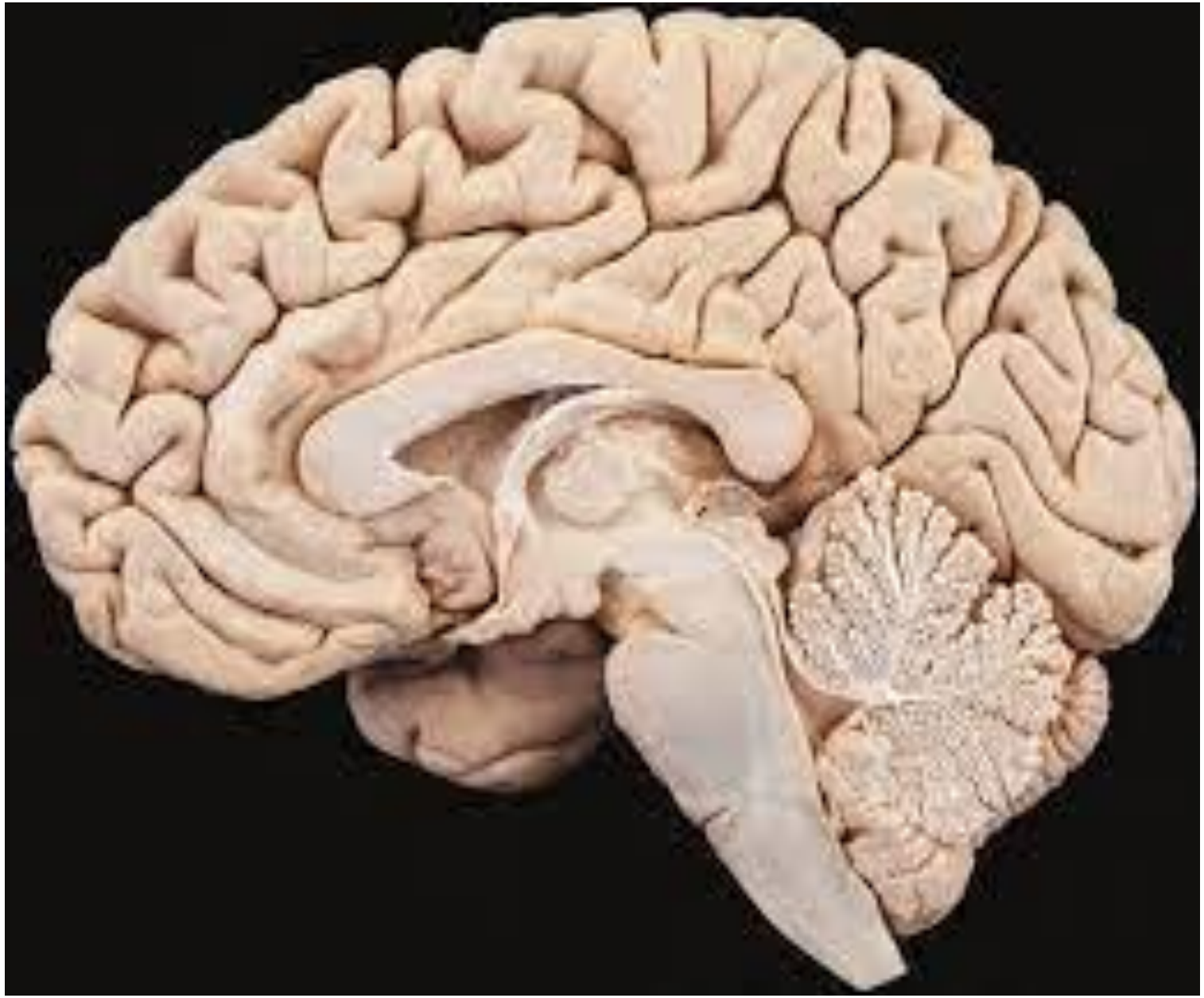

Ascending tracts
Descending tracts
Dorsal white column
Fasciculus gracilis
Fasciculus cuneatus
Dorsal spinocerebellar tract
Ventral spinocerebellar tract
Lateral spinothalamic tract
Ventral spinothalamic tract
Ventral white commissure
Lateral reticulospinal tract
Lateral corticospinal tract
Rubrospinal tract
Medial reticulospinal tract
Ventral corticospinal tract
Vestibulospinal tract
Tectospinal tract


SCIENCEPHOTOLIBRARY

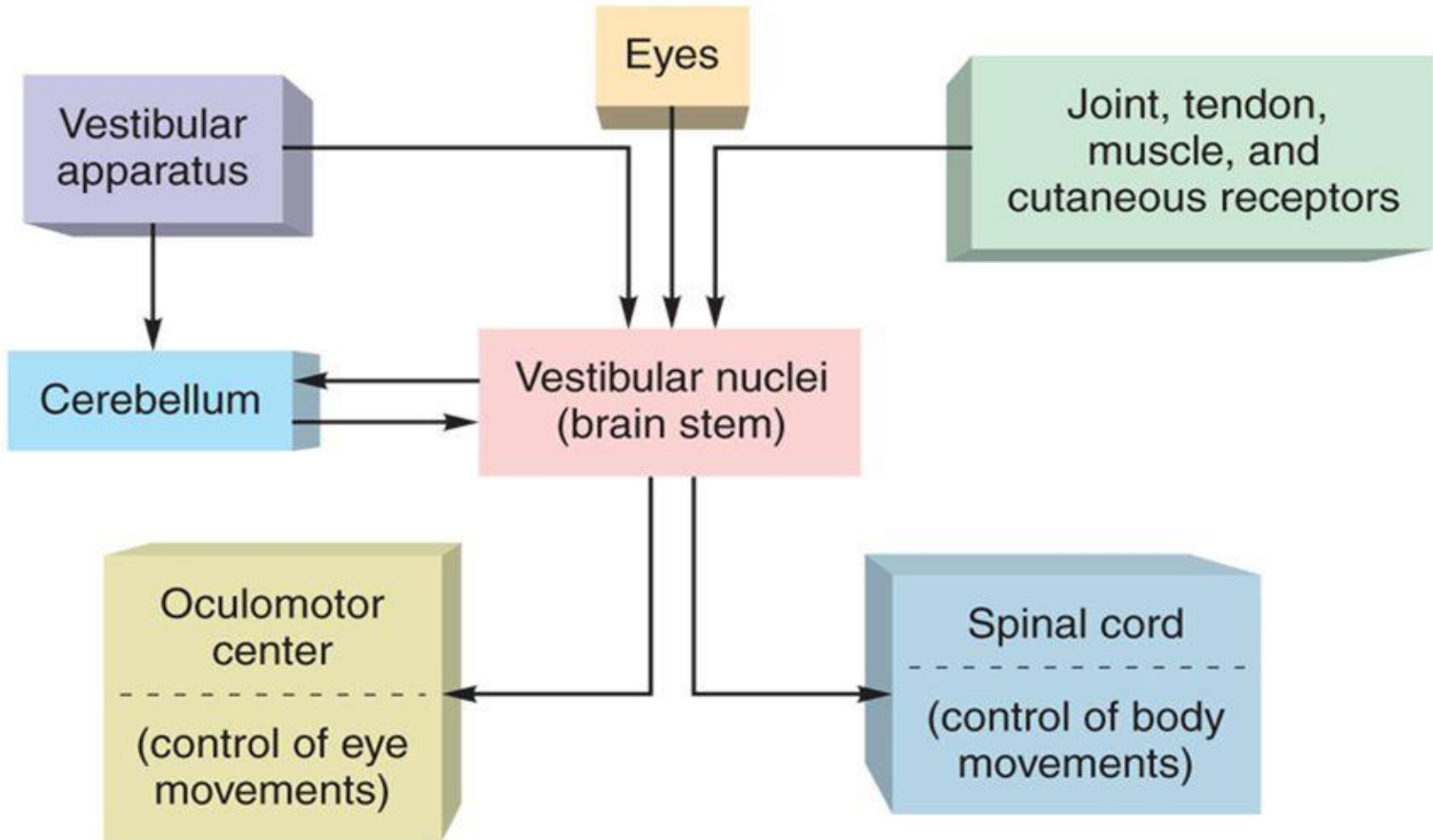


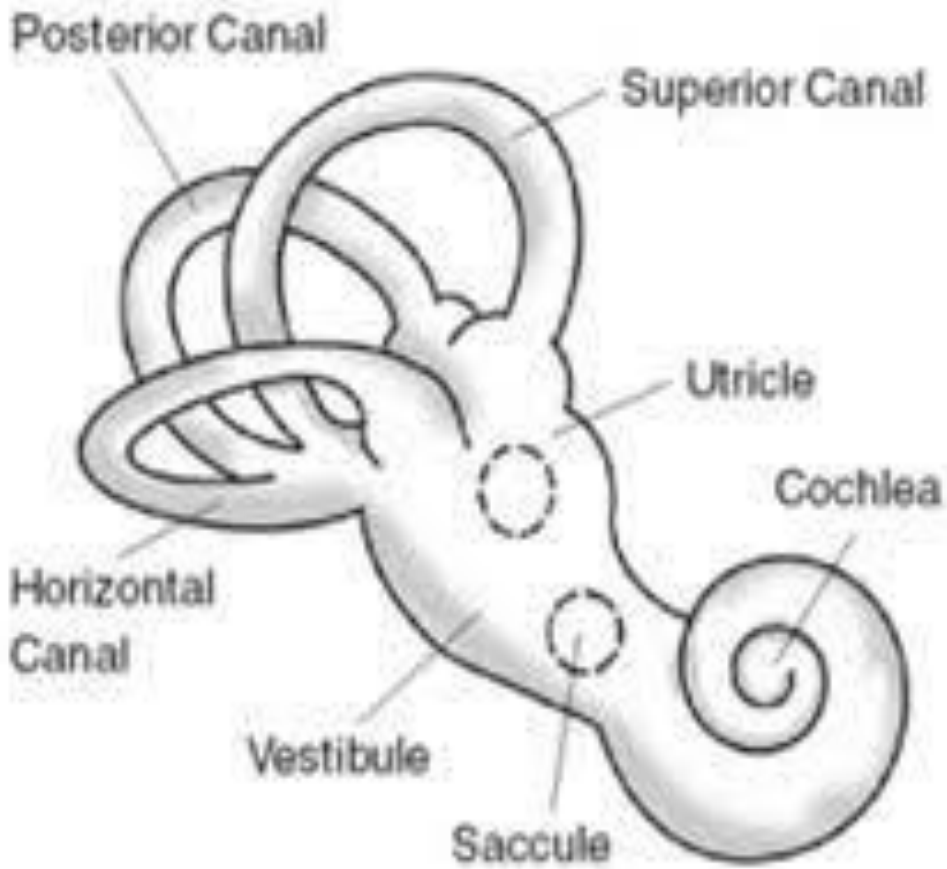

Sagittal (midsagittal) plane
Coronal plane
Horizontal, or axial, plane


Internal capsule
Medulla
Lateral corticospinal tract
Anterior corticospinal tract
Lower motor neurone
© TeachMeAnatomy

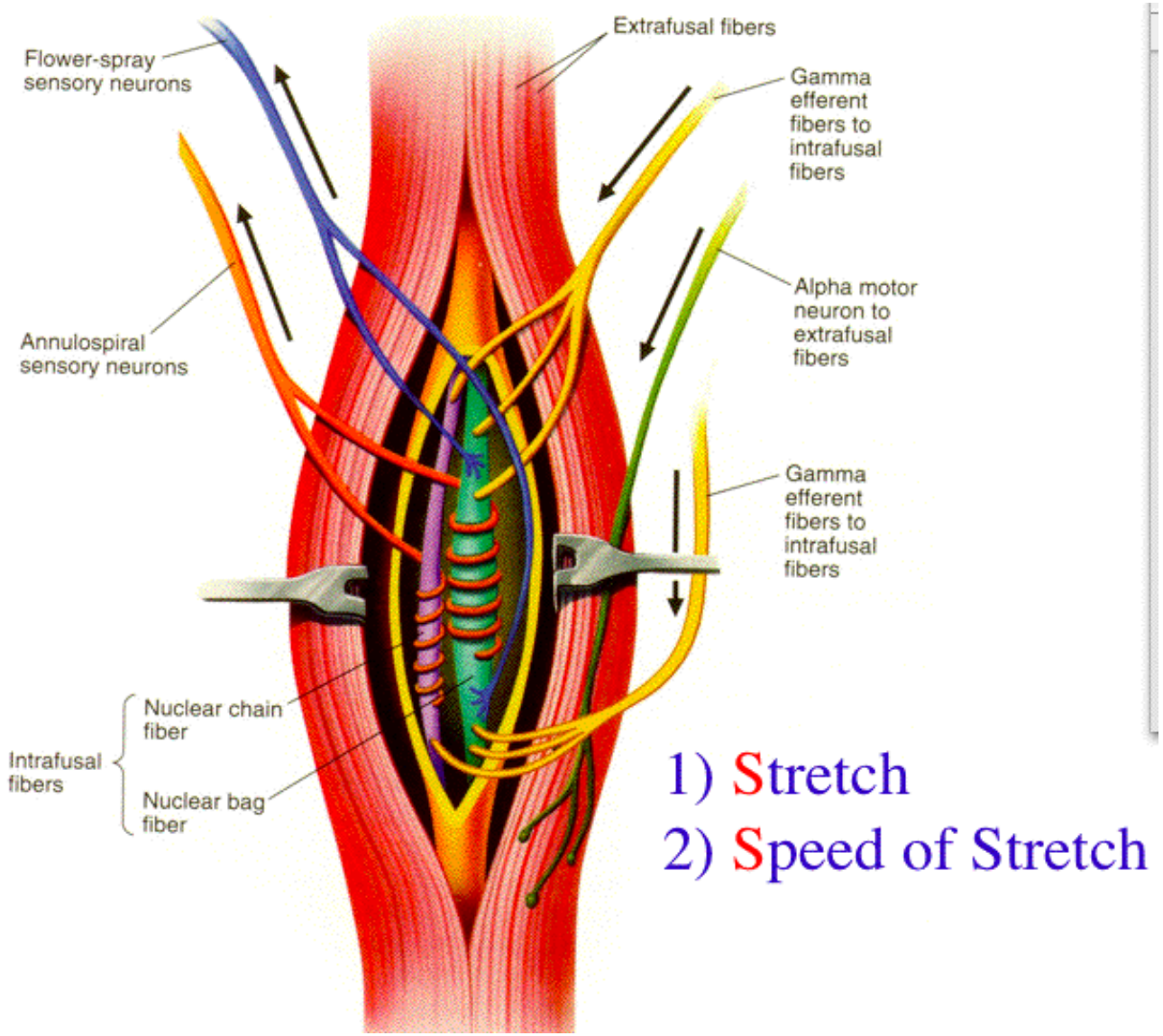


Neural Pathways for Equilibrium and Balance



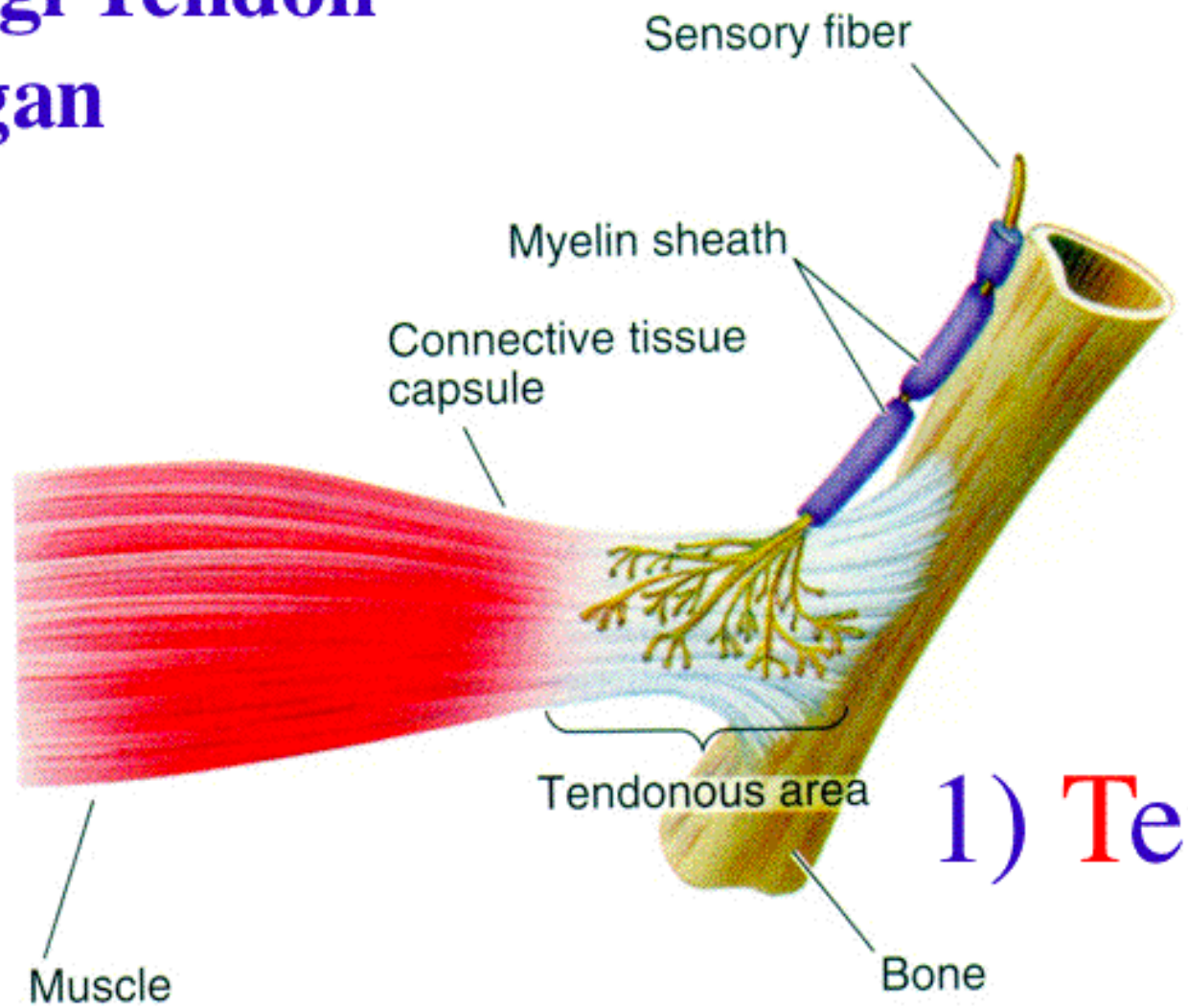

Posterior Canal
Superior Canal
Utricle
Cochlea
Horizontal Canal
Vestibule
Saccule

Muscle Spindle



1) Stretch
2) Speed of Stretch

Golgi Tendon Organ

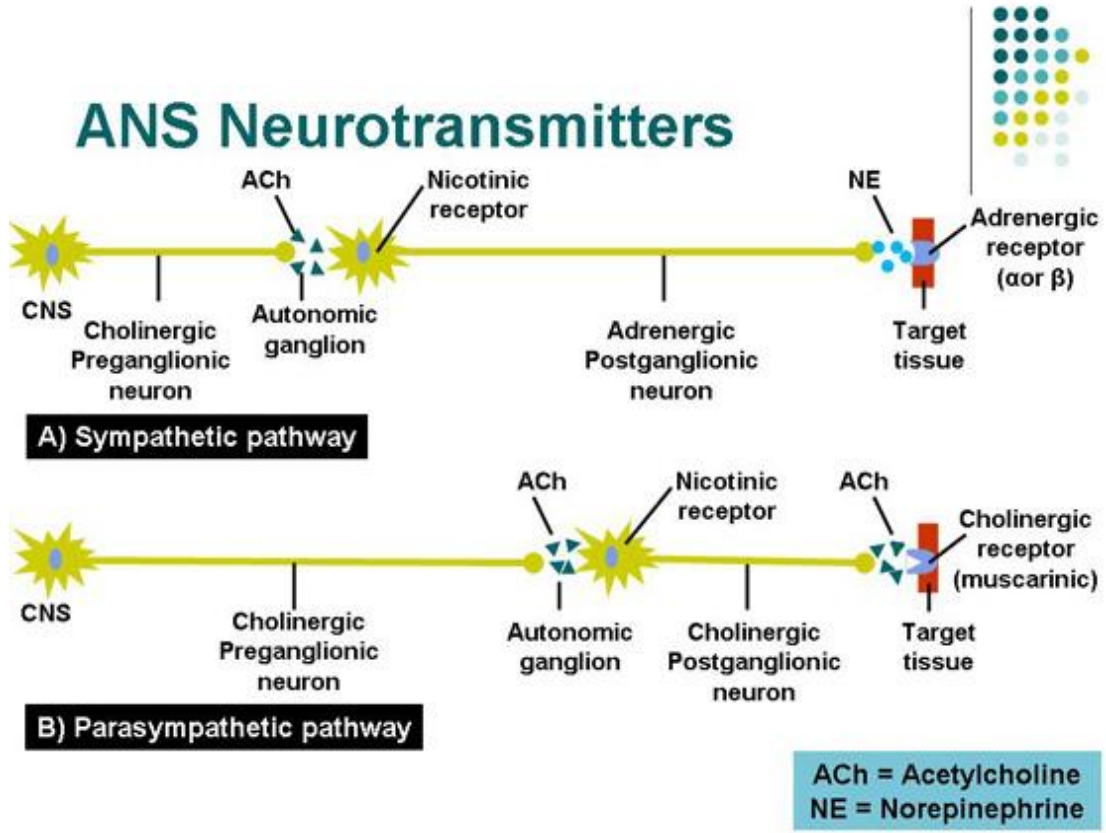


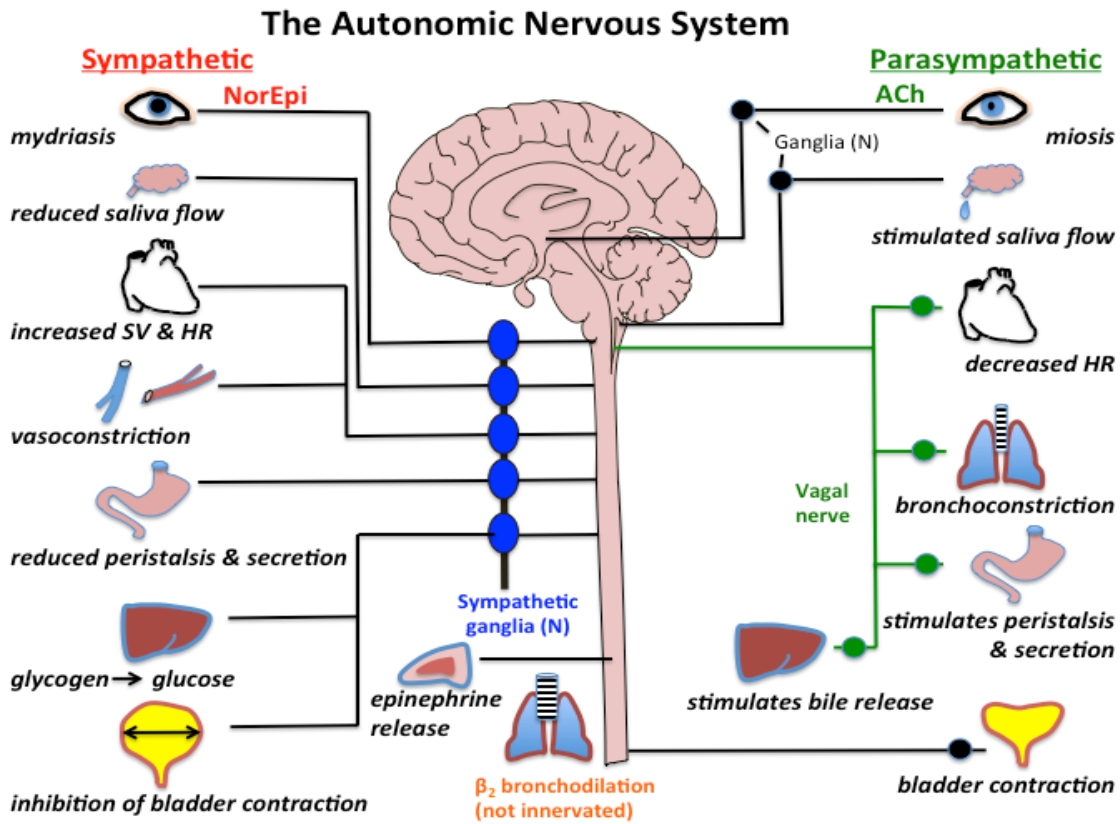
1) Tension

فیزیولوژی یک، جلسه یازدهم

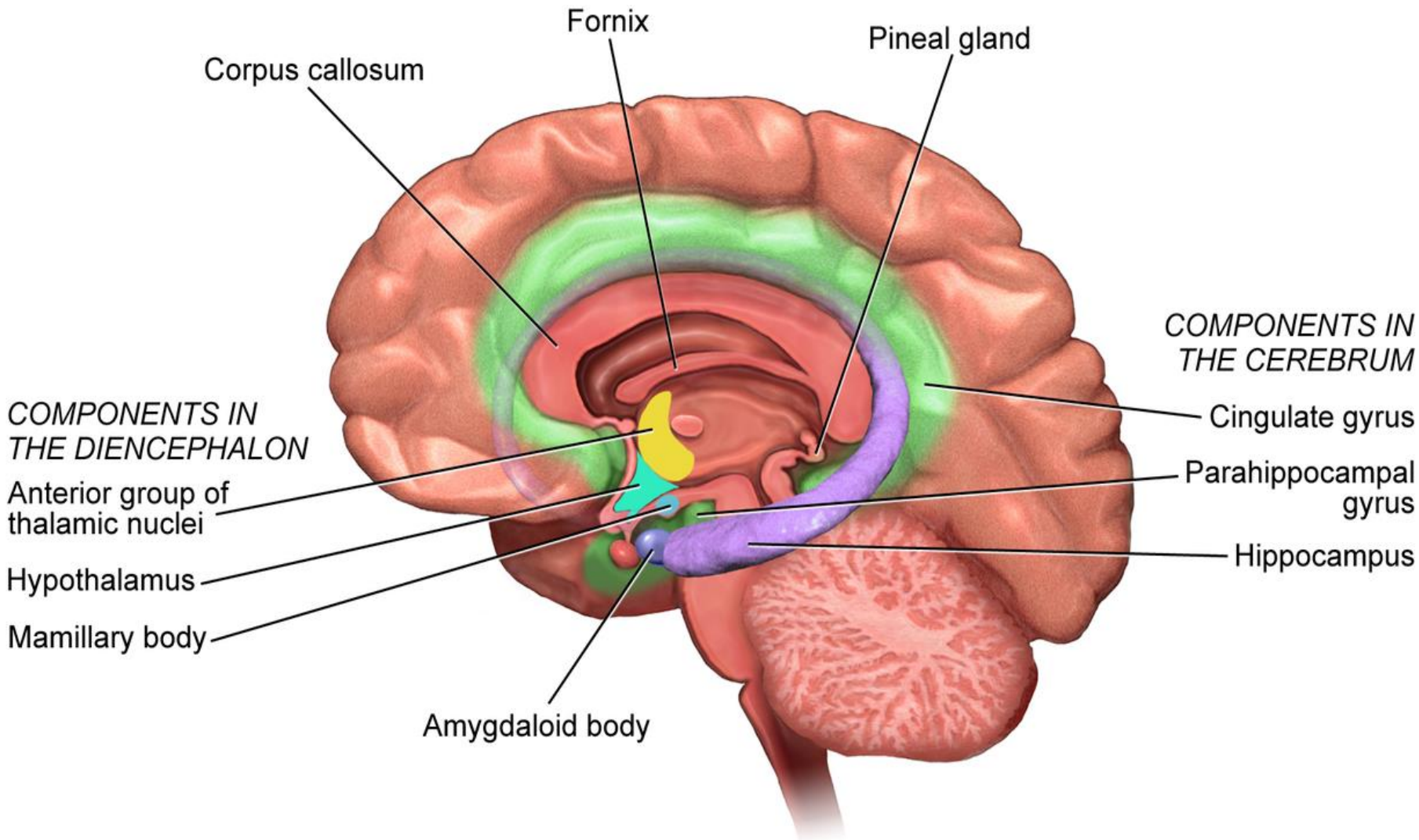
دستگاه عصبی خودمختار

دستگاه لیمبیک


ANS Neurotransmitters
ACh
Nicotinic receptor
NE
Adrenergic receptor (αor β)
CNS
Cholinergic Preganglionic neuron
Autonomic ganglion
Adrenergic Postganglionic neuron
Target tissue
A) Sympathetic pathway
ACh
Nicotinic receptor
ACh
Cholinergic receptor (muscarinic)
CNS
Cholinergic Preganglionic neuron
Autonomic ganglion
Cholinergic Postganglionic neuron
Target tissue
B) Parasympathetic pathway
ACh = Acetylcholine
NE = Norepinephrine


The Autonomic Nervous System
Sympathetic
NorEpi
Parasympathetic
ACh
mydriasis
miosis
Ganglia (N)
reduced saliva flow
stimulated saliva flow
increased SV & HR
decreased HR
vasoconstriction
Vagal nerve
bronchoconstriction
reduced peristalsis & secretion
stimulates peristalsis & secretion
Sympathetic ganglia (N)
glycogen → glucose
epinephrine release
stimulates bile release
inhibition of bladder contraction
β2 bronchodilation (not innervated)
bladder contraction

The Limbic System



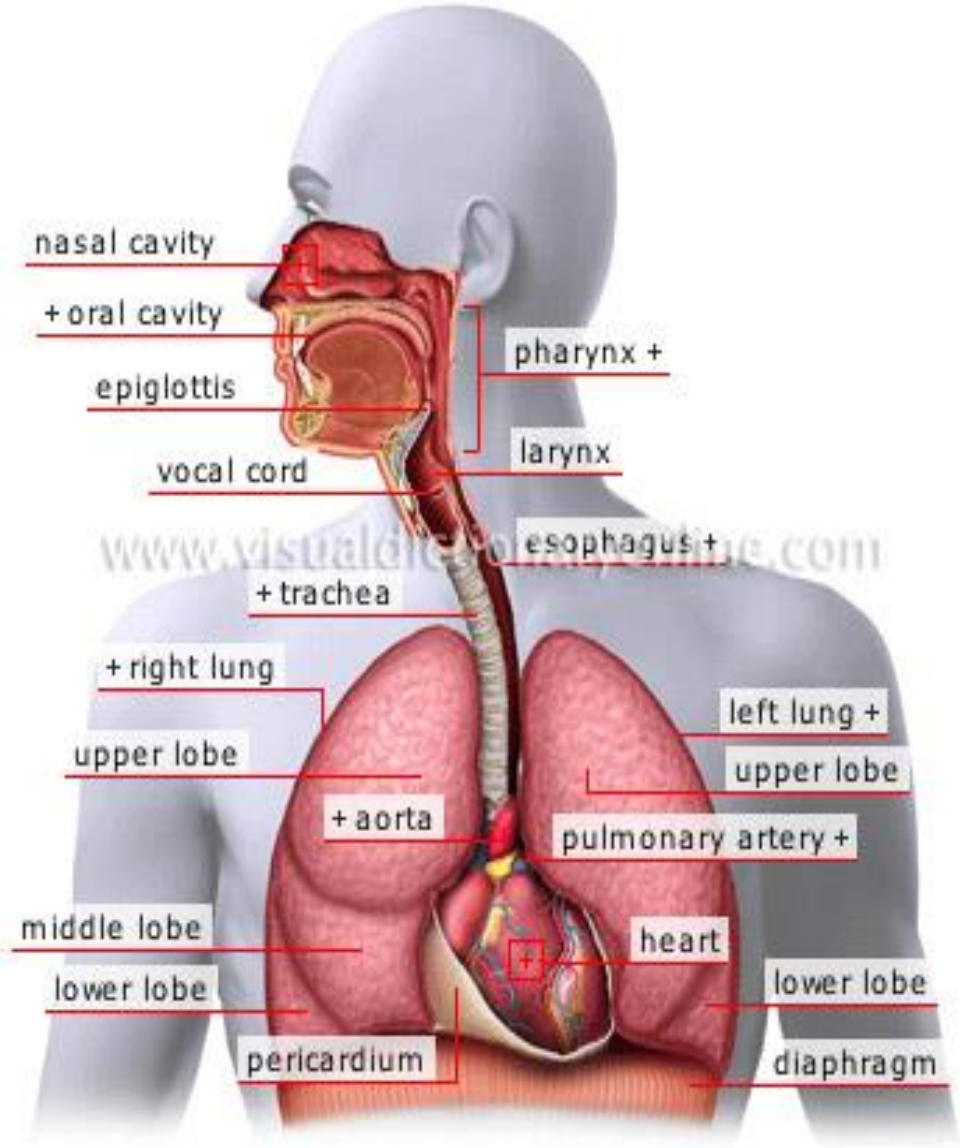
فیزیولوژی یک، جلسه دوازدهم

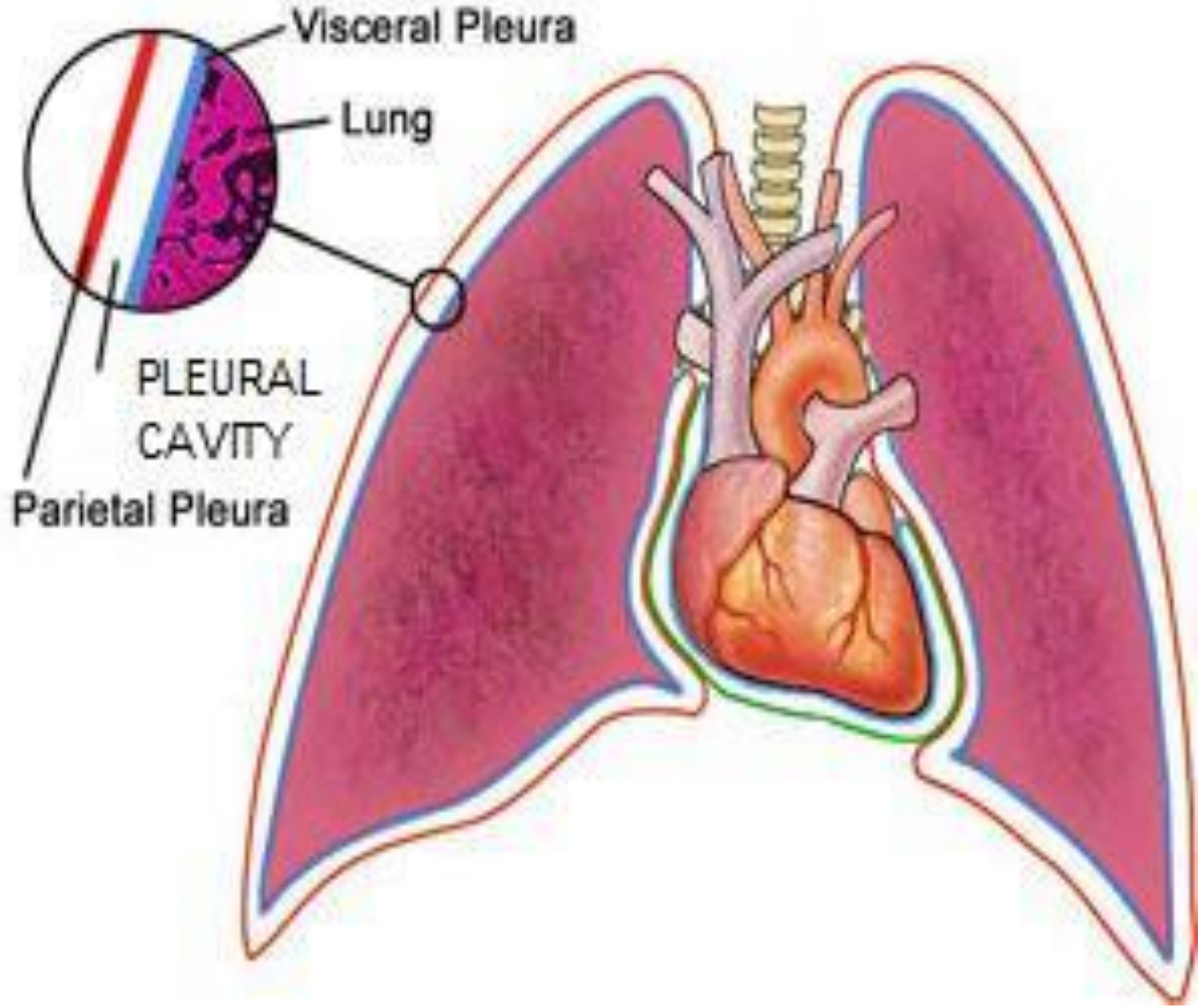
نگرشی بر دستگاه تنفس و کارکردهای تنفسی و غیر تنفسی آن

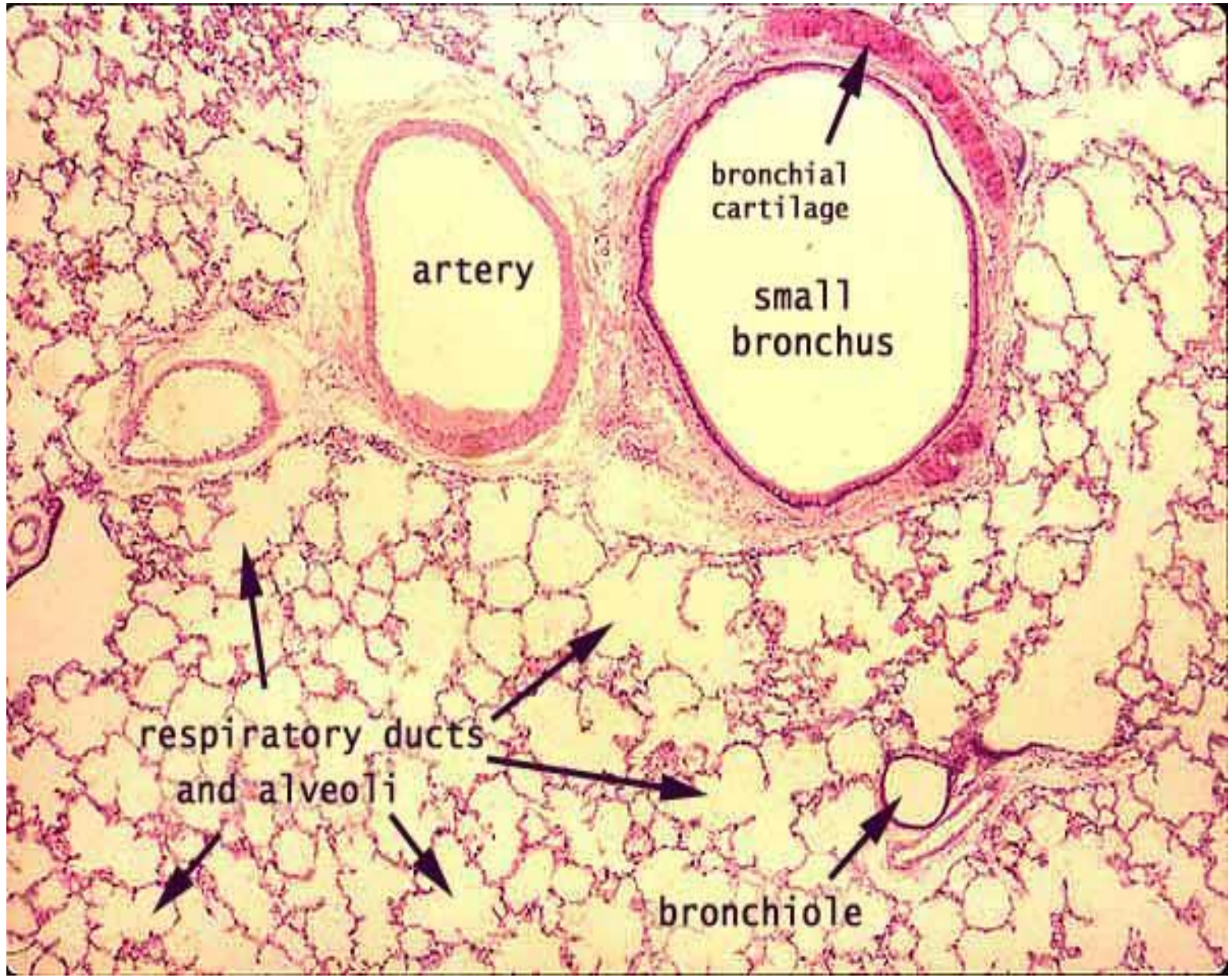
مکانیک تنفس در پستانداران و پرندگان

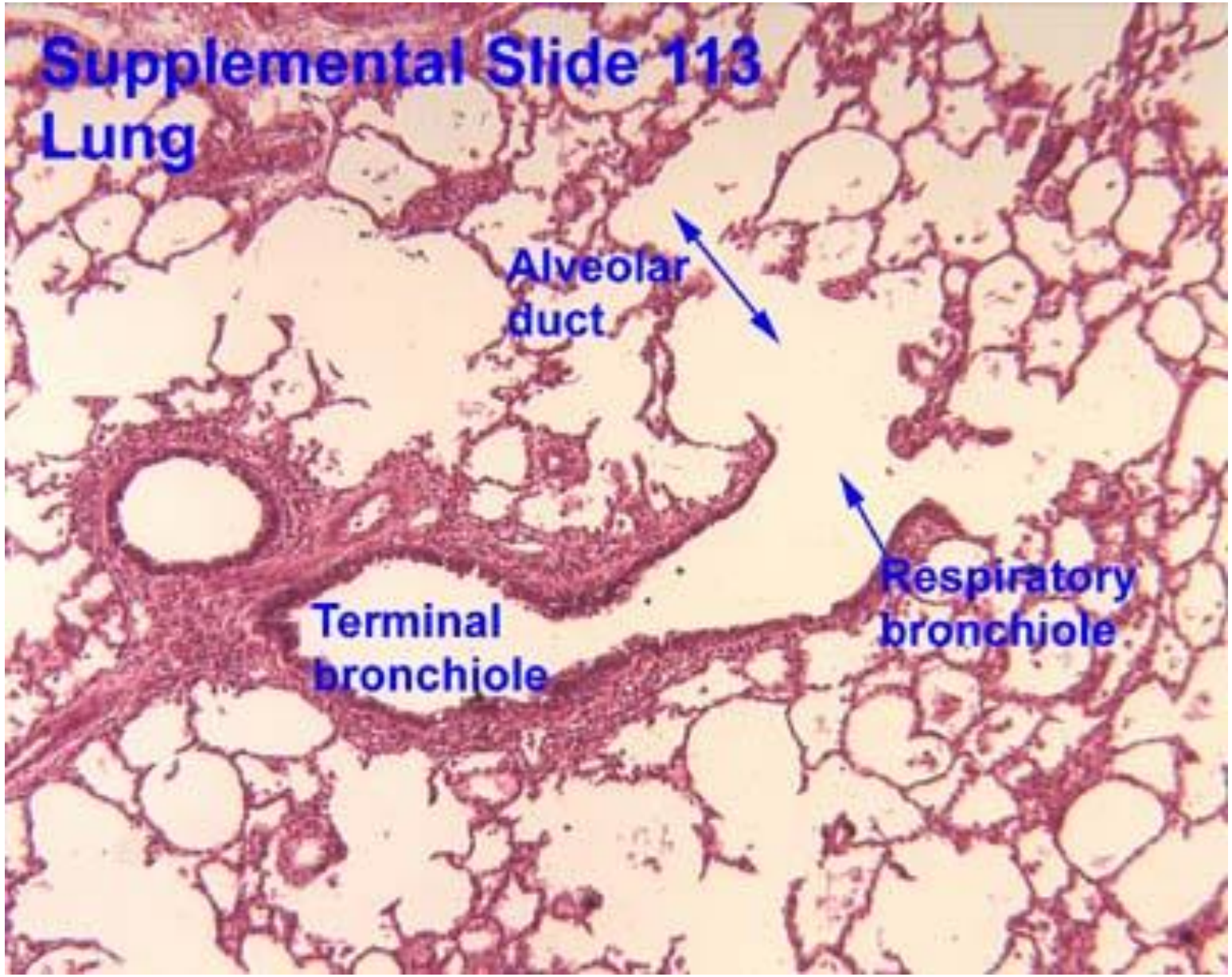
تبادل گازهای تنفسی

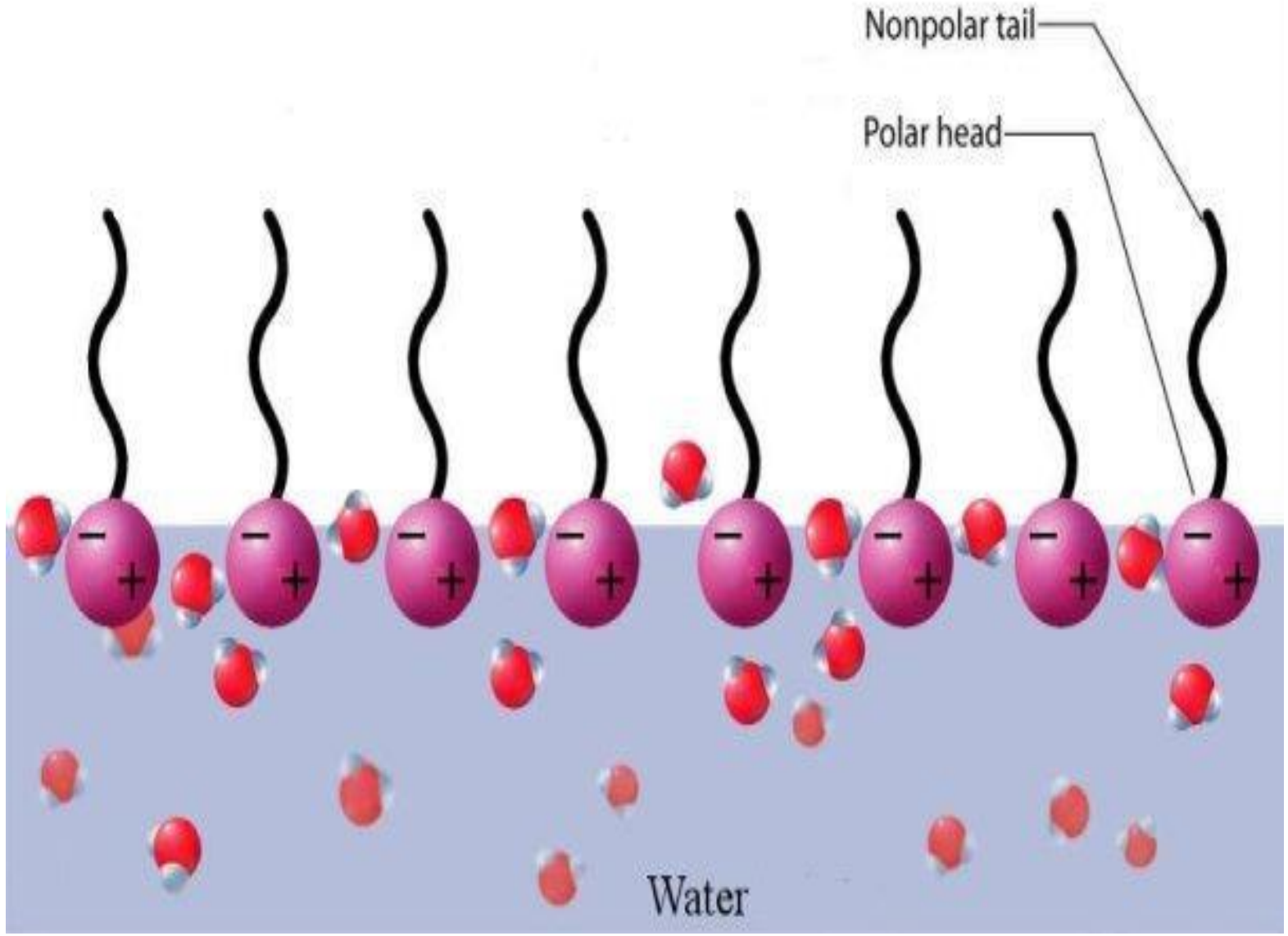
هموگلوبین و اثر بوهر


nasal cavity
+ oral cavity
epiglottis
vocal cord
pharynx +
larynx
esophagus +
+ trachea
+ right lung
upper lobe
+ aorta
middle lobe
lower lobe
pericardium
left lung +
upper lobe
pulmonary artery +
heart
lower lobe
diaphragm


Visceral Pleura
Lung
PLEURAL
CAVITY
Parietal Pleura


bronchial
cartilage
artery
small
bronchus
respiratory ducts
and alveoli
bronchiole


Supplemental Slide 113
Lung
Alveolar duct
Respiratory bronchiole
Terminal bronchiole


Nonpolar tail
Polar head
Water

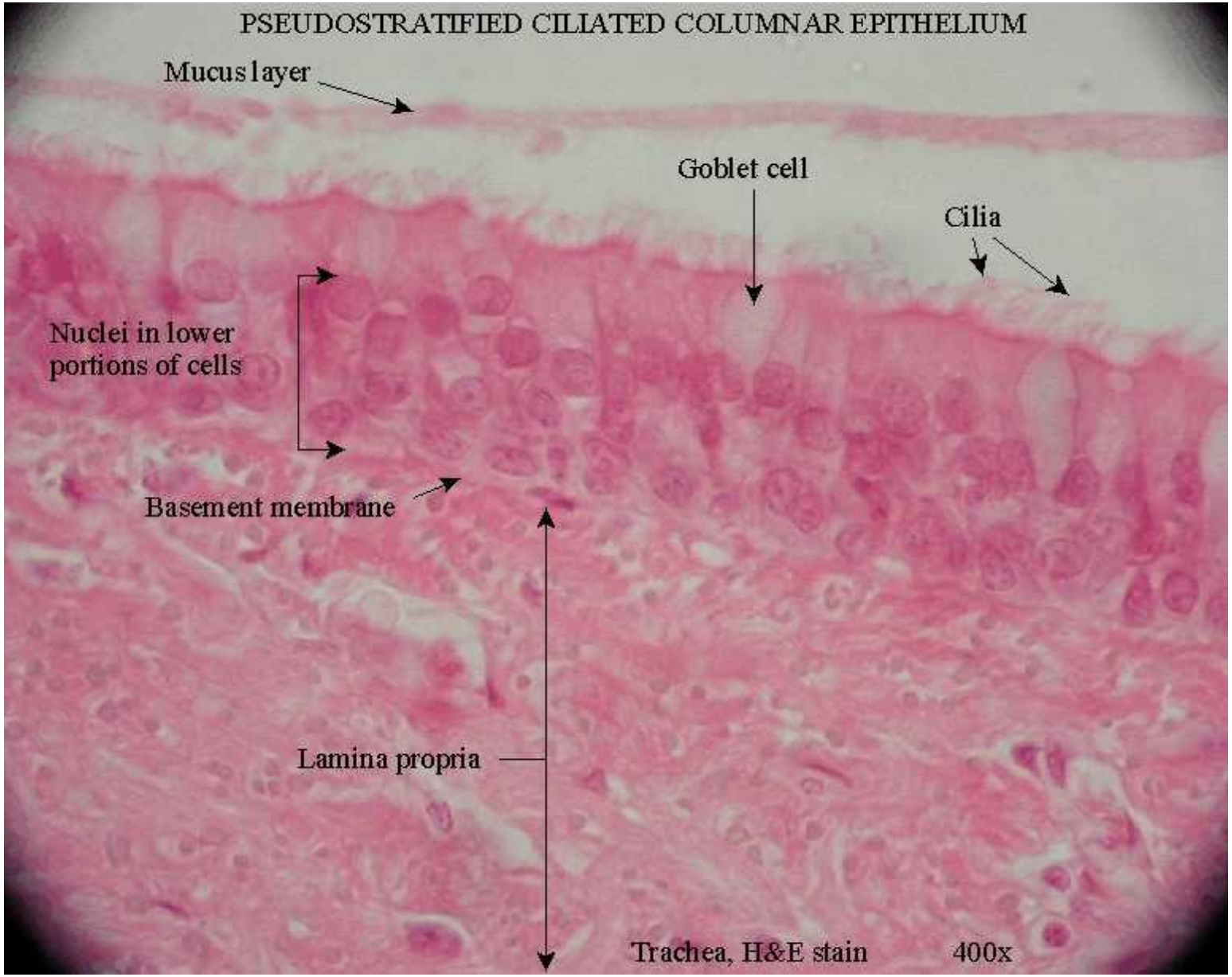
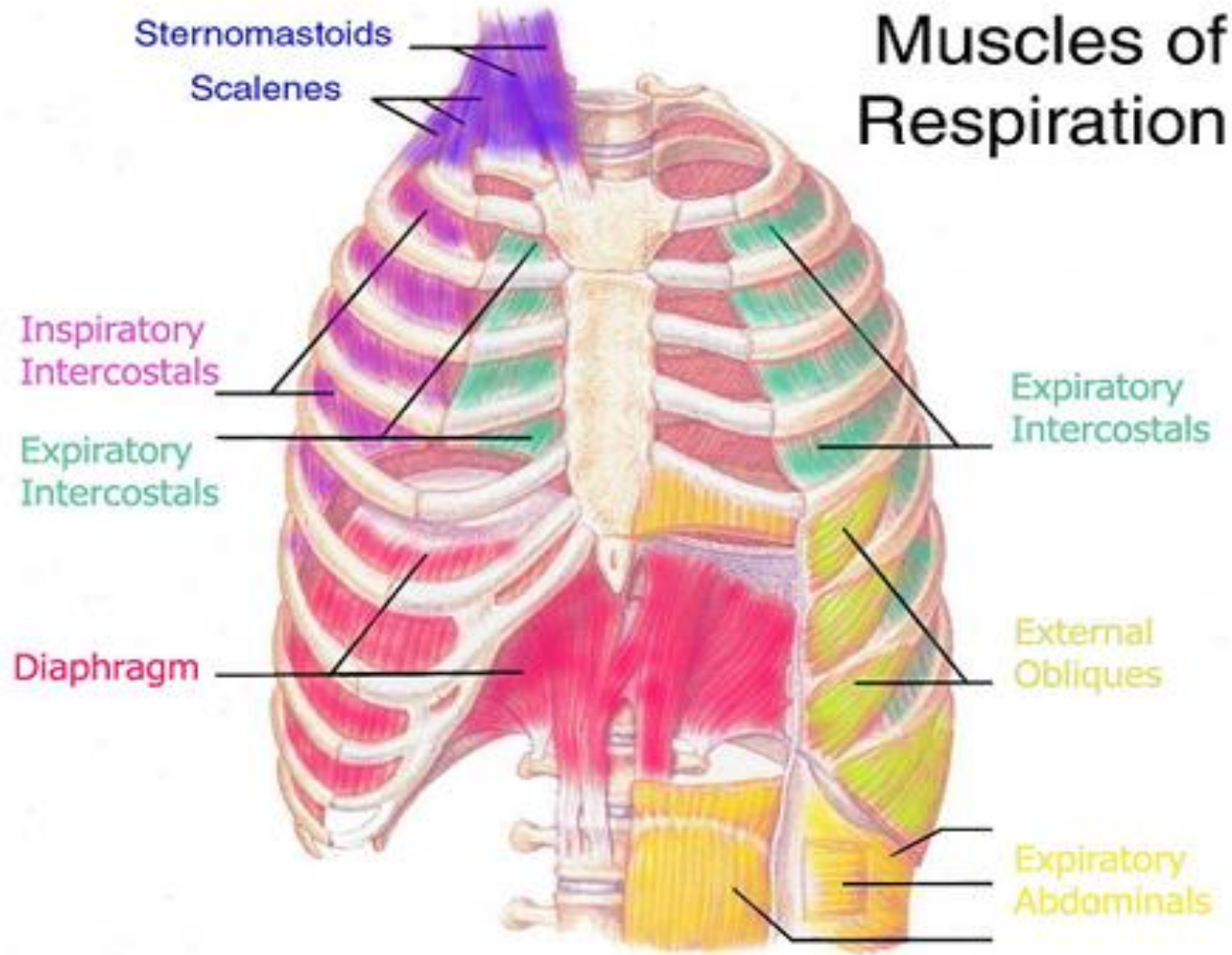
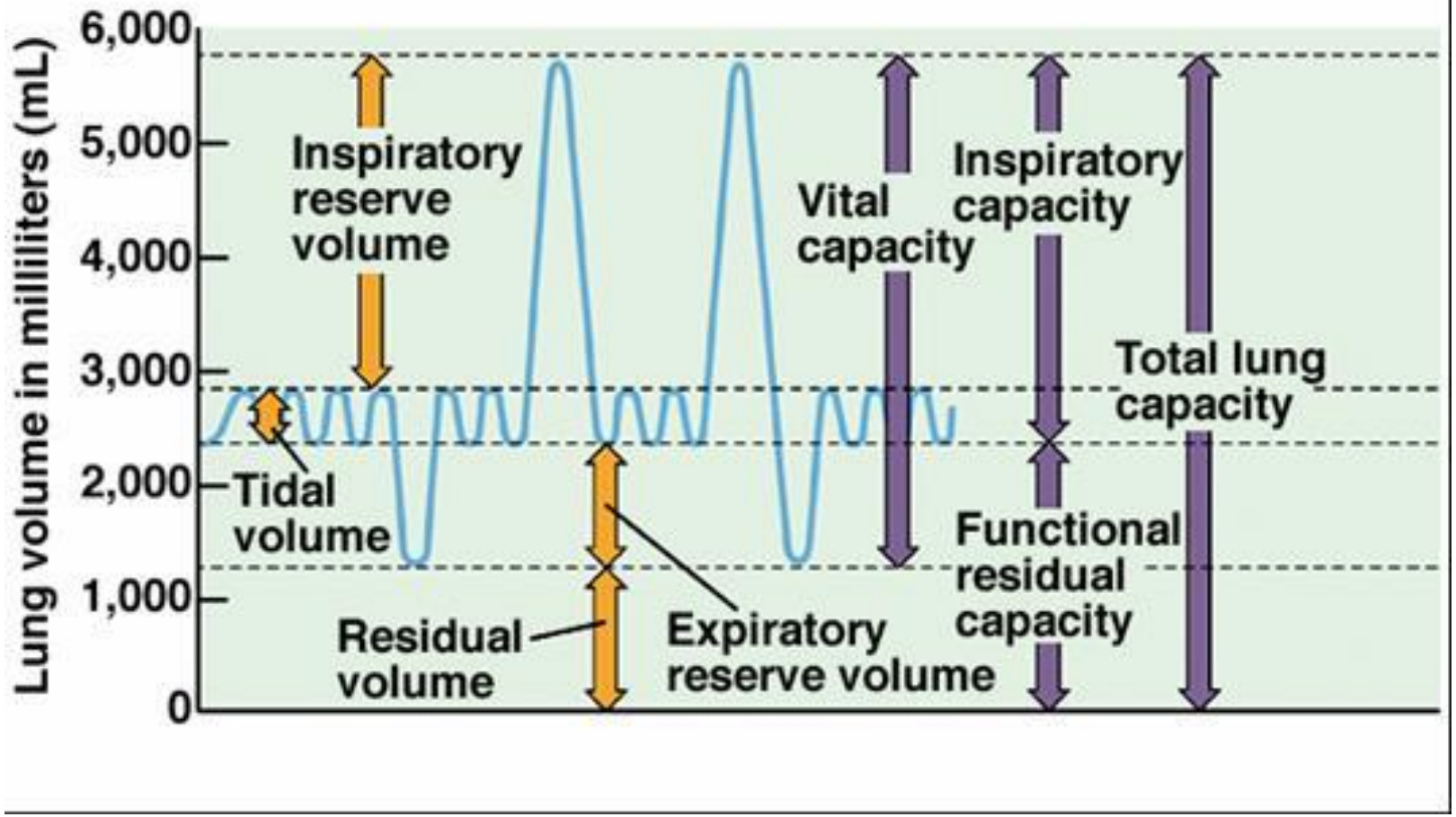
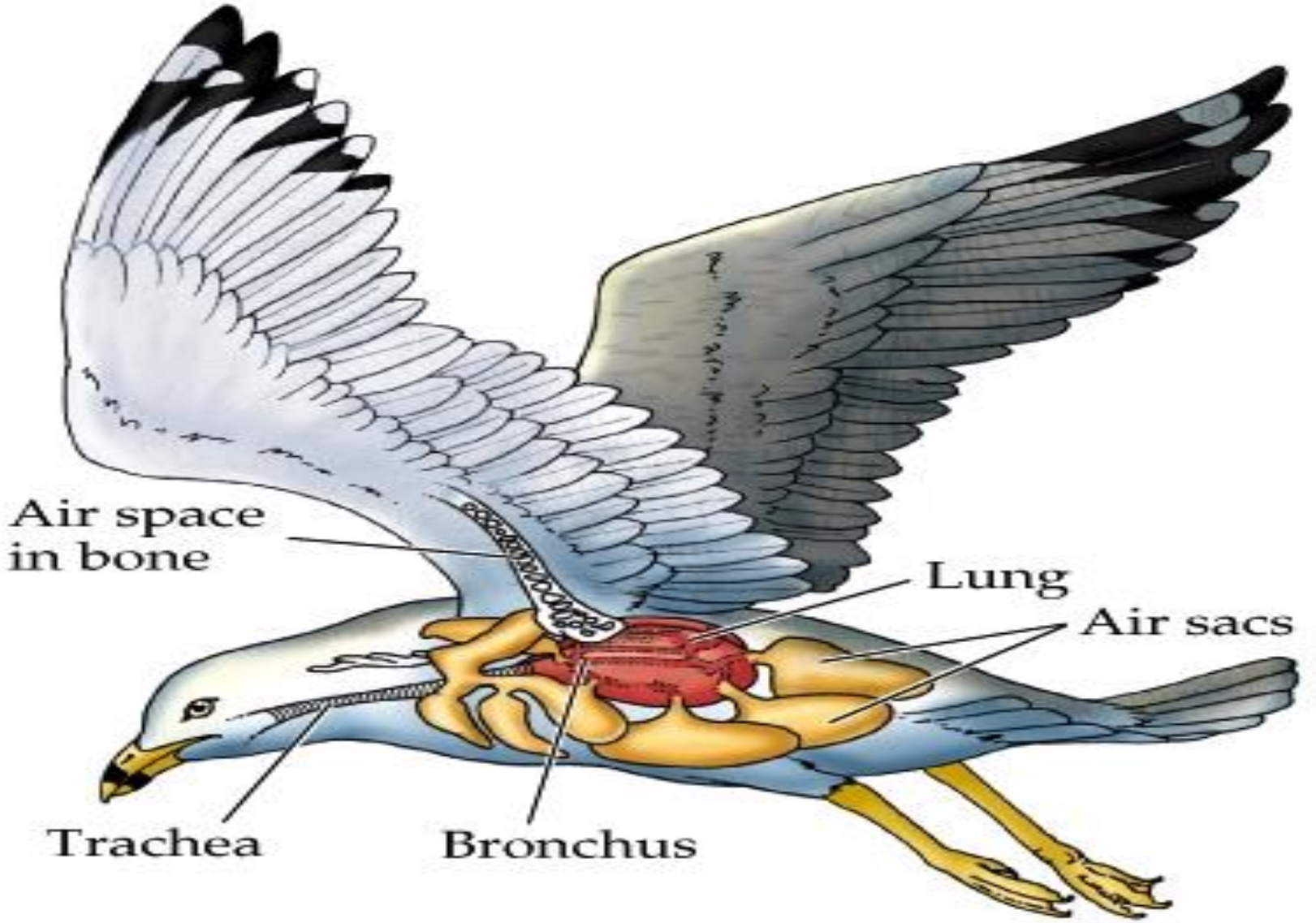

PSEUDOSTRATIFIED CILIATED COLUMNAR EPITHELIUM
Mucus layer
Goblet cell
Cilia
Nuclei in lower portions of cells
Basement membrane
Lamina propria
Trachea, H&E stain
400x

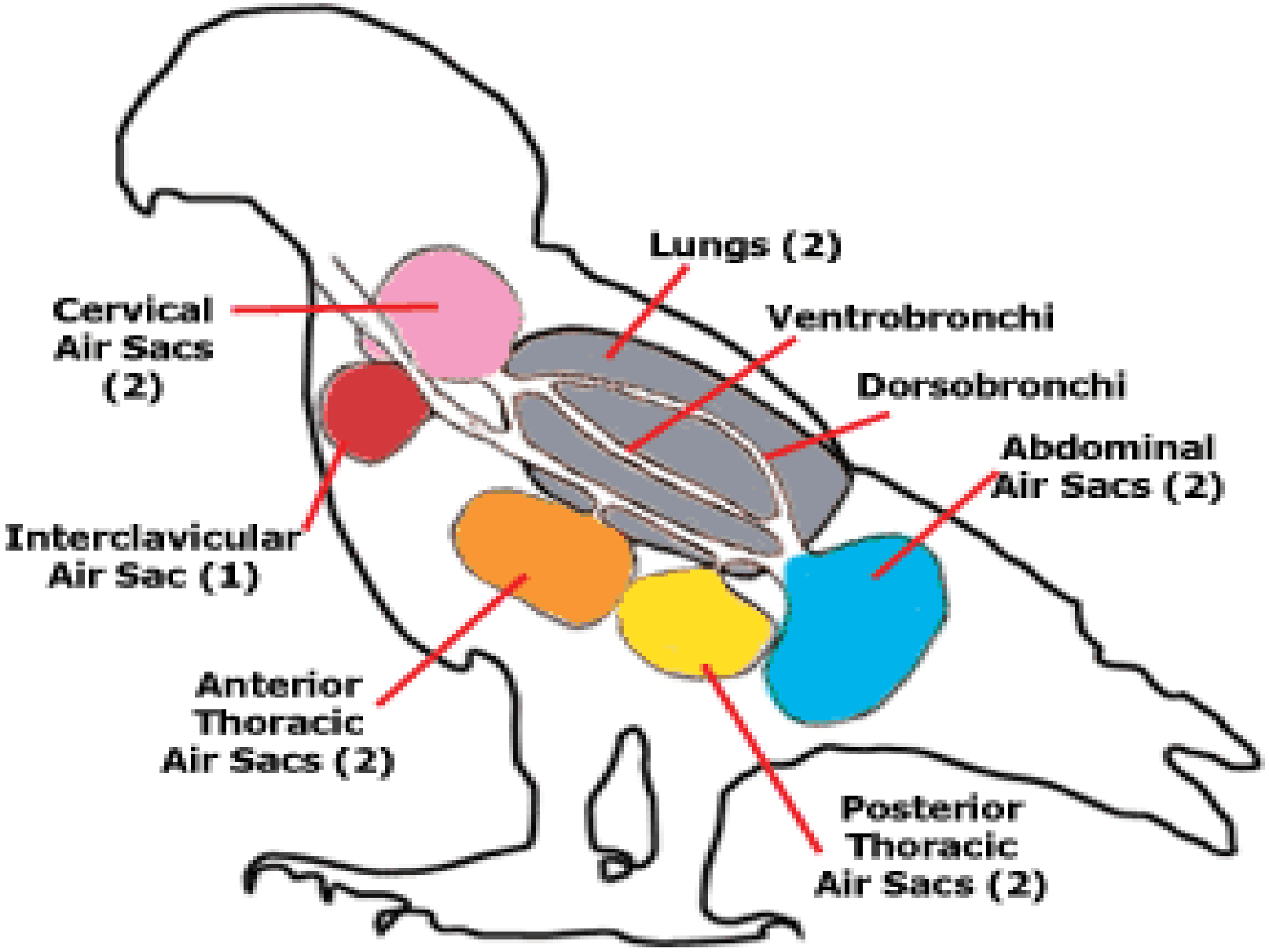
Figure 1.

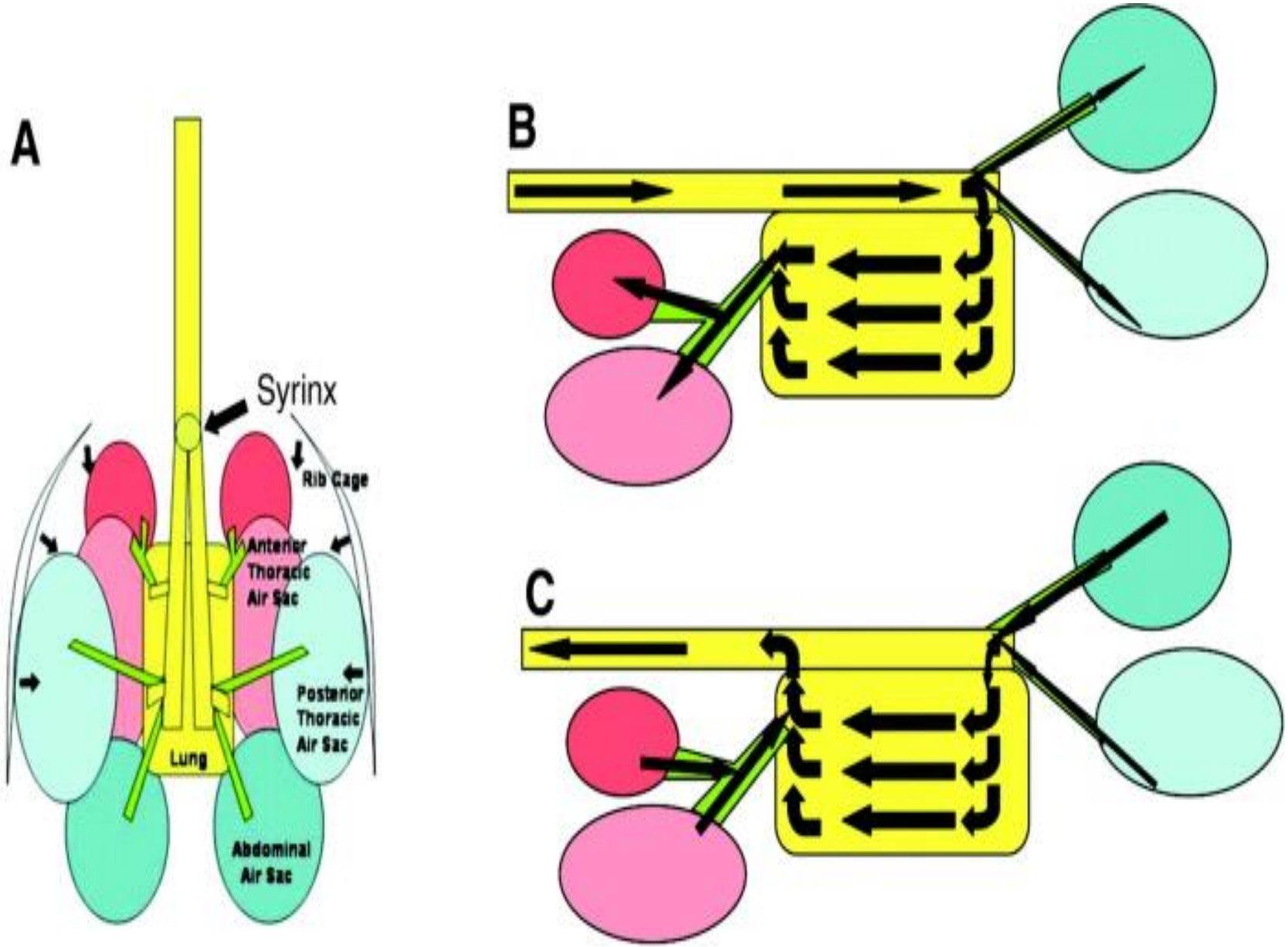

Muscles of Respiration
Sternomastoids
Scalenes
Inspiratory Intercostals
Expiratory Intercostals
Diaphragm
Expiratory Intercostals
External Obliques
Expiratory Abdominals

Respiratory Volumes and Capacities

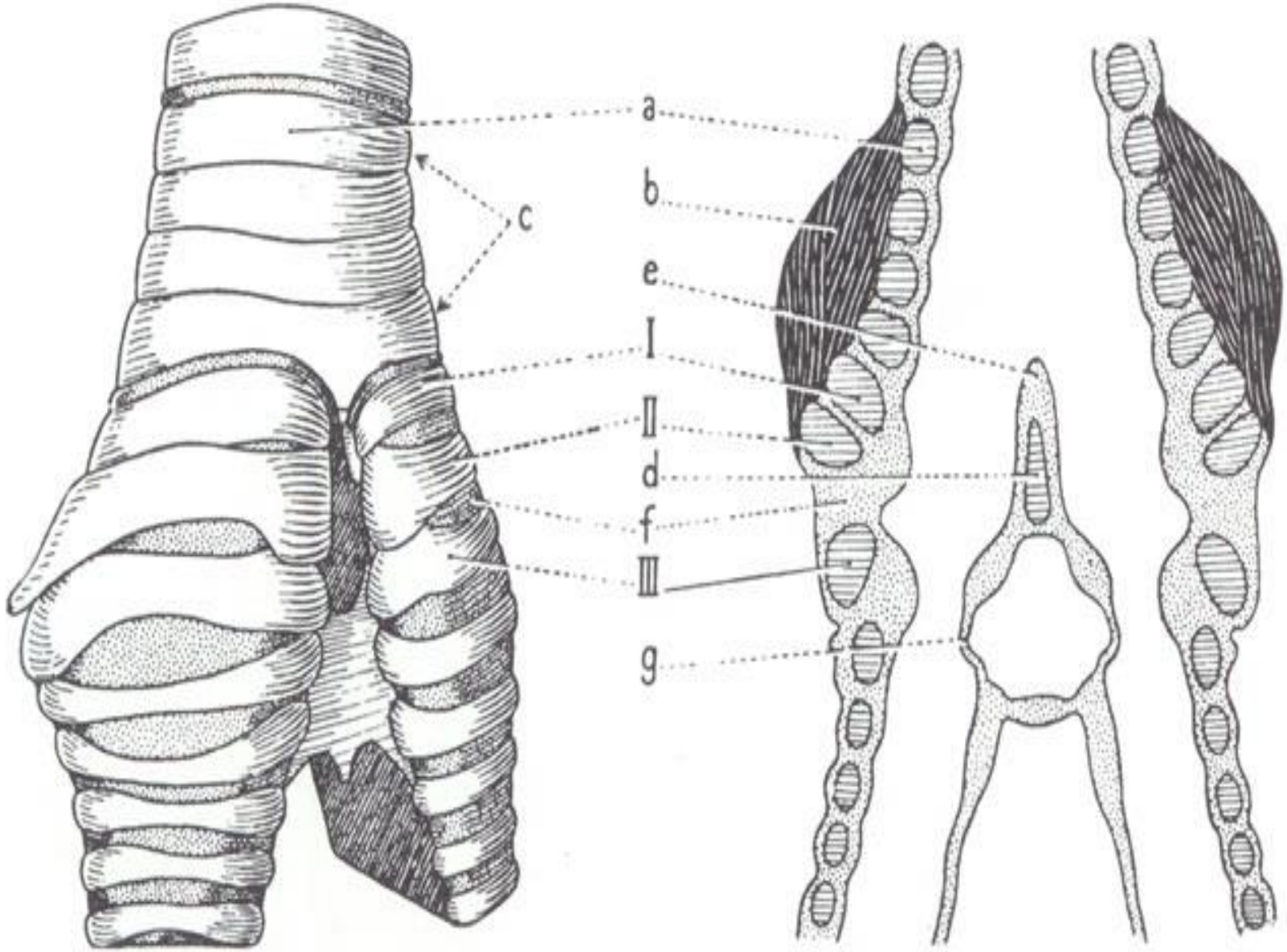


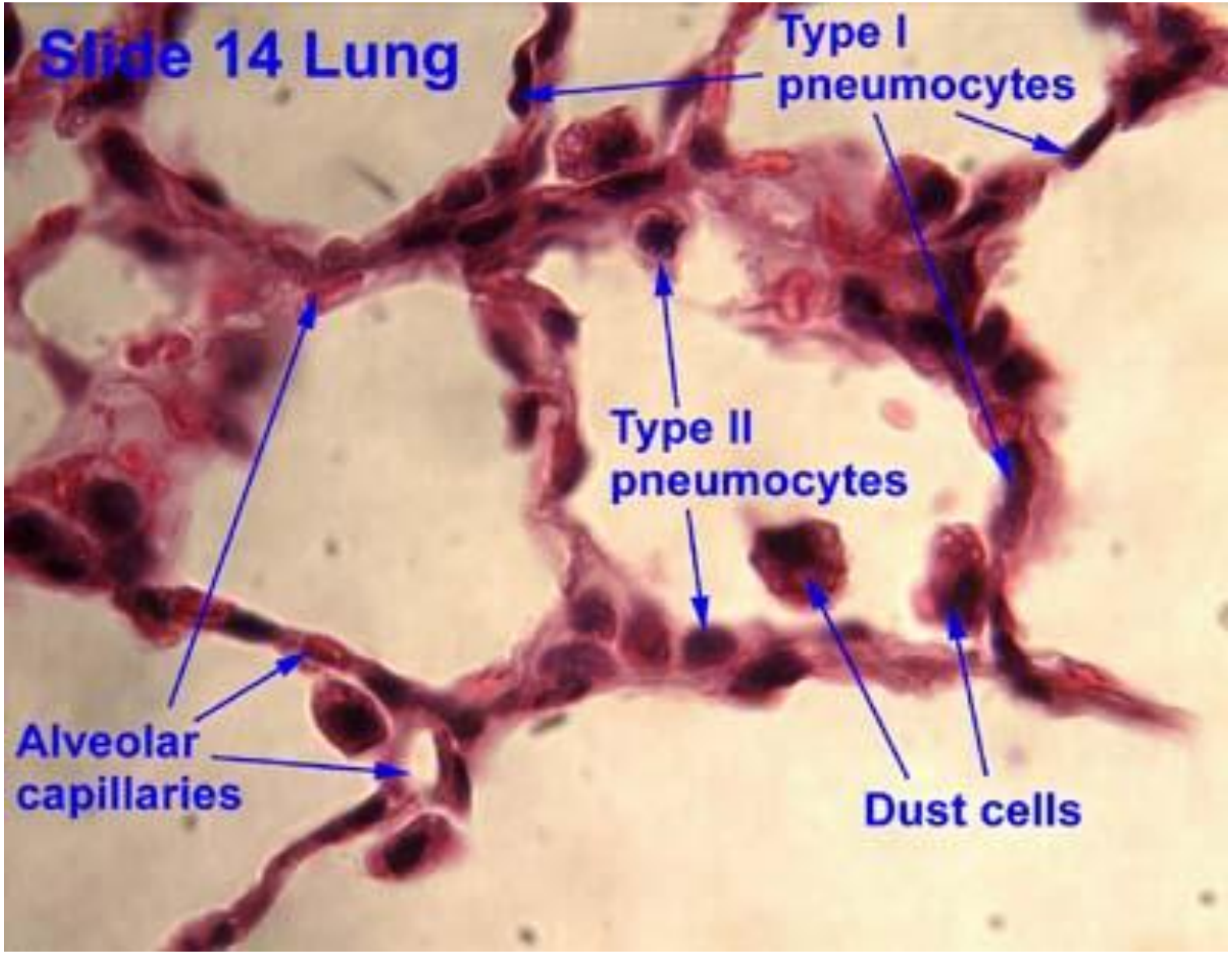


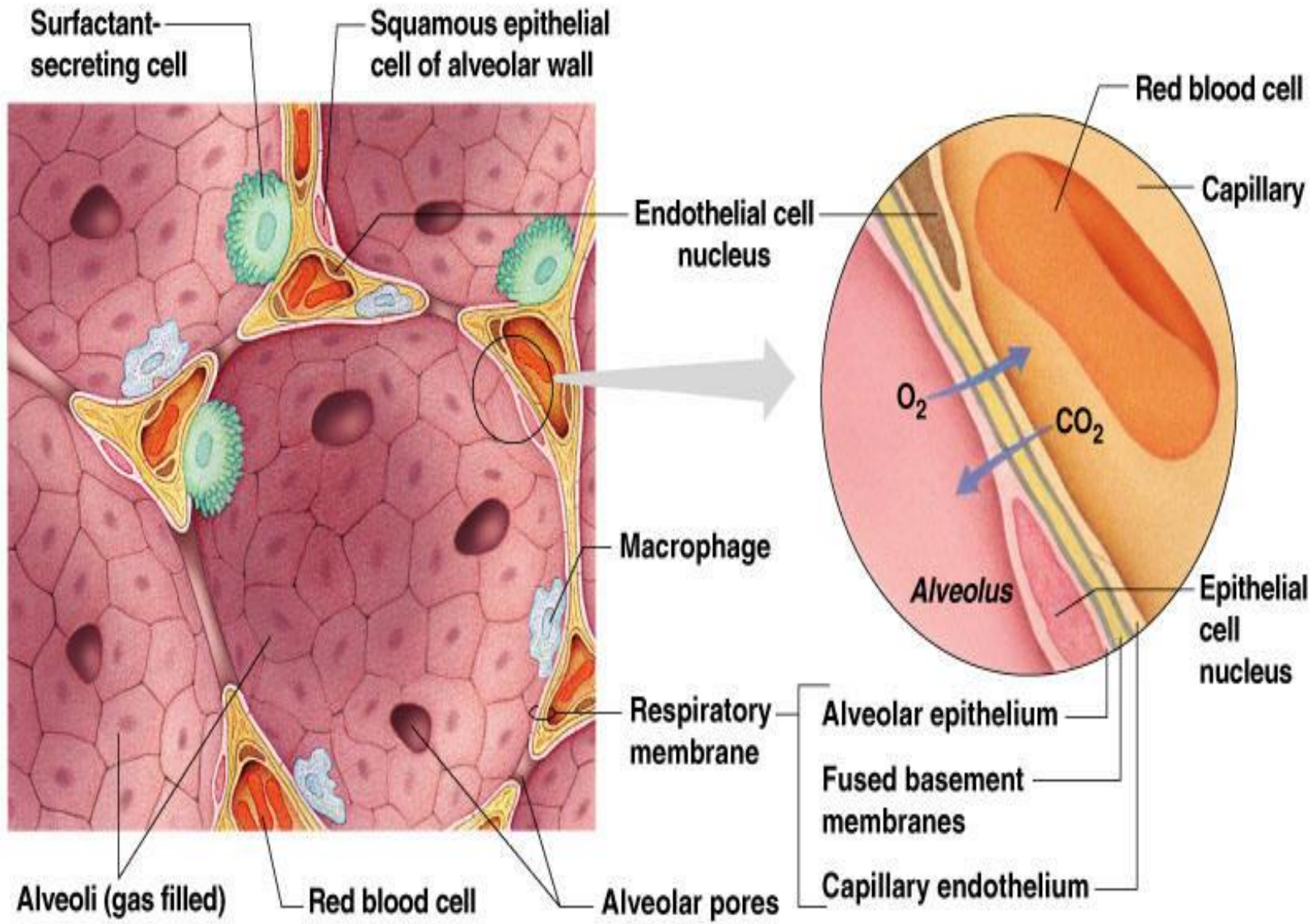

Lungs (2)
Cervical Air Sacs (2)
Ventrobronchi
Dorsobronchi
Abdominal Air Sacs (2)
Interclavicular Air Sac (1)
Anterior Thoracic Air Sacs (2)
Posterior Thoracic Air Sacs (2)

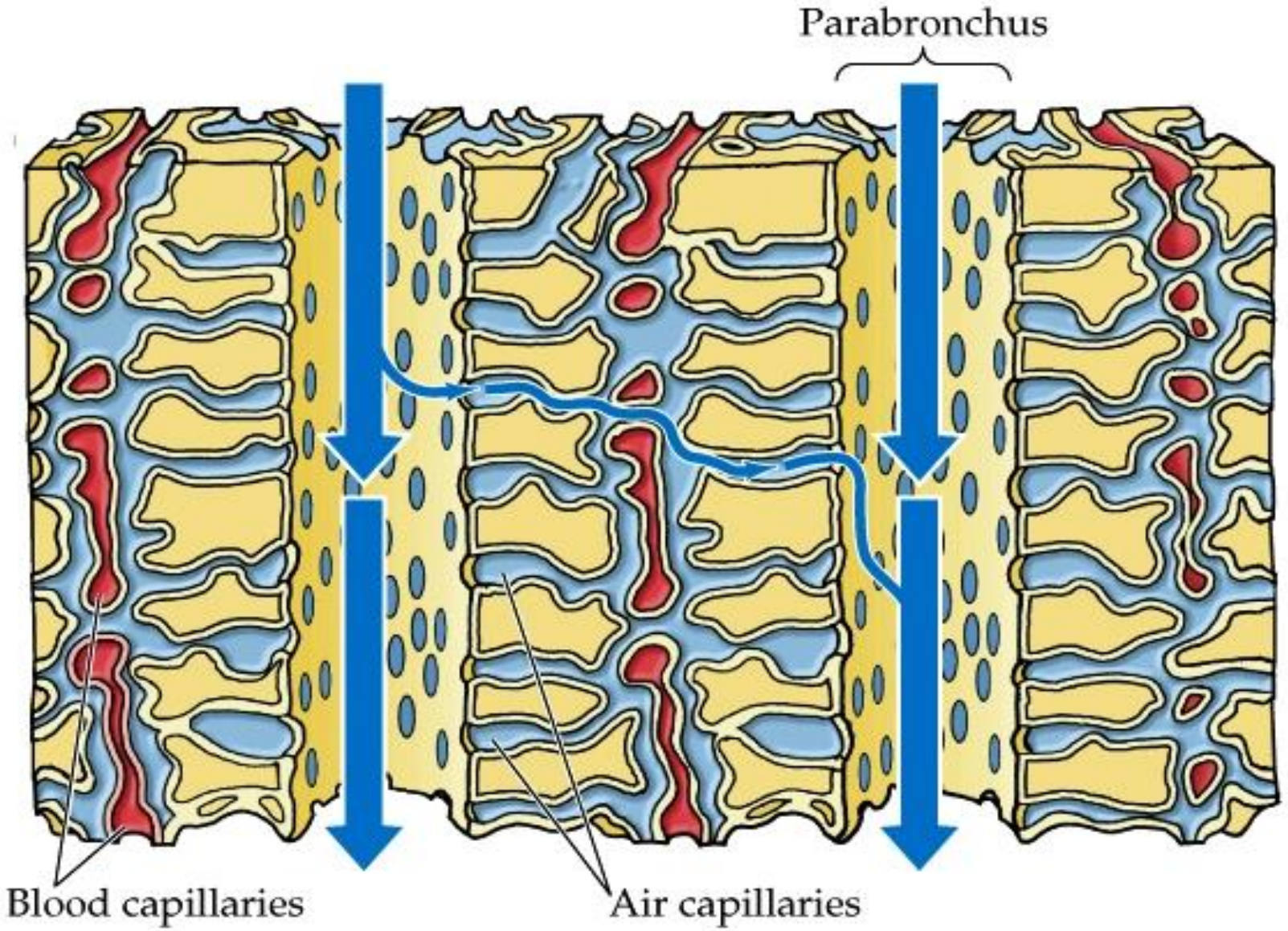

A
Syrinx
Rib Cage
Anterior
Thoracic
Air Sac
Posterior
Thoracic
Air Sac
Lung
Abdominal
Air Sac
B
C


Let's sing a new song
for today!

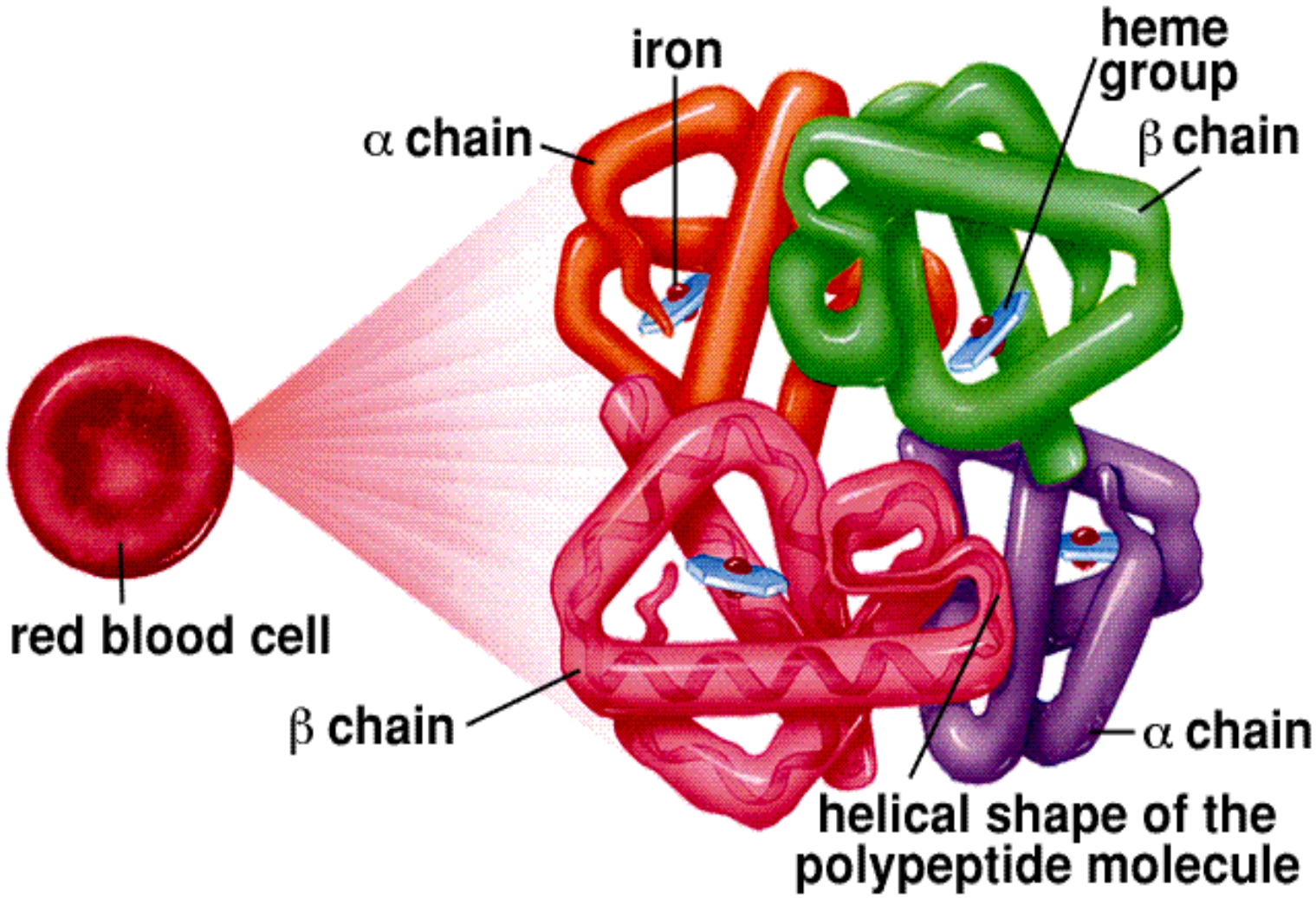

a
b
c
e
I
II
d
f
III
g

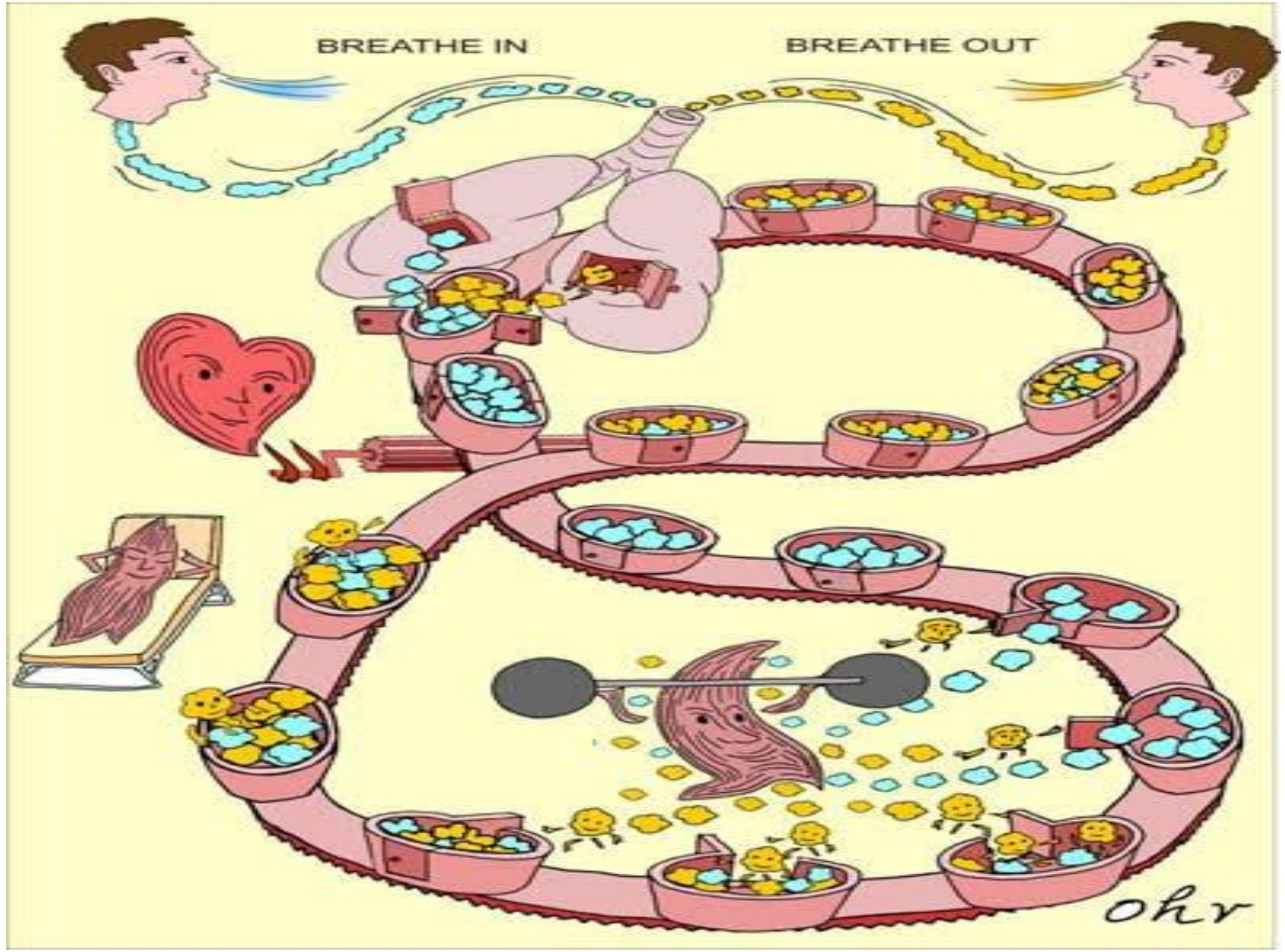

Slide 14 Lung
Type I pneumocytes
Type II pneumocytes
Alveolar capillaries
Dust cells

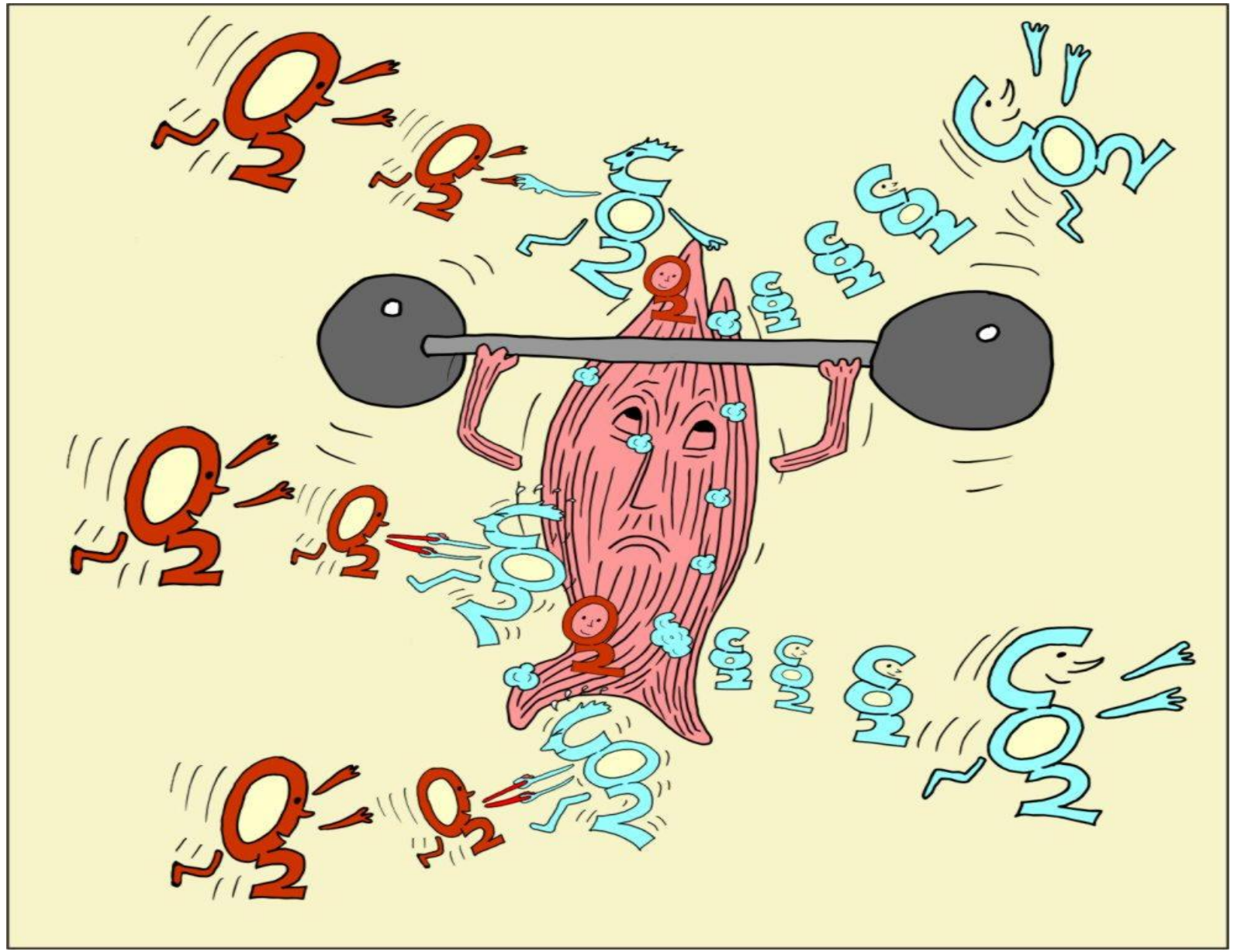


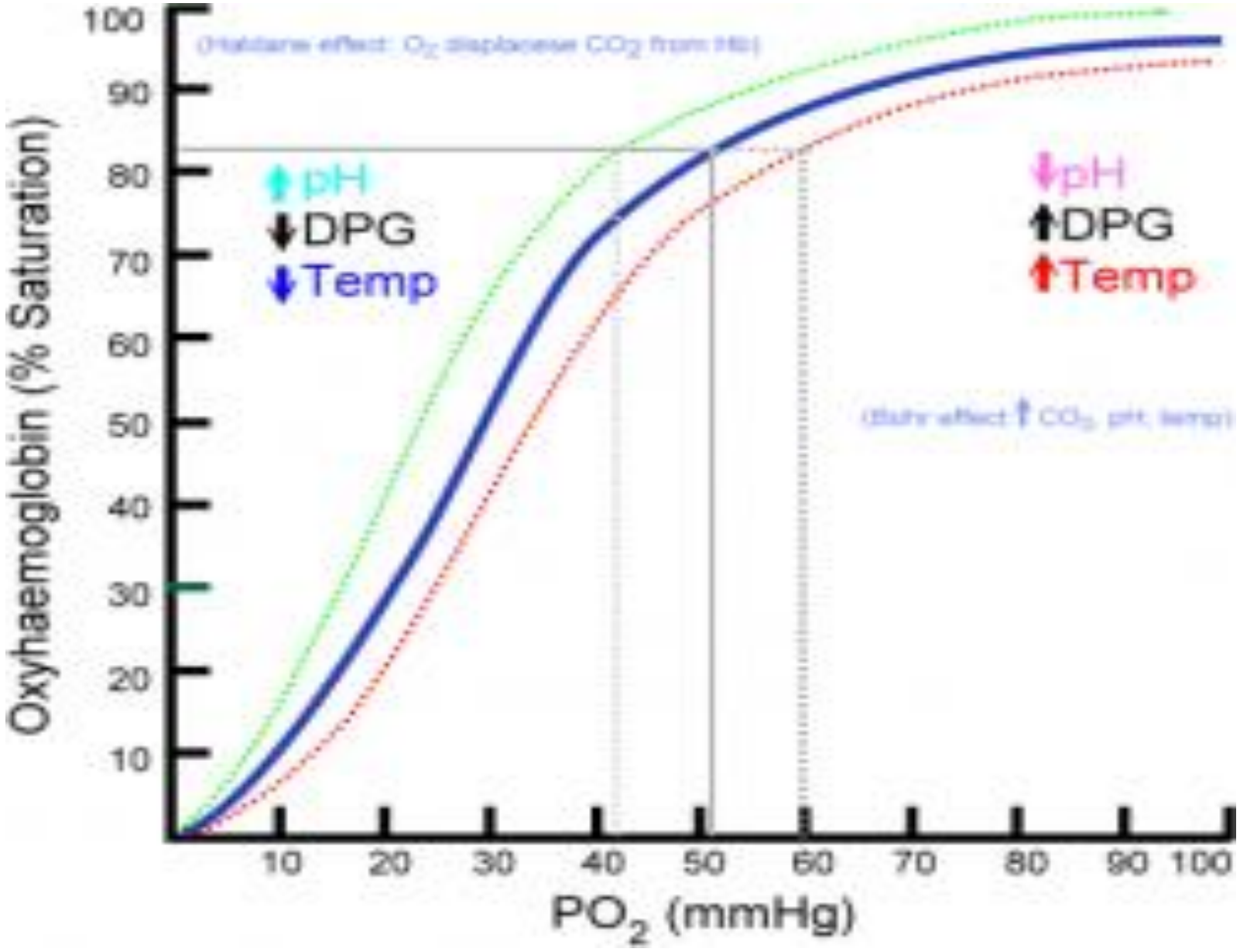


Hemoglobin Molecule



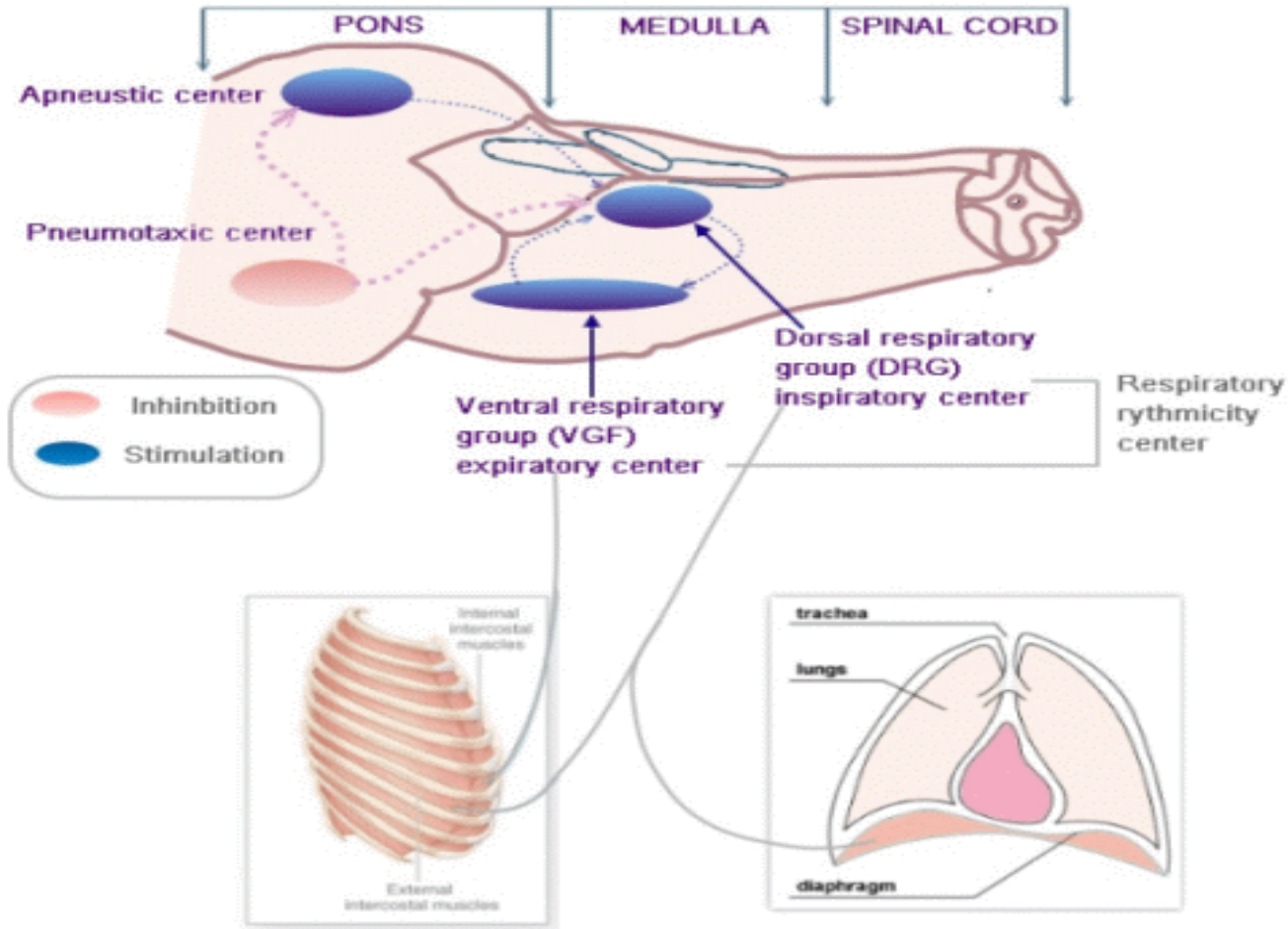

BREATHE IN
BREATHE OUT
ohr

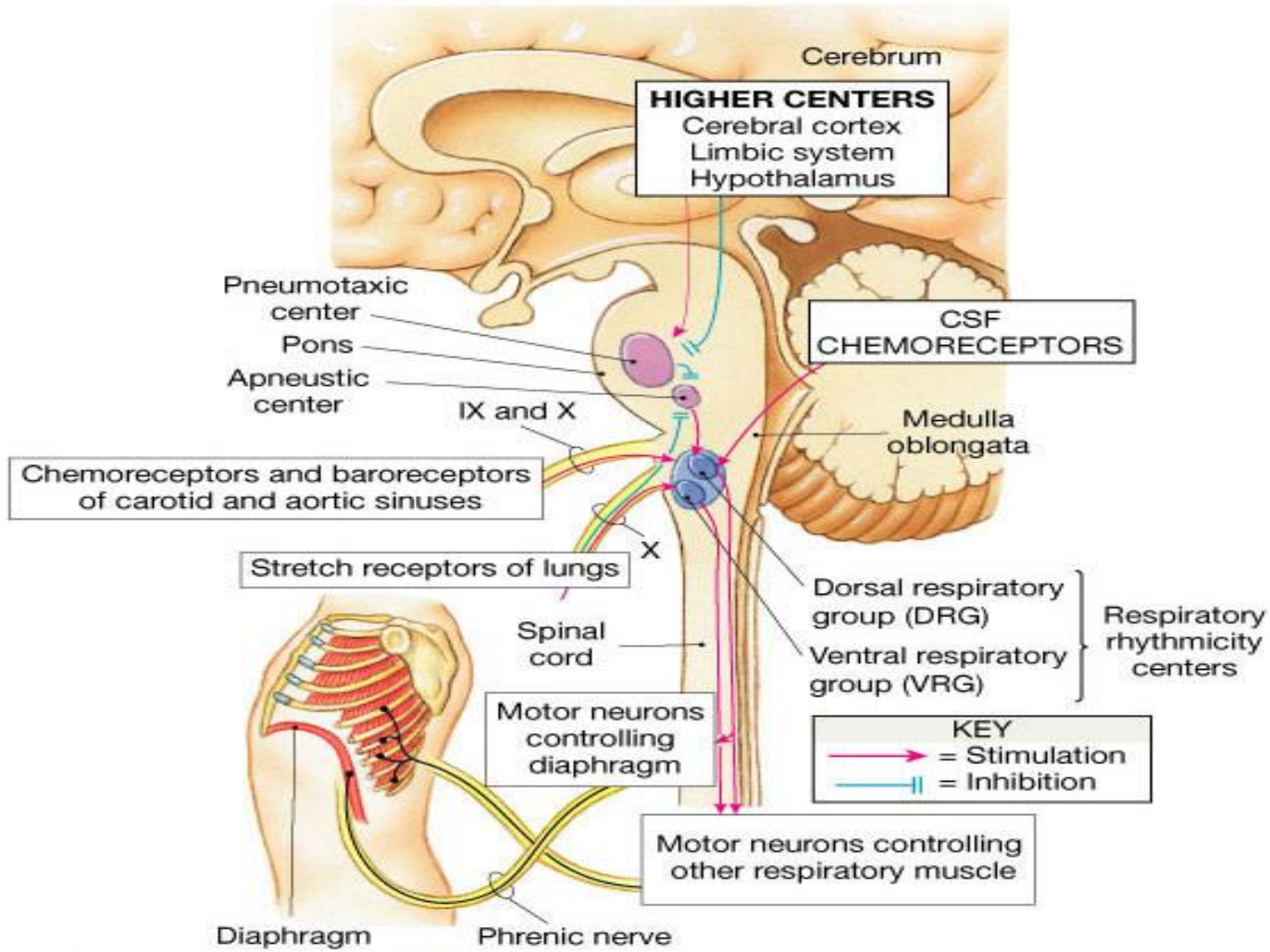

O2
CO2

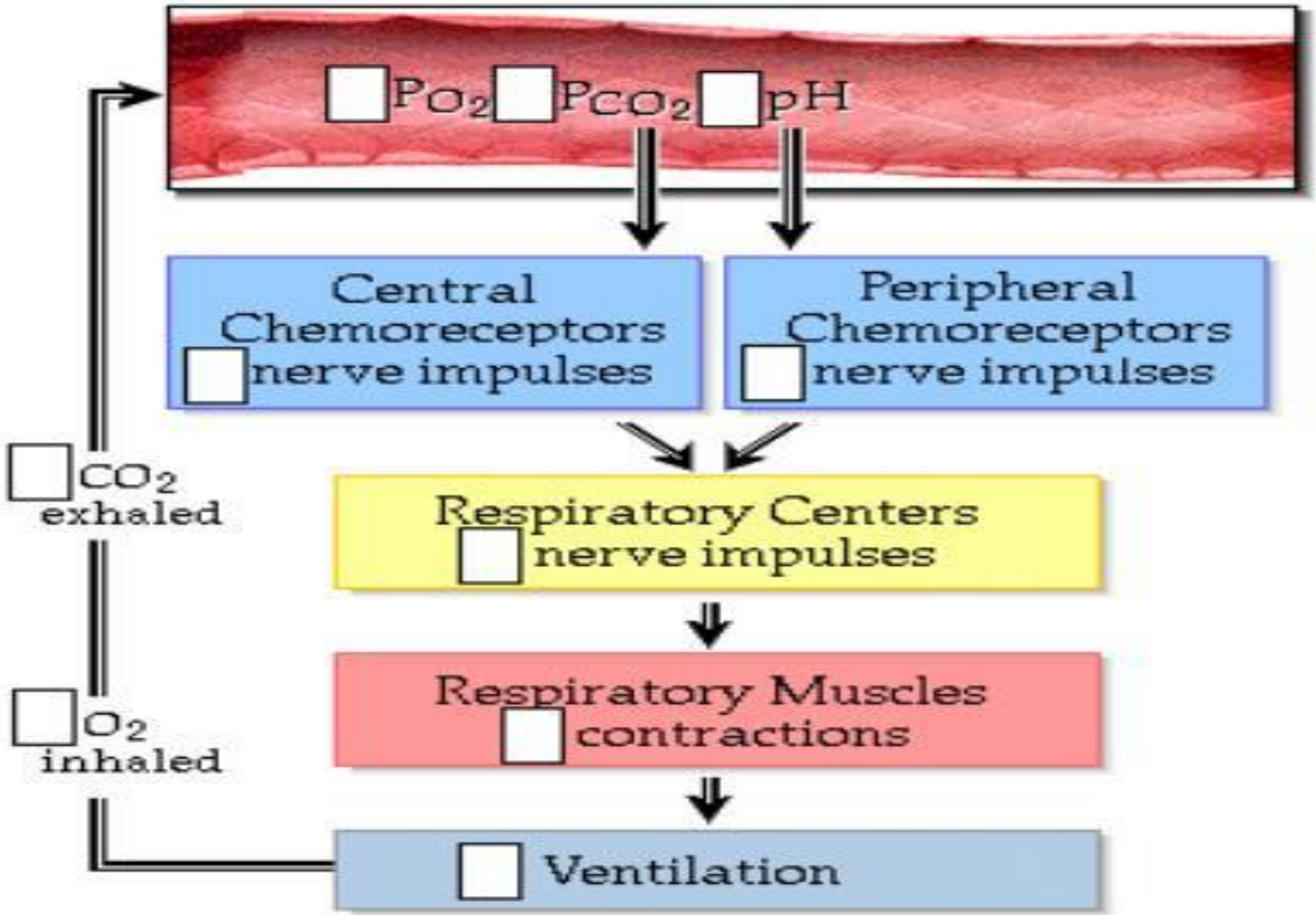

Oxyhaemoglobin (% Saturation)
100
90
80
70
60
50
40
30
20
10
pH
DPG
Temp
pH
DPG
Temp
10
20
30
40
50
60
70
80
90
100
PO2 (mmHg)

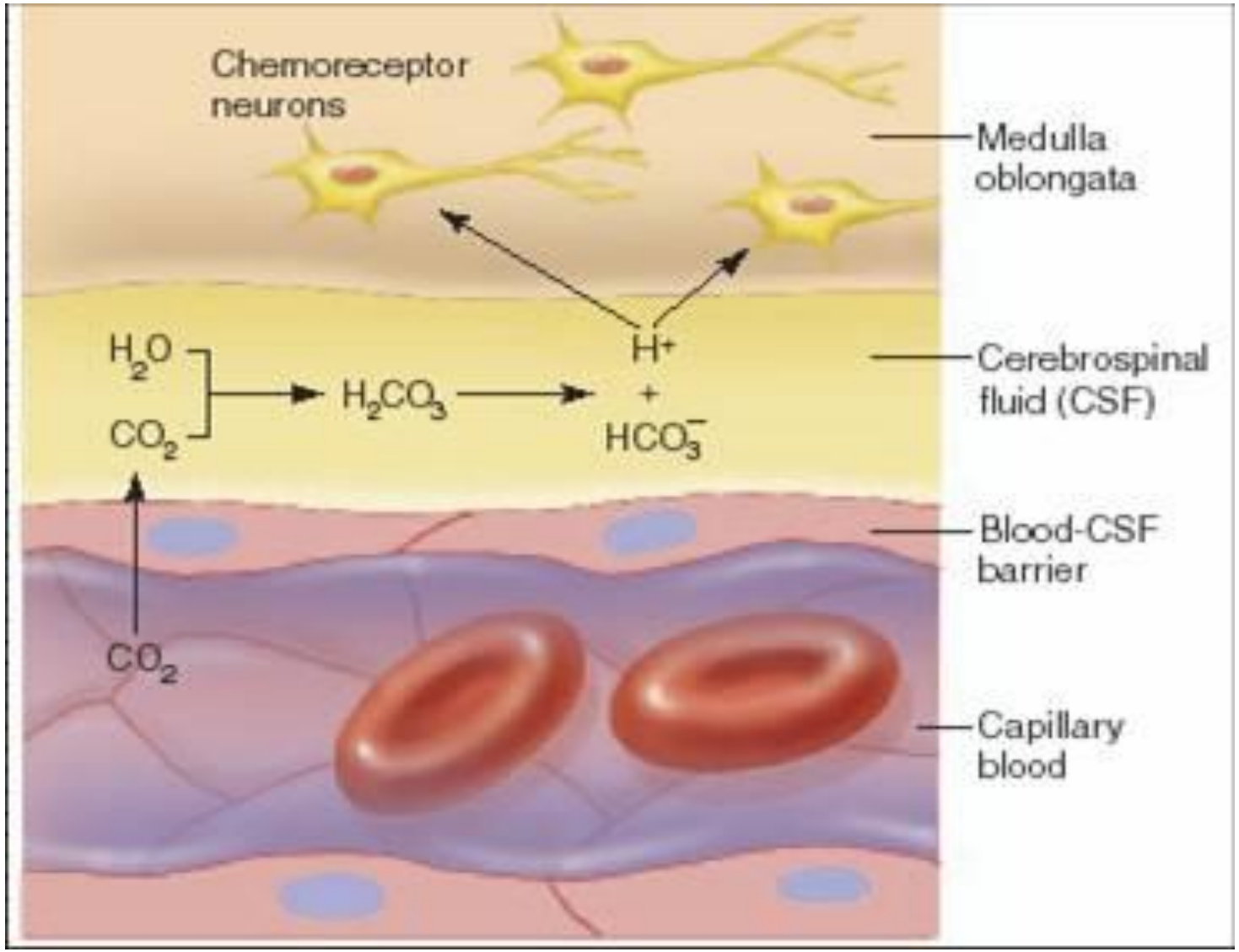
فیزیولوژی یک، جلسه سیزدهم

تنظیم عصبی و شیمیایی تنفس


PONS
MEDULLA
SPINAL CORD
Apneustic center
Pneumotaxic center
Inhinbition
Stimulation
Ventral respiratory group (VGF) expiratory center
Dorsal respiratory group (DRG) inspiratory center
Respiratory rythmicity center
Internal intercostal muscles
External intercostal muscles
trachea
lungs
diaphragm

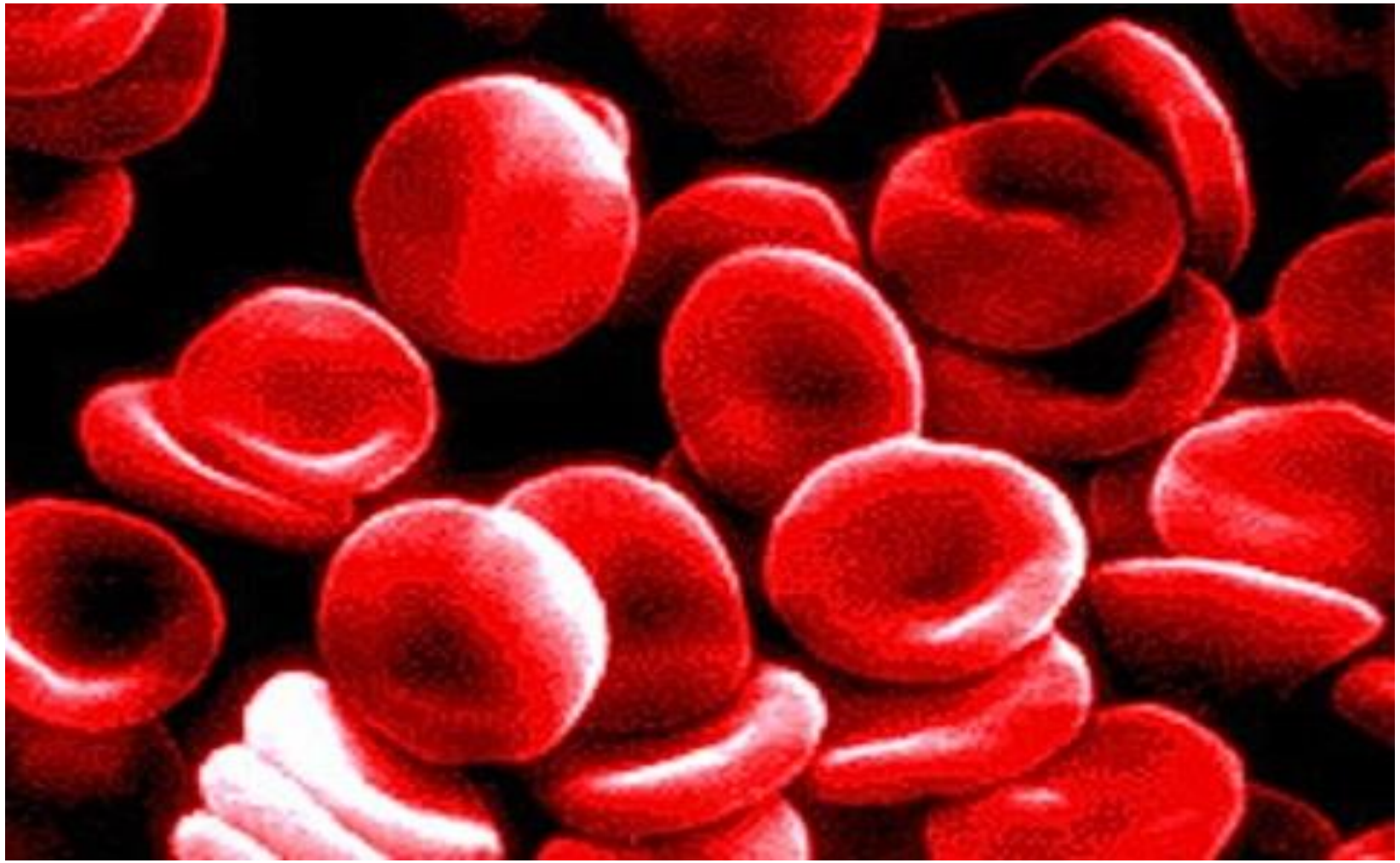


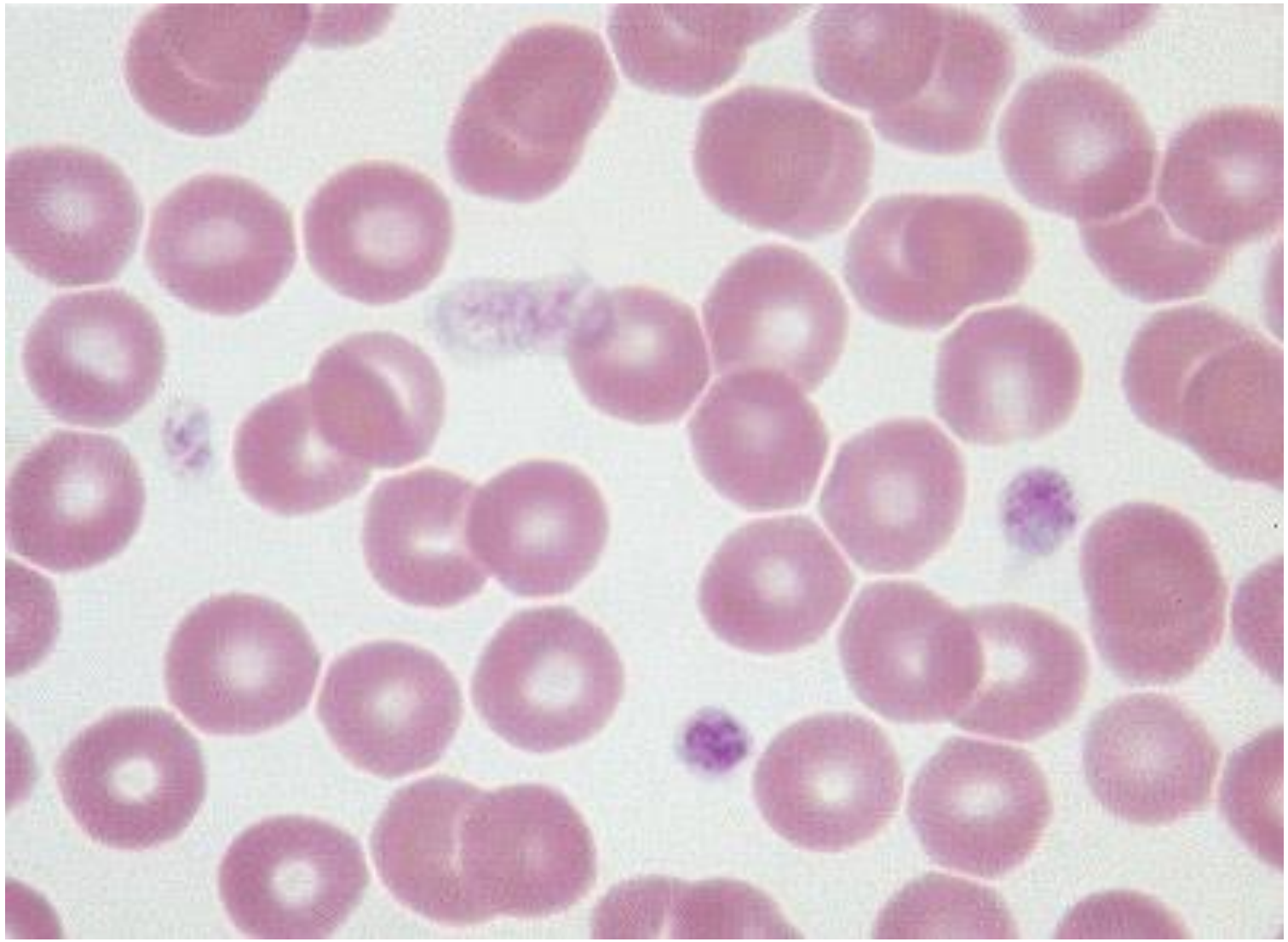

PO2
PCO2
pH
Central Chemoreceptors
nerve impulses
Peripheral Chemoreceptors
nerve impulses
CO2 exhaled
Respiratory Centers
nerve impulses
Respiratory Muscles
contractions
O2 inhaled
Ventilation

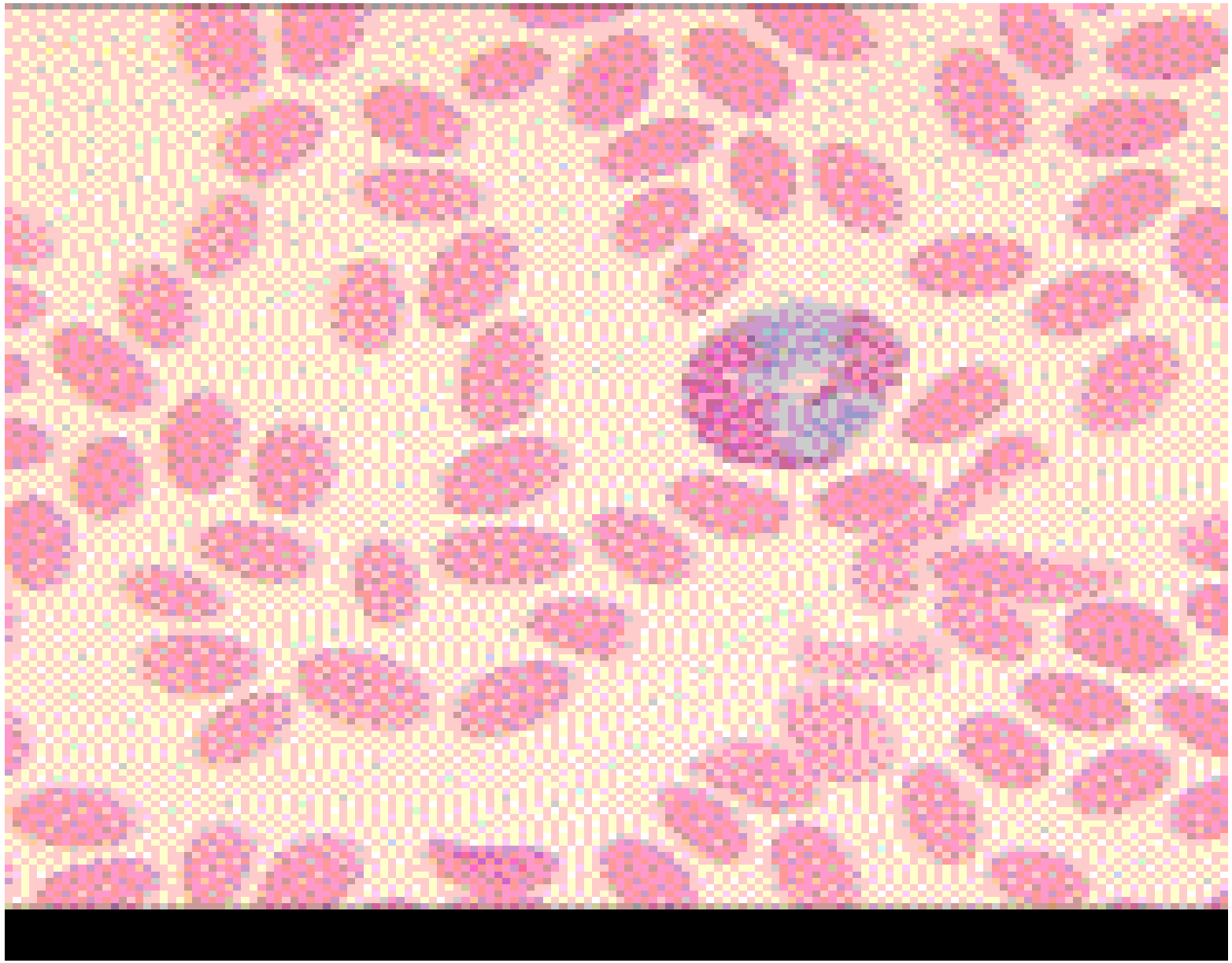

Chemoreceptor neurons
Medulla oblongata
H_2O
CO_2
H_2CO_3
H^+
+
HCO_3^-
Cerebrospinal fluid (CSF)
Blood-CSF barrier
CO_2
Capillary blood

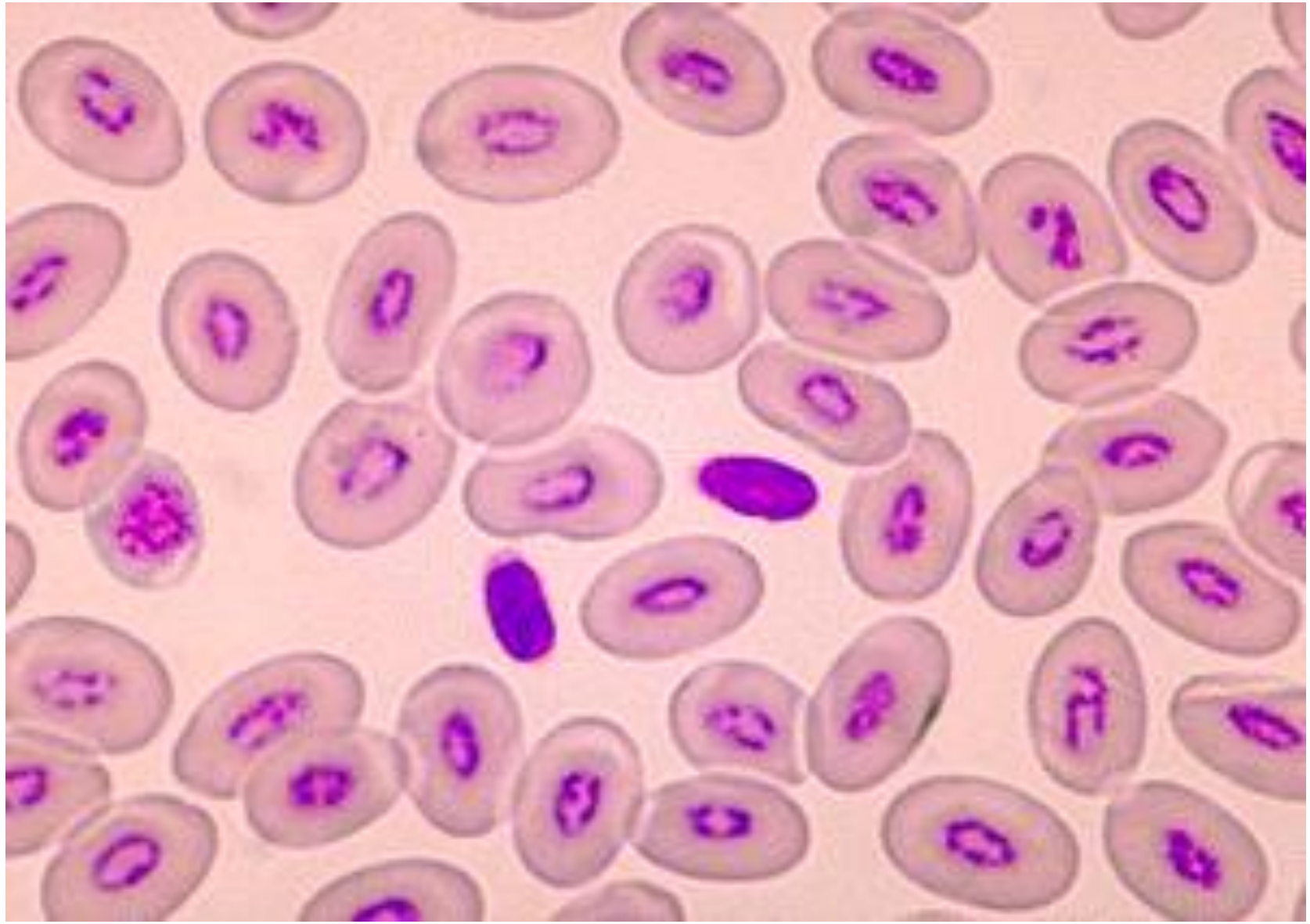
فیزیولوژی یک، جلسه چهاردهم

فیزیولوژی خون

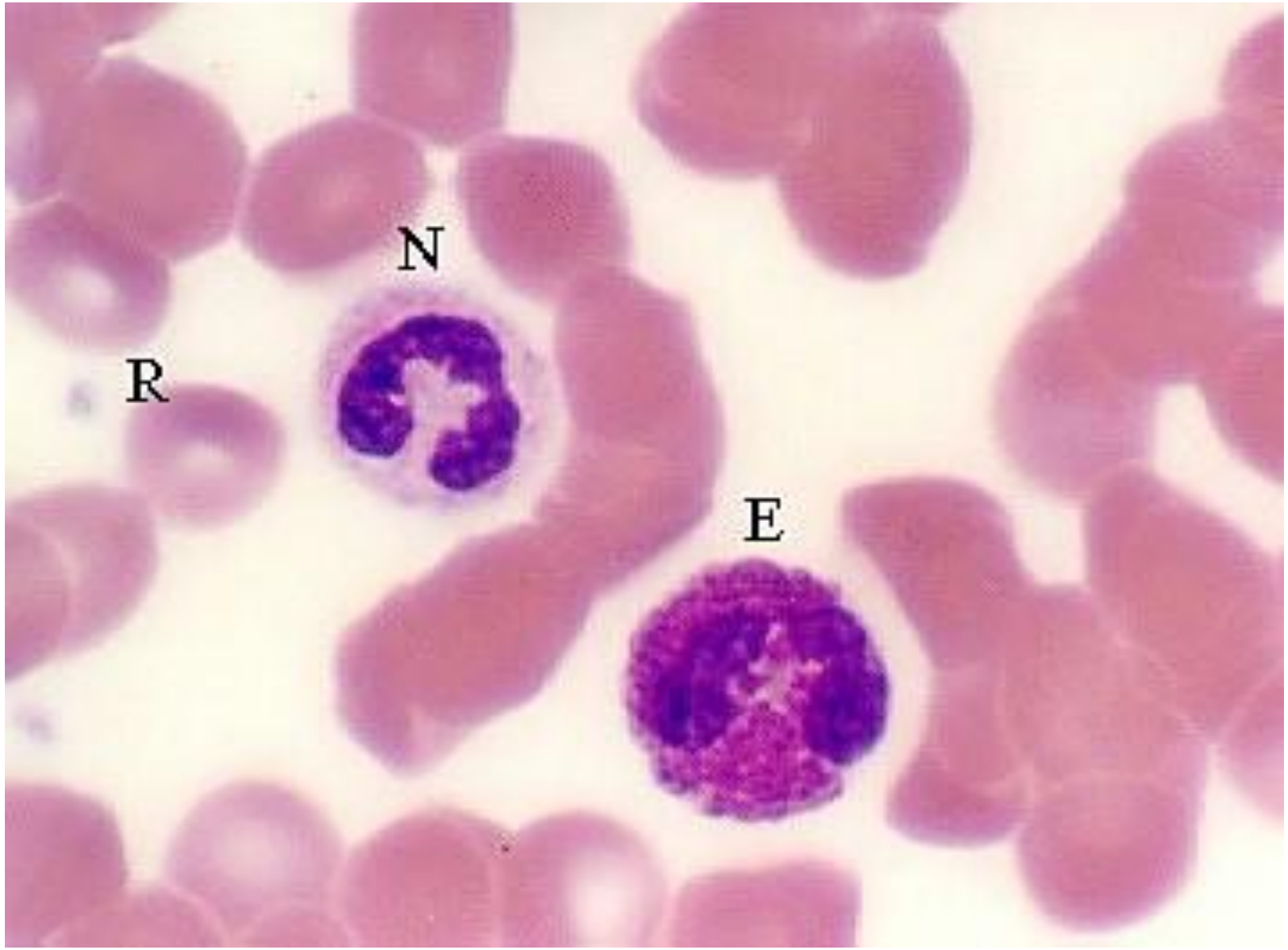









eosinophil


N
R
E