

Year 1 MBChB - GI System Intro

GI System block leads



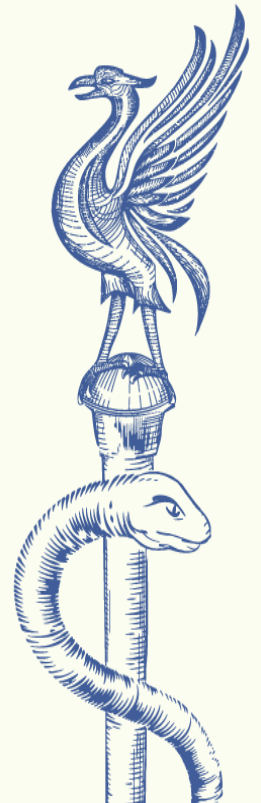
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Year 1 – GI system

Lecture 1 - 'Intro/Overview to Digestion' session (Live)

Lectures 2-3 online, Lecture 4 (Live), and Lecture 5-7 online, Lecture 8 (Live), Lecture 9-10 online,

Lecture 11 (Live), Lectures 12-16 online

5 x GI review seminars (Live)- focusing on 2-3 lectures at a time, with Polleverywhere EoB style Q & A's.

- **Slides and Q's available after the session.**

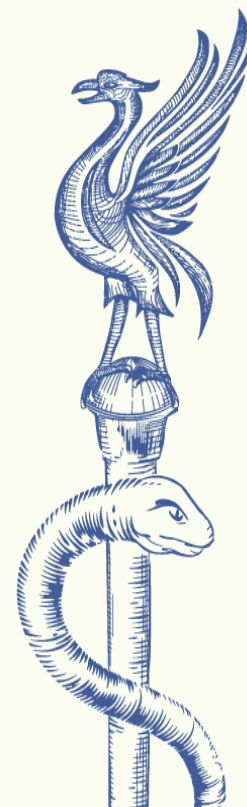
GI HARC sessions

GI HARC discussion board for Q's (and our A's) - anonymous

GI SoM discussion board for Q's (and our A's) - anonymous

End of system block review (Live) to go over:

- **Perceived LO gaps (so inform your Year reps)**
- **The full end of block test and answers**



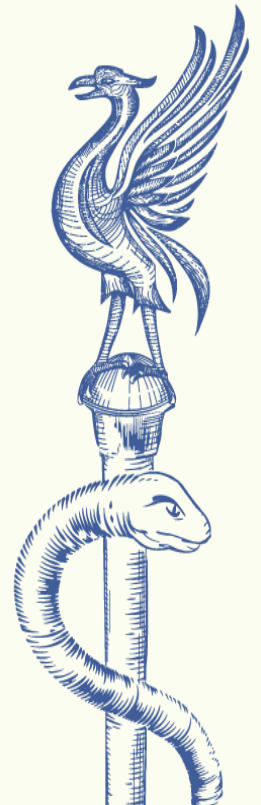
Year 1 – GI system

In Year 1, the normal anatomy, physiology and biochemistry of the gastrointestinal (GI) system is explored in detail, including...

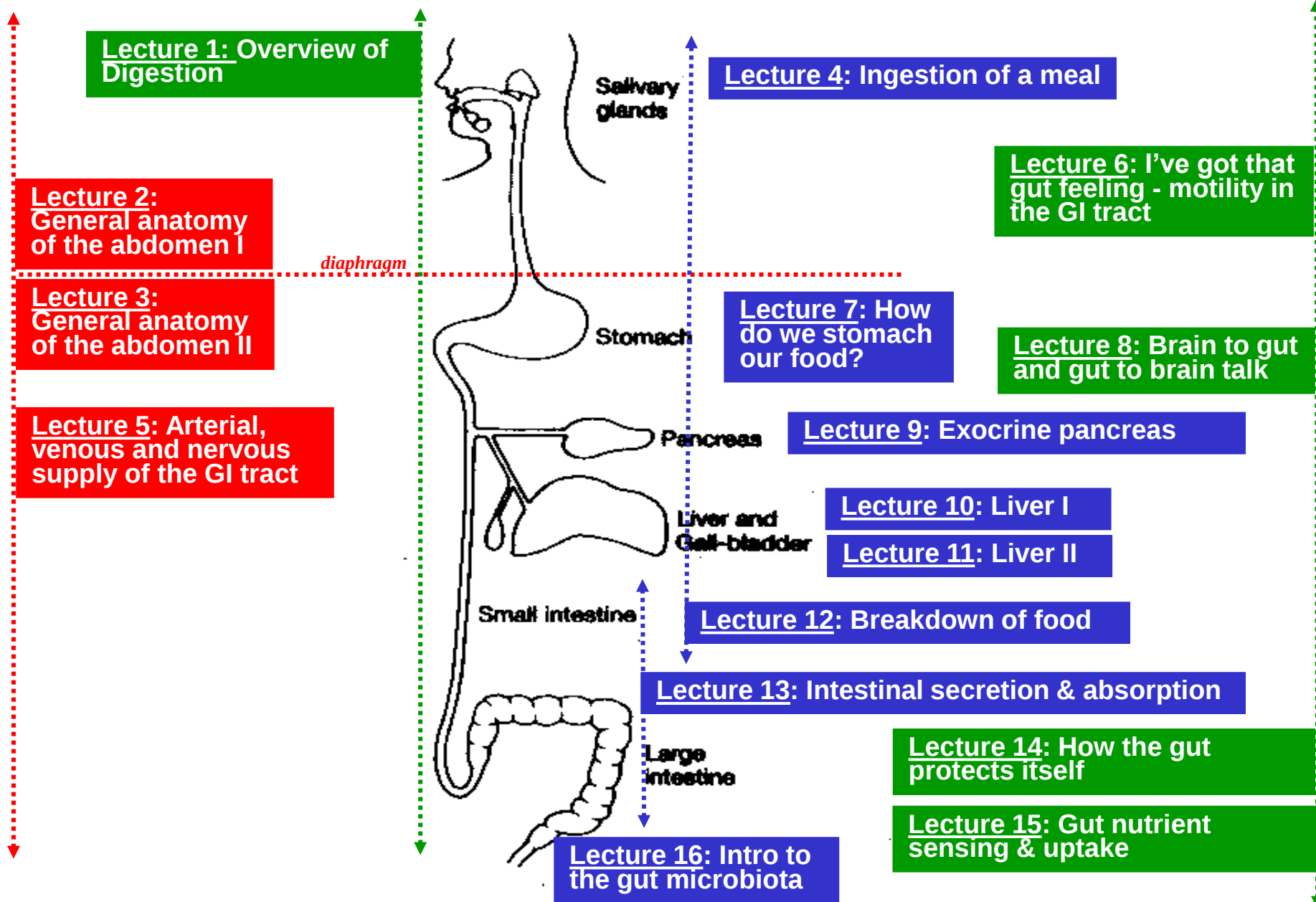
- Gross anatomy and cellular components of the GI tract and associated organs
- The process of ingestion and progressive breakdown of food into forms suitable for absorption.
- Associated transport processes facilitating passage thro' the gut
- The biochemical pathways, the secretory processes and enzymes used in the digestion.
- Nutrient sensing, controlling and integrating all of the above.
- Understanding of GI tract cellular growth, differentiation
- How the gut protects itself from damage or attack.
- Gut microbiota

In Year 2, the Gastroenterology module will focus on

- the pathophysiological/pathological processes that may affect the GI tract and its associated secretory organs.



Year 1 GI lecture plan



Year 1 GI review seminars

Lecture 1: Overview of Digestion

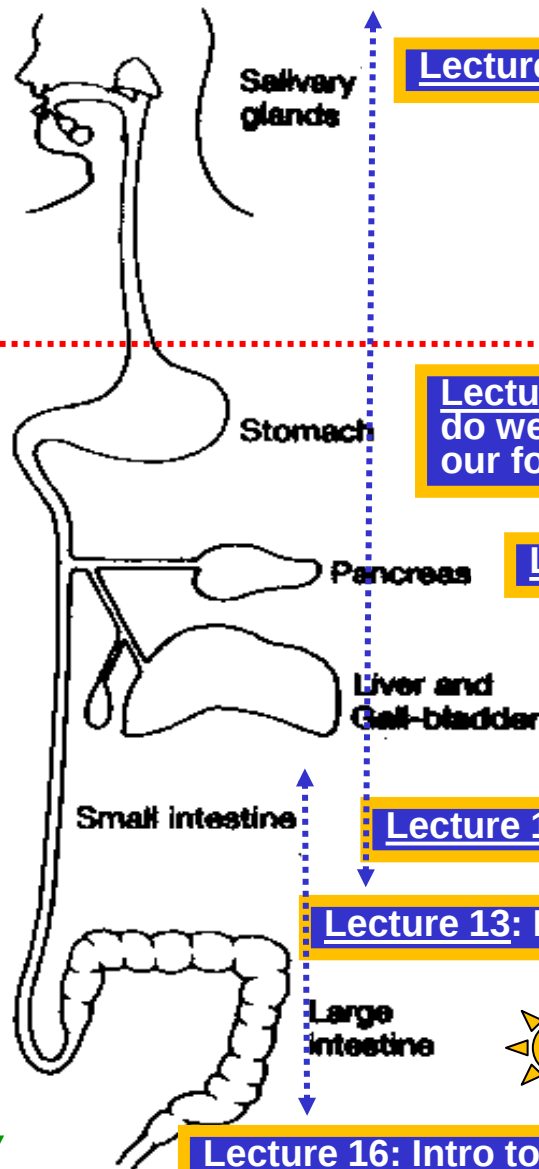
Lecture 2: General anatomy of the abdomen I

Lecture 3: General anatomy of the abdomen II

Lecture 5: Arterial, venous and nervous supply of the GI tract

Review seminars

- I. Lectures 1 & 4
 - II. Lectures 6, 7 & 8
 - III. Lectures 9, 10, & 11
 - IV. Lectures 12 & 13
 - V. Lectures 14, 15 & 16
- HARC drop in



Lecture 4: Ingestion of a meal



Lecture 6: I've got that gut feeling - motility in the GI tract



Lecture 7: How do we stomach our food?

Lecture 8: Brain to gut and gut to brain talk

Lecture 9: Exocrine pancreas

Lecture 10: Liver I



Lecture 11: Liver II

Lecture 12: Breakdown of food



Lecture 13: Intestinal secretion & absorption

Lecture 14: How the gut protects itself

Lecture 15: Gut nutrient sensing & uptake



Lecture 16: Intro to the gut microbiota

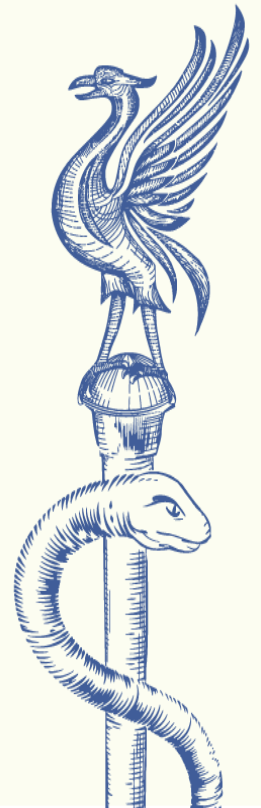
Overview of Digestion

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Learning Outcomes:

- **LO1** - Describe the function of the regions of gut tube (i.e. from mouth to anus) and its associated secretory organs
- **LO2** - Define neural, endocrine and paracrine control of the gut
- **LO3** - Differentiate between involuntary and voluntary muscle control and the context to gastrointestinal (GI) tract motility (e.g. swallowing, peristalsis, defecation)
- **LO4** - Differentiate between the autonomic and enteric innervation of the GI tract
- **LO5** - Illustrate function versus dysfunction in the GI tract using clinical examples

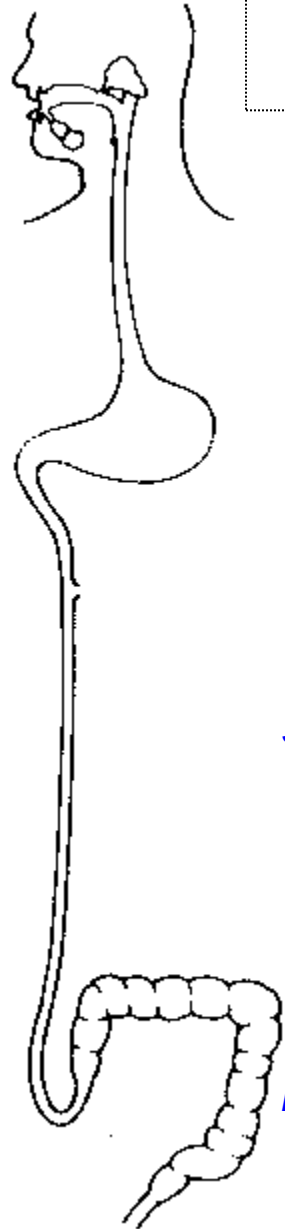
DIGESTION

“The progressive breakdown of food into a form suitable for absorption and the associated transport processes”

Digestion therefore also includes: -

- ***The processes of secretion***
- ***The processes of absorption***
- ***Movement of the gut contents***
- ***growth & differentiation***
- ***The mechanisms protecting the gut from damage or attack, and***
- ***the mechanisms controlling and integrating all of the above***

SCHEMATIC REPRESENTATION OF MAIN REGIONS OF THE GASTROINTESTINAL TRACT



REGION:

FUNCTION:

Oesophagus

- *Transit*

Stomach

- *storage, H⁺/peptic digestion
& intrinsic factor*

duodenum

- *fat, protein, carbohydrate
digestion & absorption, Ca²⁺/Fe²⁺*

jejunum

- *water and electrolyte transport*

ileum

- *bile salt & vit B12 transport*

Colon

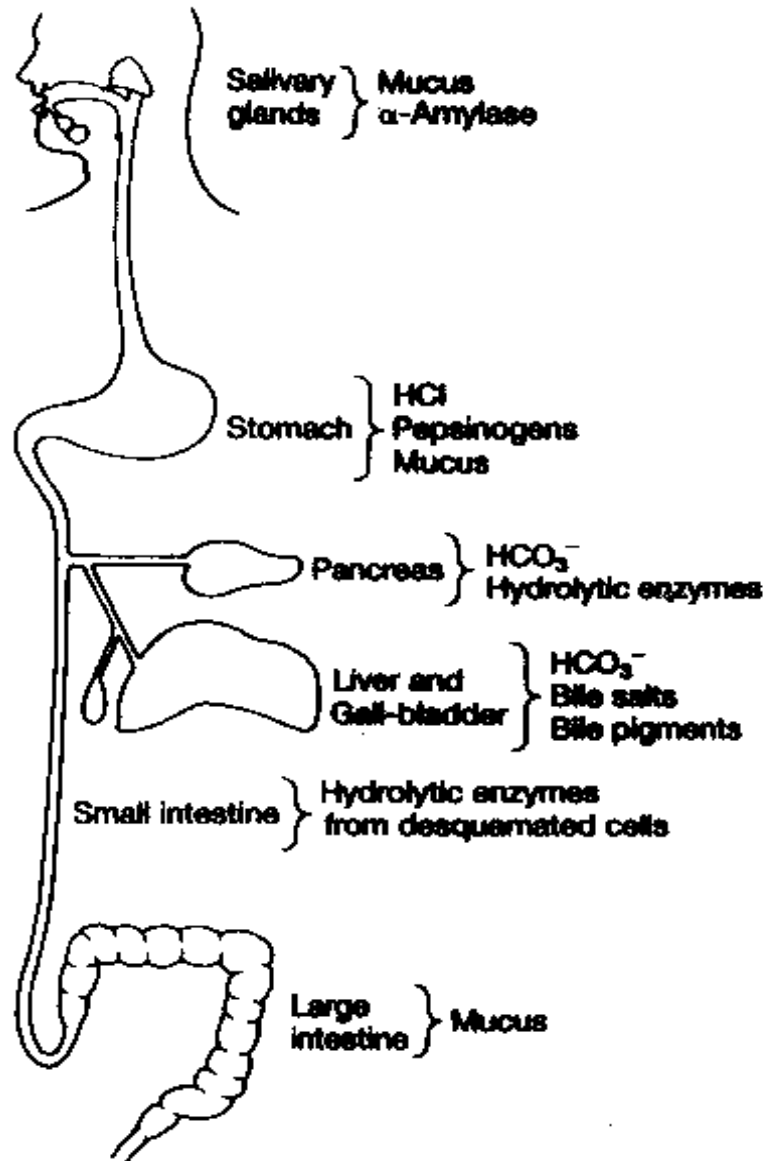
- *Storage*

- *water and electrolyte transport*

rectum & anus

- *defaecation*

SECRETIONS OF THE GUT



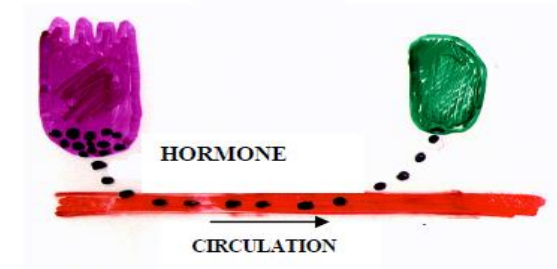
Salivary glands -
synthesis/secretion:
amylase, mucus.
Water, electrolytes

Exocrine pancreas -
synthesis/secretion:
proteases, lipase, amylase.
 HCO_3^- , water

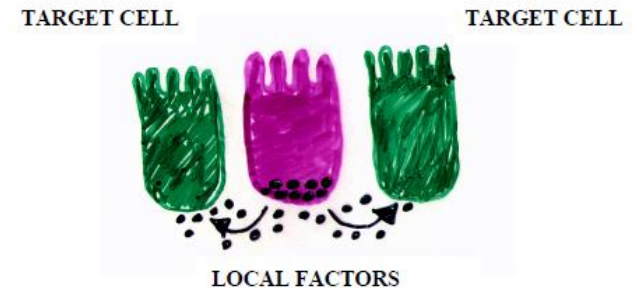
Liver -
bile salt synthesis,
bile secretion.
Gall bladder -
storage and concentration
of bile

Physiological control systems in the gut

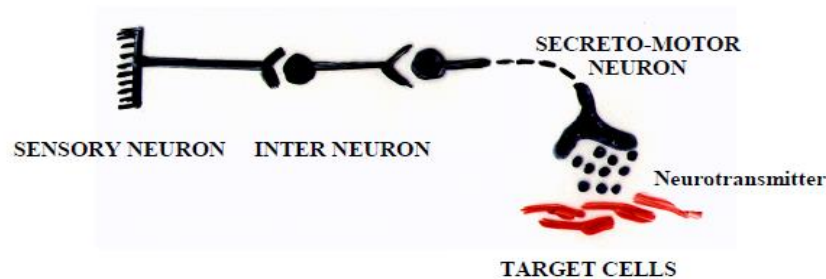
- **Endocrine** - Gut hormones



- **Paracrine** - Local regulators



- **Neural**



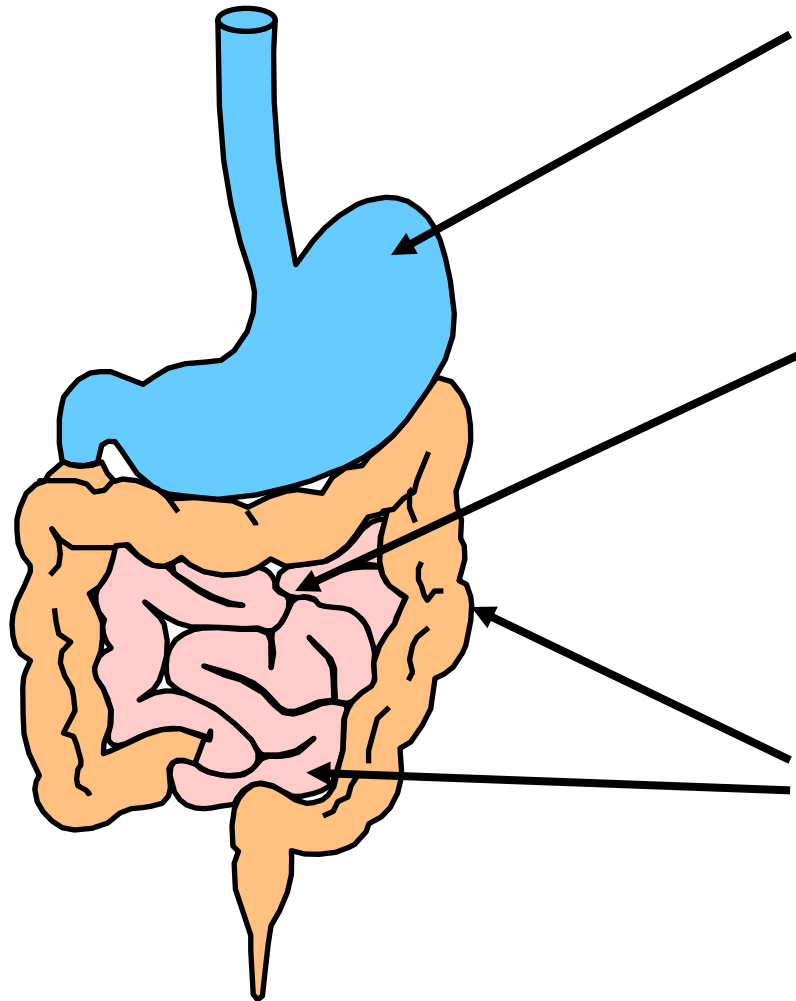
Intrinsic

- Myenteric & submucosal nerve plexuses

Extrinsic

- Afferent & efferent nerves
vagal & splanchnic trunks (autonomic nervous system)

Major hormones of the gut



STOMACH

Gastrin

Somatostatin

UPPER SMALL INTESTINE

Cholecystokinin (CCK)

Secretin

Gastric inhibitory peptide (GIP)*

Motilin

Vasoactive intestinal polypeptide (VIP)

ILEUM AND COLON

Glucagon-like peptide 1 (GLP-1)

Peptide YY (PYY)

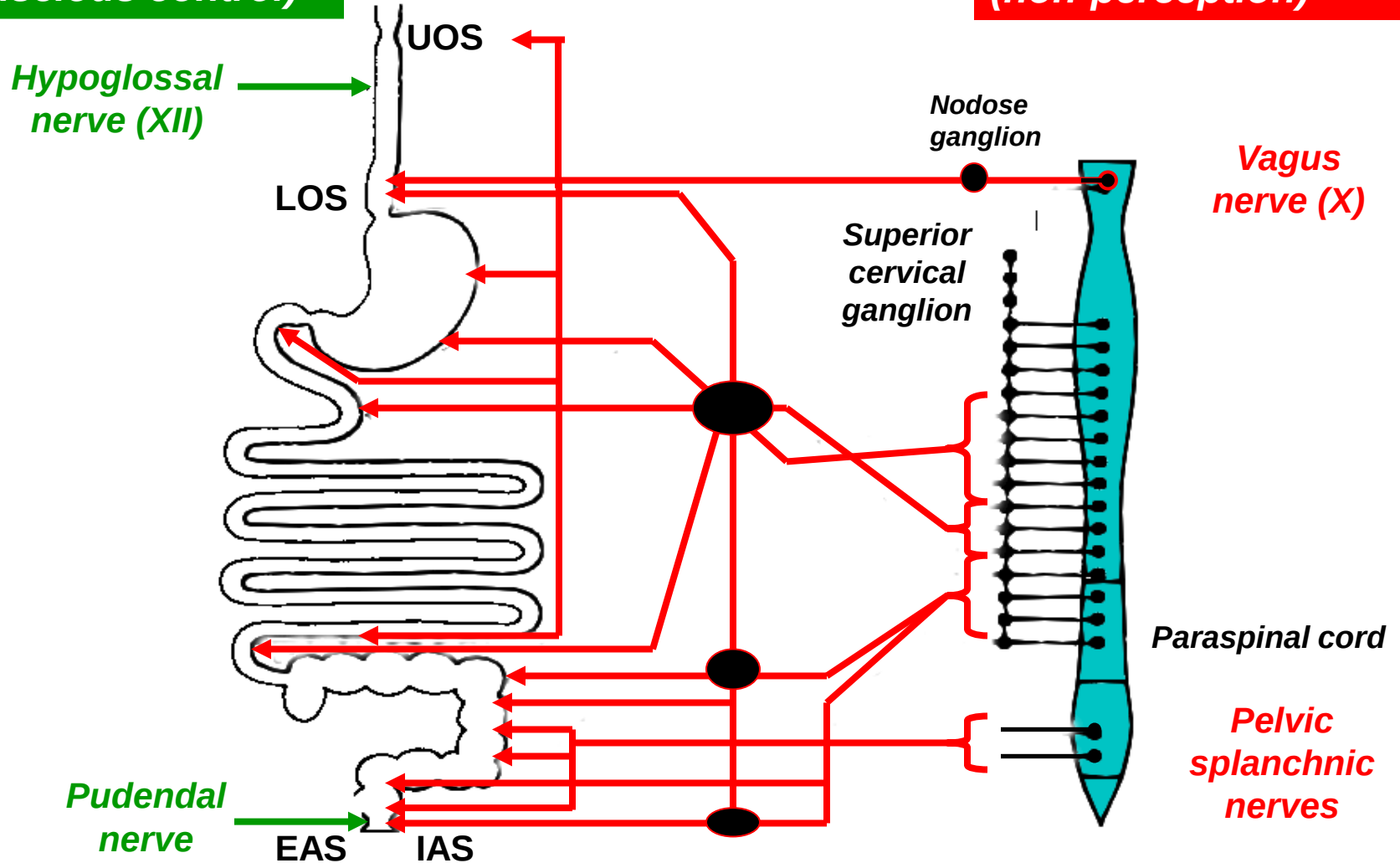
Neurotensin

*Also known as glucose-dependent insulintropic peptide (GIP)

Overview of extrinsic innervation:

Voluntary
(Conscious control)

Autonomic
(non-perception)



The autonomic nervous system

Sympathetic system:

Noradrenaline

EFFECTS

ACTION

β (+) secretion of saliva

salivary glands

α (+) vasoconstriction

gut blood vessels

β_2 (-) vasodilation

$\beta_{1/2}$ (-) decrease motility

gut wall, sphincters

α (+) contraction

adrenaline

(+) secretion

Adrenal medulla

α and β adrenoceptors

Parasympathetic system:

Acetylcholine (ACh)

ACTION

EFFECTS

Salivary glands

(+) secretion of saliva

Gut wall

(+) increased motility and tone

Gut sphincters

(-) reflex relaxation

Gut secretions

(+) e.g acid, enzymes & electrolytes

Pancreas

(+) exocrine & endocrine secretion

Gallbladder

(+) contraction

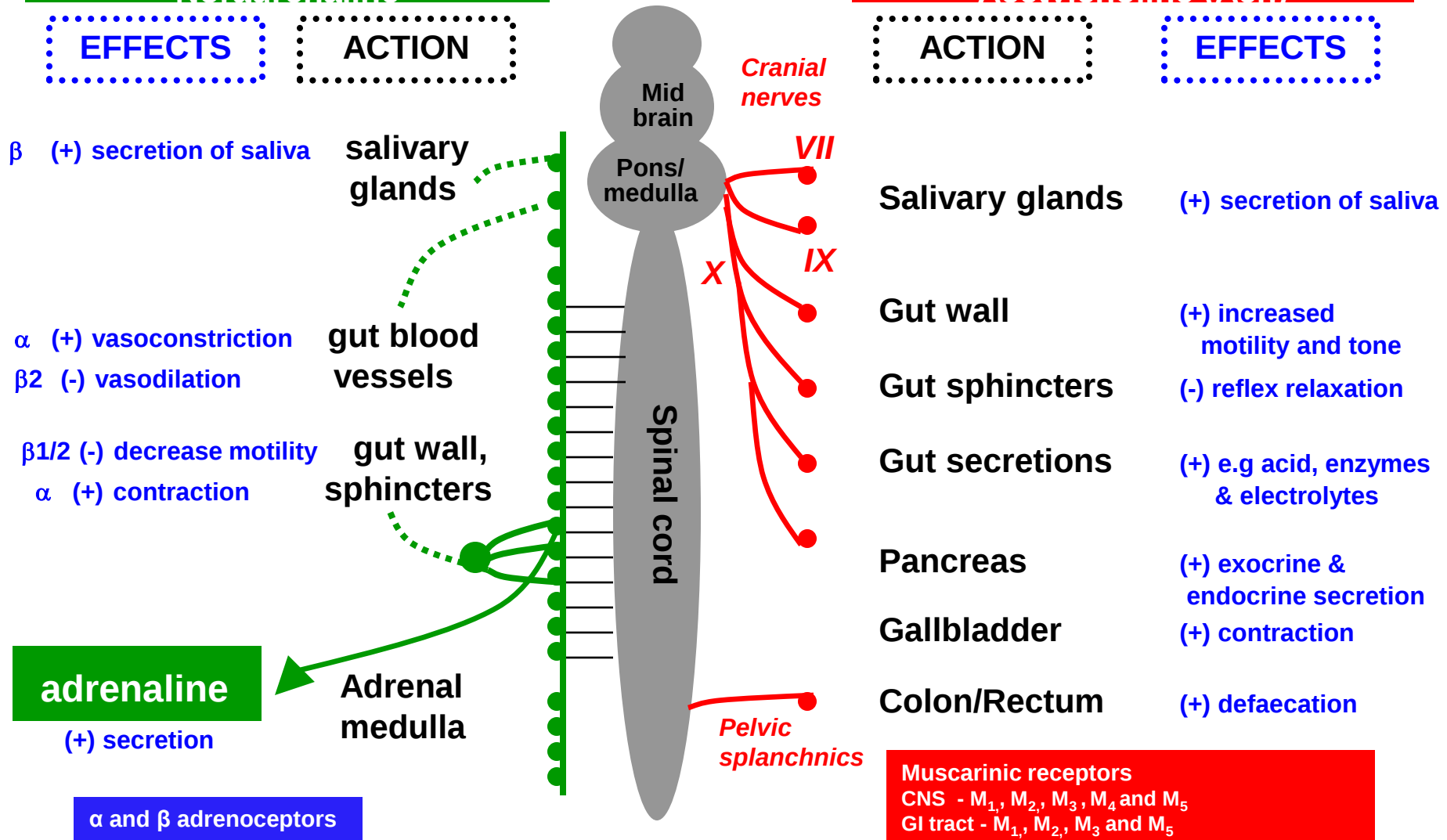
Colon/Rectum

(+) defaecation

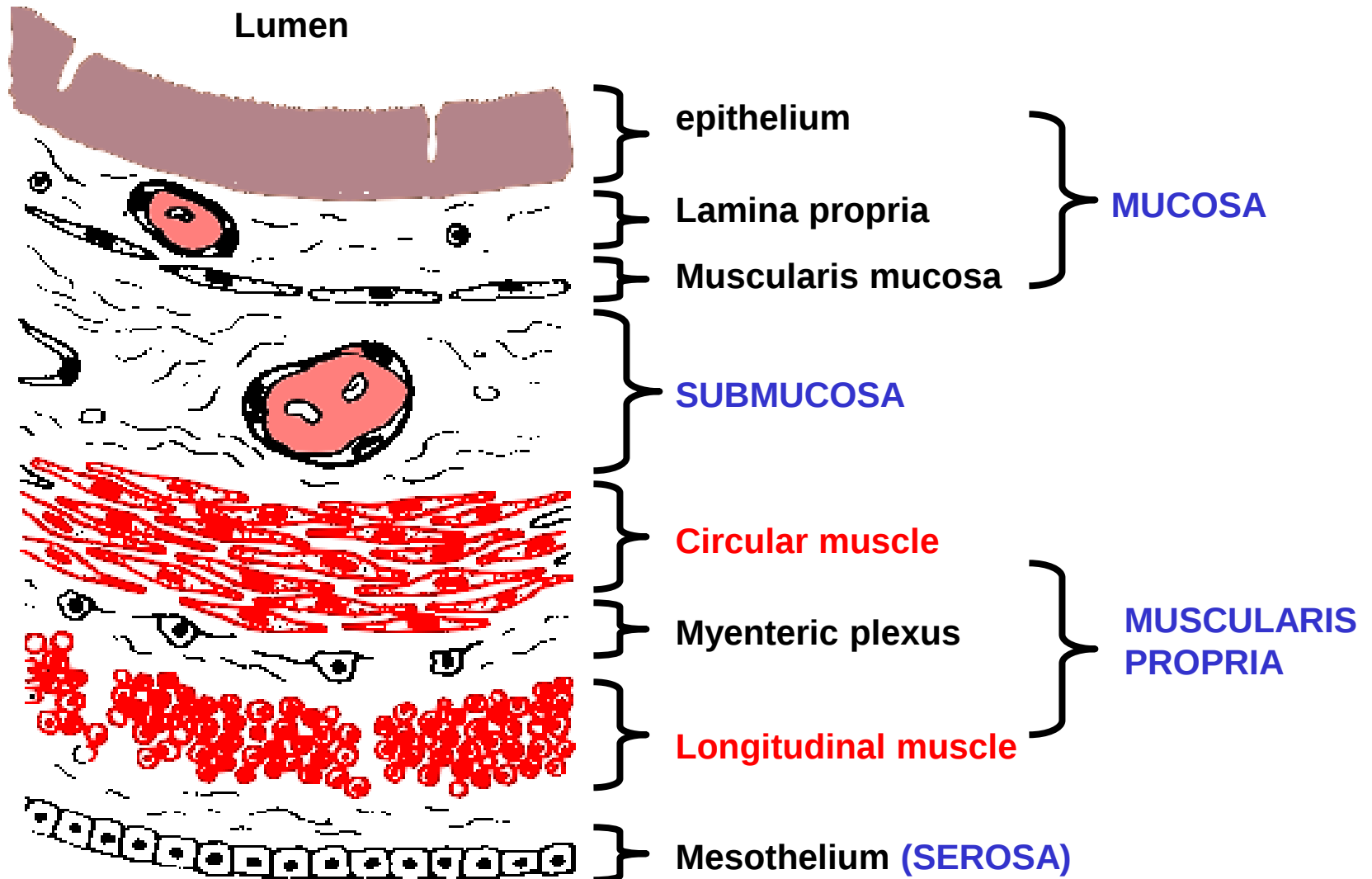
Muscarinic receptors

CNS - M_1 , M_2 , M_3 , M_4 and M_5

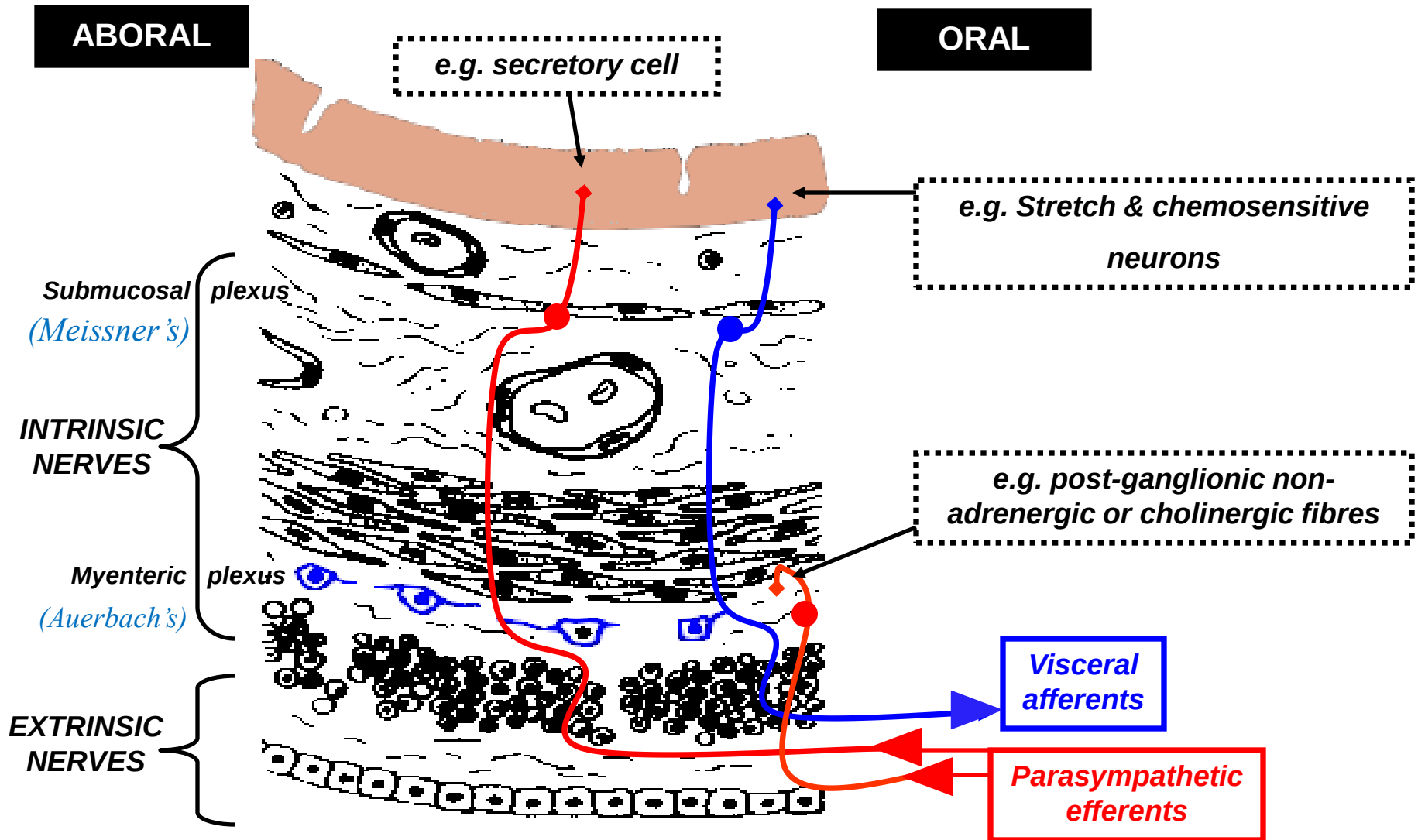
GI tract - M_1 , M_2 , M_3 and M_5



Organisation of the gut wall



Intrinsic and extrinsic nerves of the digestive tract



Function & Dysfunction in the GI tract

Physiology

- **Growth/development**
- **secretion**
- **absorption**
- **motility & signalling to CNS**
- **surveillance**
(immuno/metabolic)
- **co-ordination**
(neurons/hormones)

Pathology

- **cancer**
- **peptic ulcer, cystic fibrosis**
- **malabsorption**
- **oesophagitis, gastroparesis, non-ulcer dyspepsia and irritable bowel**
- **ulcerative colitis, Crohn's disease, Coeliac disease**
- **aganglionic colon (Hirschsprung's)**

GI system case-based learning (CBL)

1. A problem that's difficult to swallow

Achalasia

- voluntary and involuntary components, motility patterns and problems of swallowing and delivery of an ingested meal to the stomach

2. No more fish and chips!

Gallstone pancreatitis

- Composition of bile, gallbladder and liver functions, pancreaticobiliary flow and enterohepatic circulation of bile/bile components

3. Gap year to India

Traveller's diarrhoea

- normal electrolyte levels/fluid balance, understanding key mechanisms of intestinal secretion, gut fluid balance, small intestinal water uptake and mechanisms of diarrhoea



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*Thank you for
your attention.*

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- <http://pcwww.liv.ac.uk/~bjcampbl/Digestion.htm>

