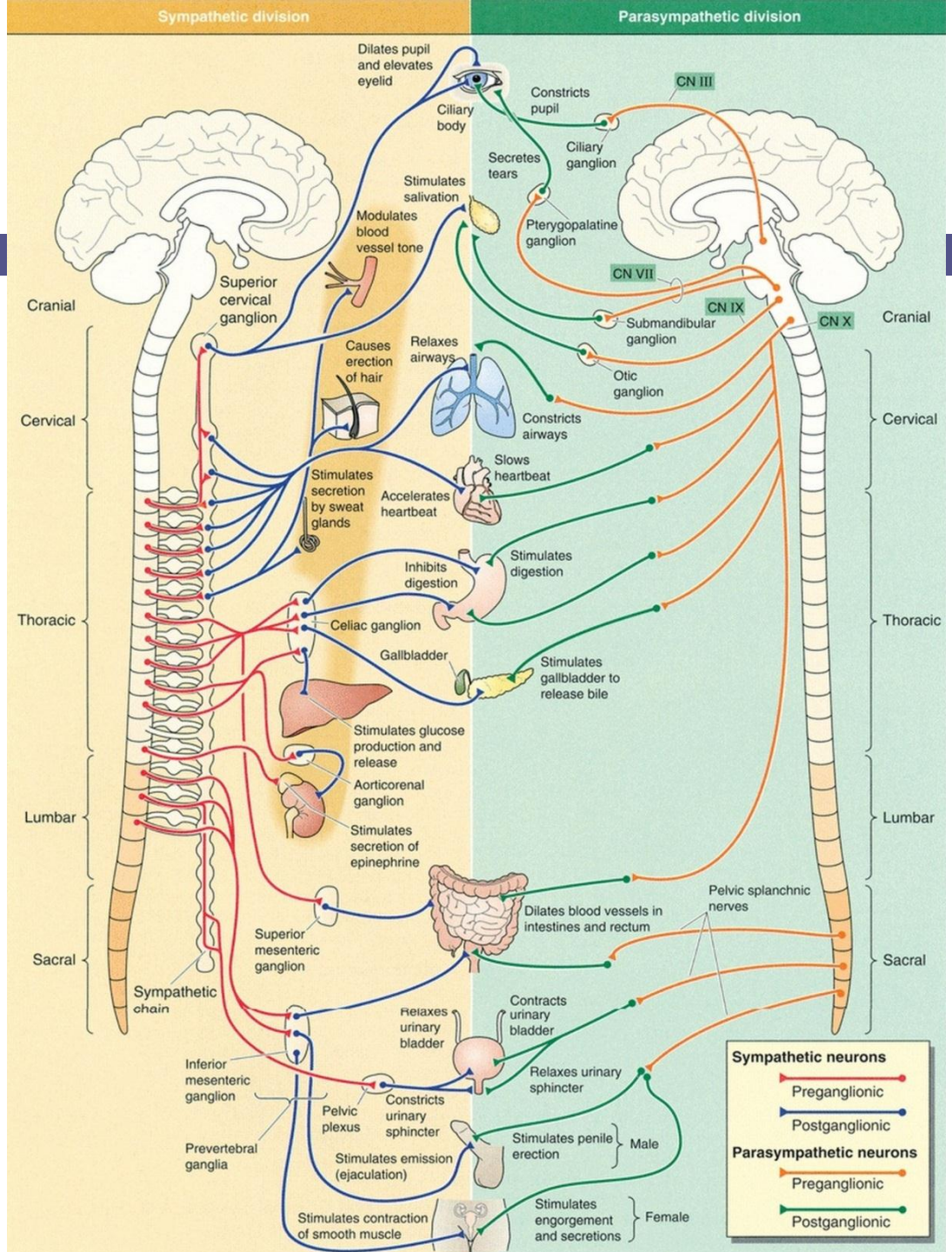
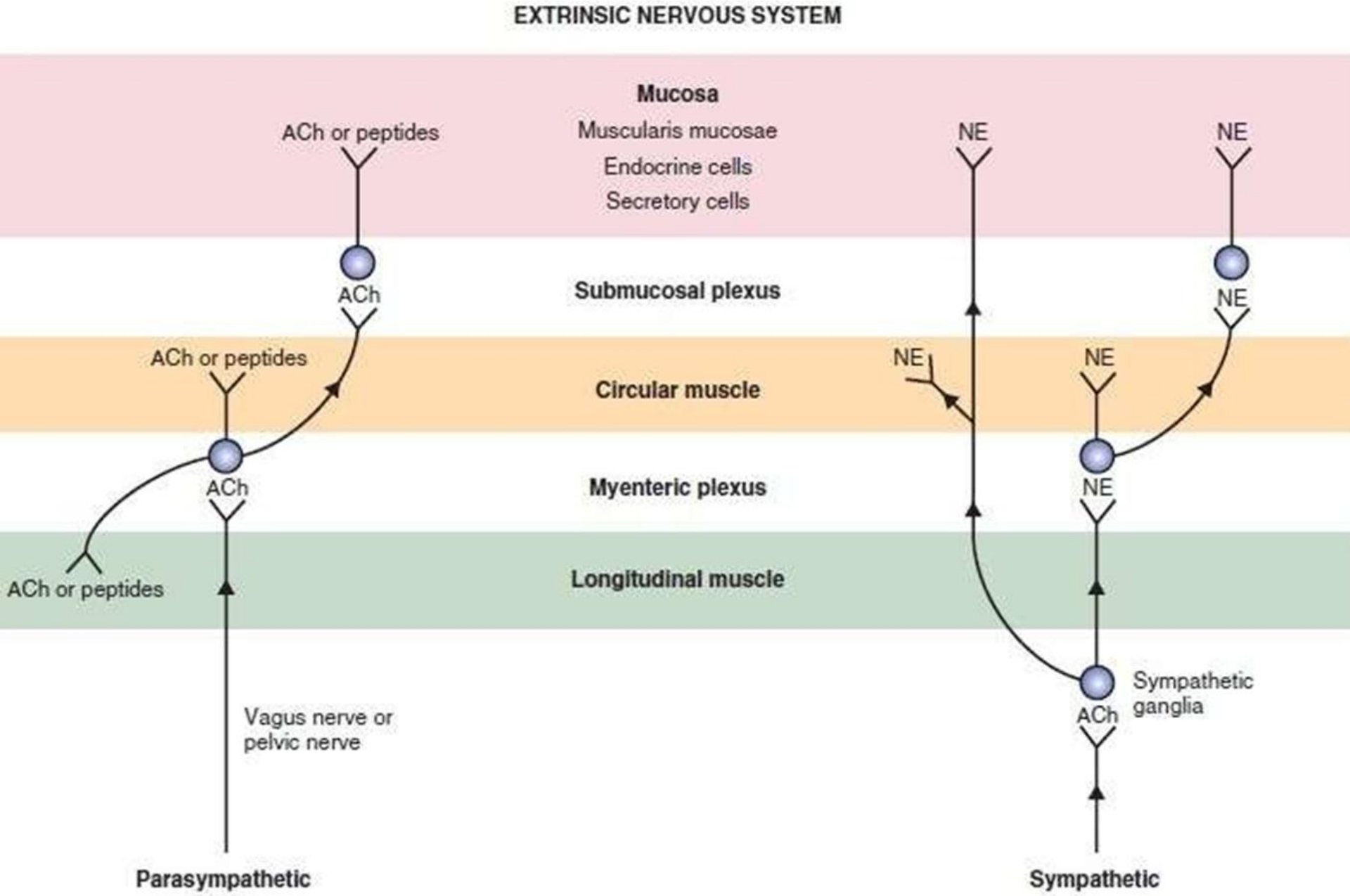
ĐIỀU HÒA HOẠT ĐỘNG HỆ TIÊU HÓA

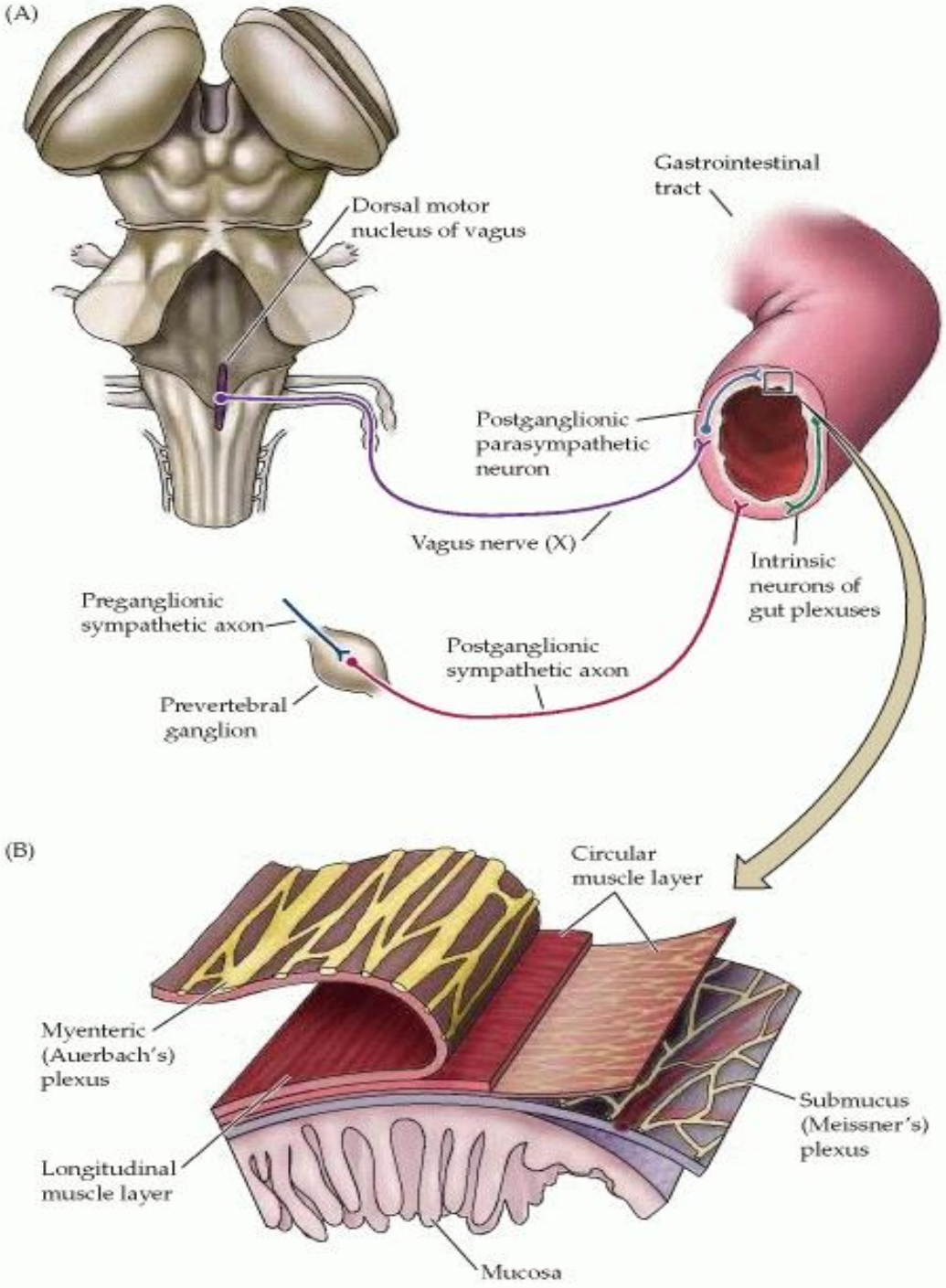
BS Nguyễn Bình Thư

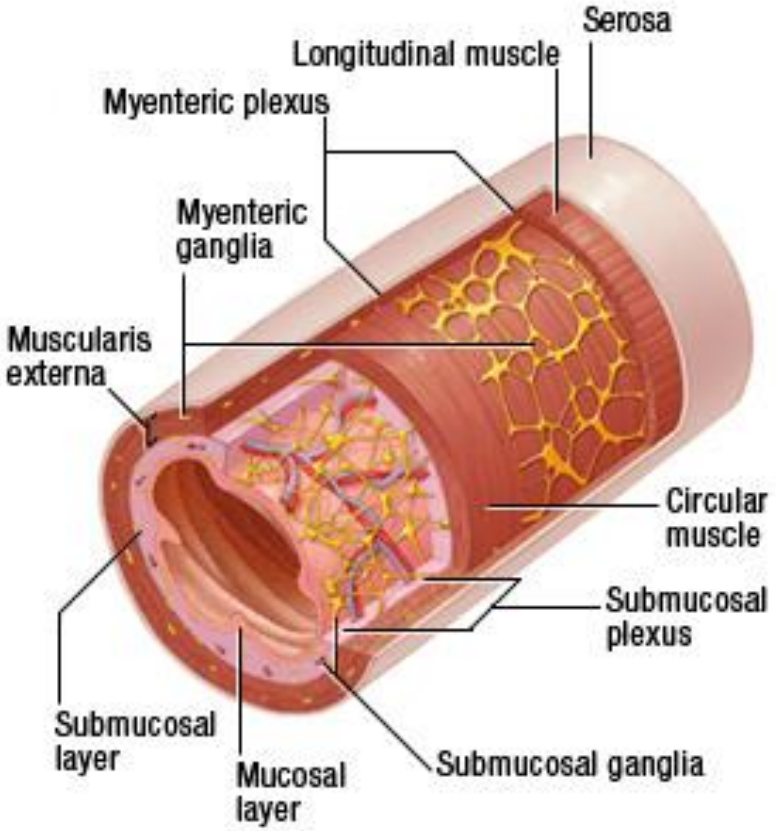
MỤC TIÊU

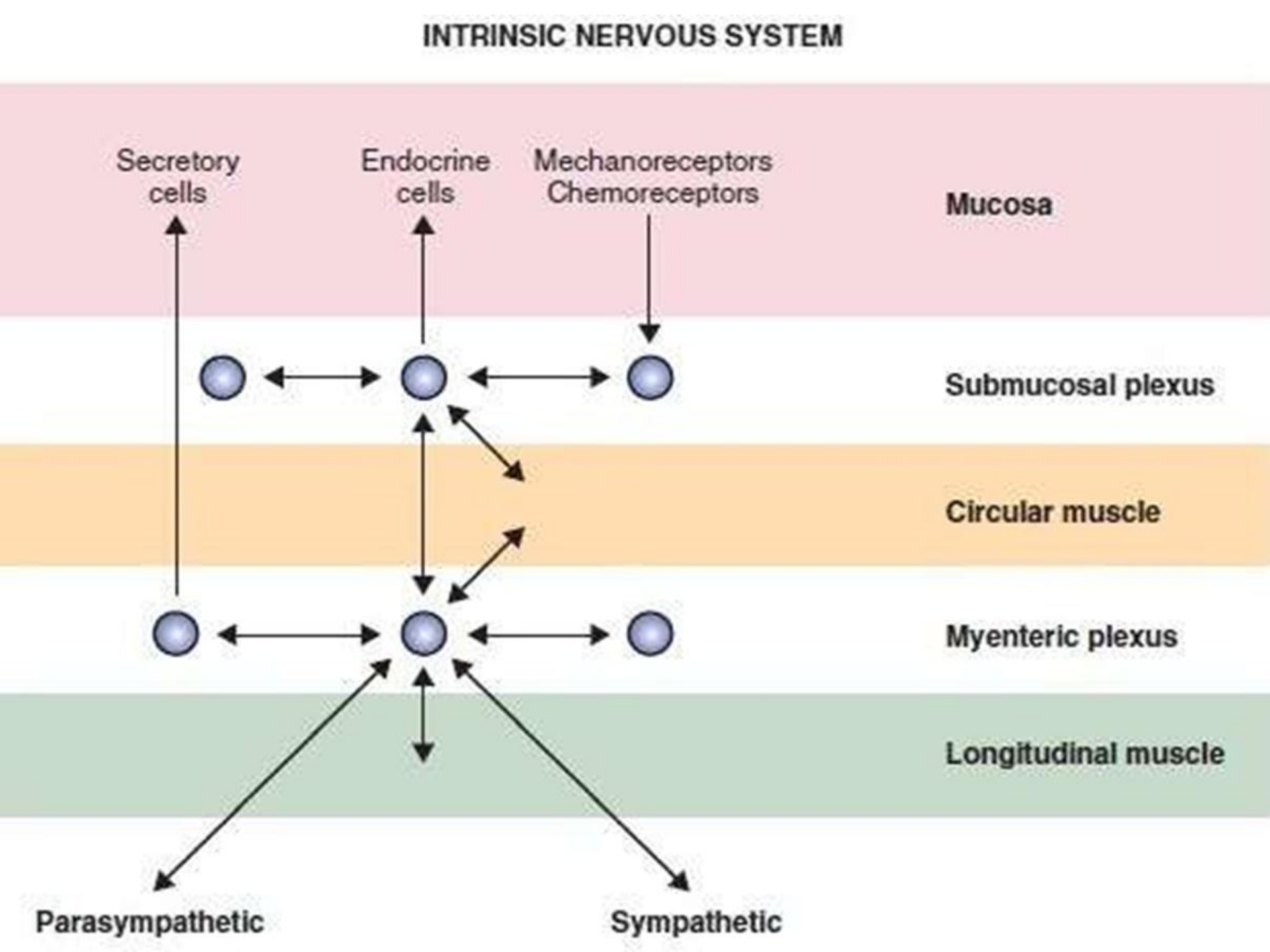
1) Trình bày cơ chế điều hòa hoạt động của hệ tiêu hóa thông qua hệ thần kinh ruột và thần kinh tự chủ.
2) Trình bày được các hormone chính tham gia điều hòa hoạt động tiêu hóa và cơ chế tác động.


Sympathetic division
Parasympathetic division
Dilates pupil and elevates eyelid
Ciliary body
Constricts pupil
CN III
Ciliary ganglion
Secretes tears
Stimulates salivation
Modulates blood vessel tone
Pterygopalatine ganglion
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
Lumbar
Stimulates secretion of epinephrine
Pelvic splanchnic nerves
Dilates blood vessels in intestines and rectum
Superior mesenteric ganglion
Sacral
Sympathetic chain
Relaxes urinary bladder
Contracts urinary bladder
Inferior mesenteric ganglion
Relaxes urinary sphincter
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

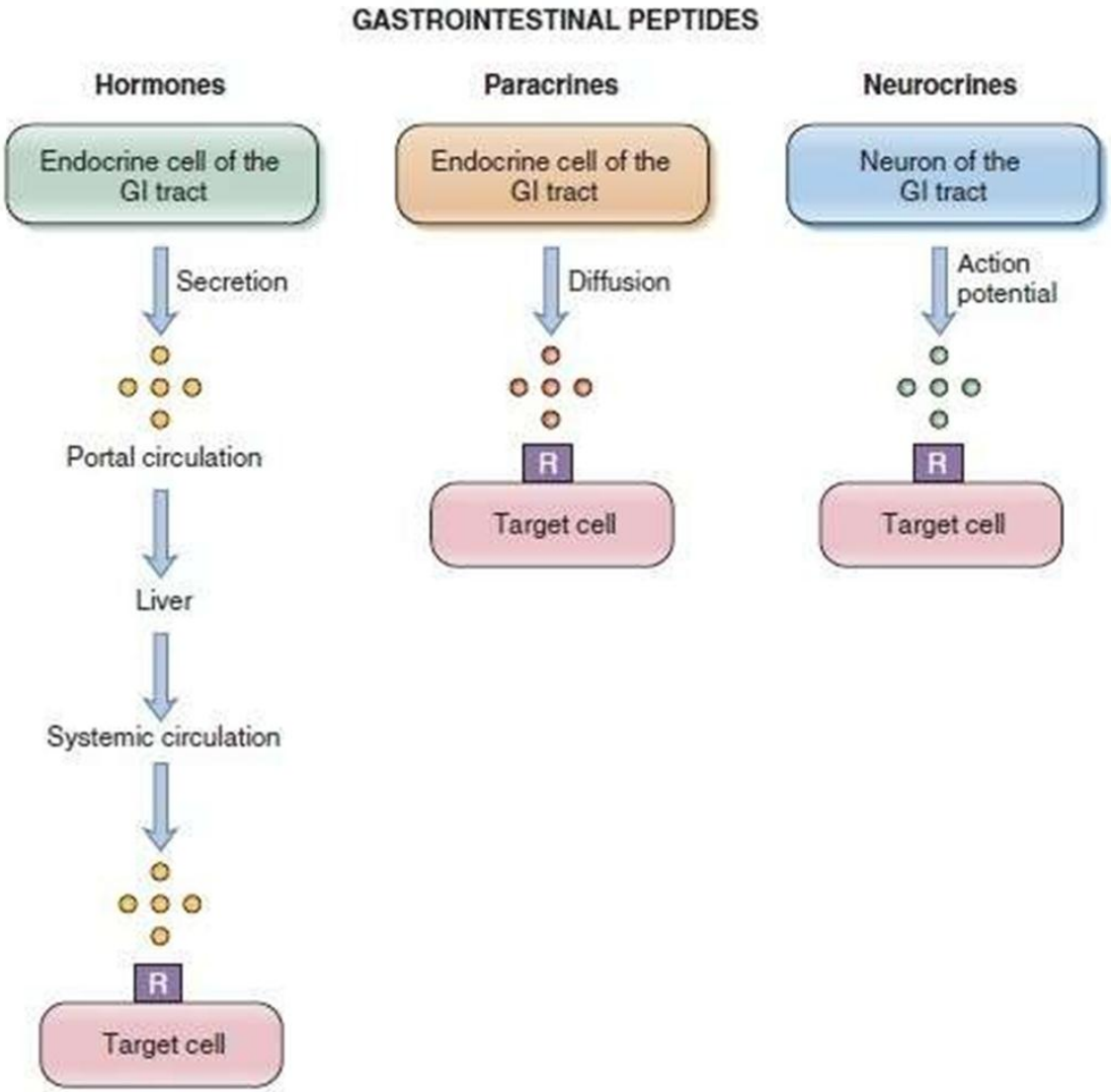

EXTRINSIC NERVOUS SYSTEM
Mucosa
Muscularis mucosae
Endocrine cells
Secretory cells
Submucosal plexus
Circular muscle
Myenteric plexus
Longitudinal muscle
ACh or peptides
ACh
ACh or peptides
ACh
ACh or peptides
Vagus nerve or
pelvic nerve
Parasympathetic
NE
NE
NE
NE
NE
NE
Sympathetic
ganglia
ACh
Sympathetic


(A)
Gastrointestinal tract
Dorsal motor nucleus of vagus
Postganglionic parasympathetic neuron
Vagus nerve (X)
Intrinsic neurons of gut plexuses
Preganglionic sympathetic axon
Postganglionic sympathetic axon
Prevertebral ganglion
(B)
Circular muscle layer
Myenteric (Auerbach's) plexus
Submucus (Meissner's) plexus
Longitudinal muscle layer
Mucosa


Serosa
Longitudinal muscle
Myenteric plexus
Myenteric ganglia
Muscularis externa
Circular muscle
Submucosal plexus
Submucosal layer
Mucosal layer
Submucosal ganglia


INTRINSIC NERVOUS SYSTEM
Secretory cells
Endocrine cells
Mechanoreceptors Chemoreceptors
Mucosa
Submucosal plexus
Circular muscle
Myenteric plexus
Longitudinal muscle
Parasympathetic
Sympathetic

Substance	Source	Actions
Acetylcholine (ACh)	Cholinergic neurons	Contraction of smooth muscle in wall Relaxation of sphincters ↑ Salivary secretion ↑ Gastric secretion ↑ Pancreatic secretion
Norepinephrine (NE)	Adrenergic neurons	Relaxation of smooth muscle in wall Contraction of sphincters ↑ Salivary secretion
Vasoactive Intestinal Peptide (VIP)	Neurons of the enteric nervous system	Relaxation of smooth muscle ↑ Intestinal secretion ↑ Pancreatic secretion
Nitric Oxide (NO)	Neurons of the enteric nervous system	Relaxation of smooth muscle
Gastrin-Releasing Peptide (GRP), or Bombesin	Vagal neurons of gastric mucosa	↑ Gastrin secretion
Enkephalins (Opiates)	Neurons of the enteric nervous system	Contraction of smooth muscle ↓ Intestinal secretion
Neuropeptide Y	Neurons of the enteric nervous system	Relaxation of smooth muscle ↓ Intestinal secretion
Substance P	Cosecreted with ACh by neurons of the enteric nervous system	Contraction of smooth muscle ↑ Salivary secretion


GASTROINTESTINAL PEPTIDES
Hormones
Endocrine cell of the GI tract
Secretion
Portal circulation
Liver
Systemic circulation
R
Target cell
Paracrines
Endocrine cell of the GI tract
Diffusion
R
Target cell
Neurocrines
Neuron of the GI tract
Action potential
R
Target cell

Hormone	Hormone Family	Site of Secretion	Stimuli for Secretion	Actions
Gastrin	Gastrin-CCK	G cells of stomach	Small peptides and amino acids Distention of the stomach Vagal stimulation (GRP)	↑ Gastric H^+ secretion Stimulates growth of gastric mucosa
Cholecystokinin (CCK)	Gastrin-CCK	I cells of duodenum and jejunum	Small peptides and amino acids Fatty acids	↑ Pancreatic enzyme secretion ↑ Pancreatic HCO_3^- secretion Stimulates contraction of the gallbladder and relaxation of the sphincter of Oddi Stimulates growth of the exocrine pancreas and gallbladder Inhibits gastric emptying
Secretin	Secretin-glucagon	S cells of duodenum	H^+ in the duodenum Fatty acids in the duodenum	↑ Pancreatic HCO_3^- secretion ↑ Biliary HCO_3^- secretion ↓ Gastric H^+ secretion Inhibits trophic effect of gastrin on gastric mucosa
Glucose-Dependent Insulinotropic Peptide (GIP)	Secretin-glucagon	Duodenum and jejunum	Fatty acids Amino acids Oral glucose	↑ Insulin secretion from pancreatic β cells ↓ Gastric H^+ secretion