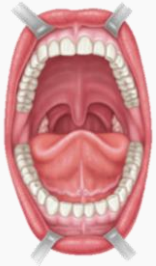
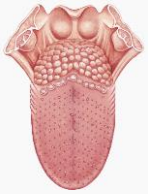
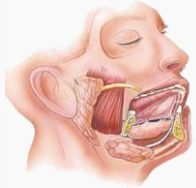
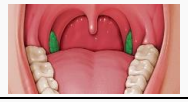
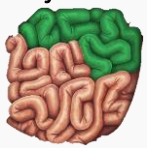
GASTROINTESTINAL SYSTEM SUPPLY

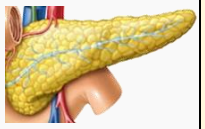
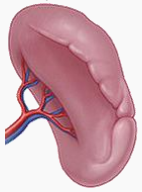
sheet	PART	INNERVATION	BLOOD SUPPLY	VENOUS DRAINAGE	LYMPH DRAINAGE
1	Mouth 	× Roof: **greater palatine** & **nasopalatine** nerves (maxillary N.) × Floor: **lingual** nerve (mandibular N.) × Taste {ant 2/3}: **chorda tympani** nerve (facial nerve) × Cheeks: **buccal** nerve (**mandibular** N.) × Buccinator muscle: **Buccal** Nerve (**facial** Nerve) × Orbicularis oris muscle: **facial** nerve			
	Tongue 	× Ant 2/3: **Lingual** nerve (sensory) & **chorda tympani** (Taste) × Post 1/3: **glossopharyngeal** N. (both)	× **lingual** artery (←ECA) × **tonsillar** branch of facial artery (←ECA) × **ascending pharyngeal** artery (←ECA)	lingual veins correspond to the arteries and drain into **IJV**	× Tip: **Submental** LNs × sides of ant 2/3: **submandibular** & **deep cervical** LNs × post 1/3: **Deep cervical** LNs
2	Palate 	× Hard Palate: **greater palatine** and **nasopalatine** nerves × Soft Palate: **lesser palatine** and **glossopharyngeal** nerves	× **greater palatine** artrey (←maxillary A.) × **ascending palatine** artrey (←facial A.) × **ascending pharyngeal** artery	× **greater palatine** vein (→maxillary V.) × **ascending palatine** vein (→facial V.) × **ascending pharyngeal vein**	**Deep cervical** lymph nodes
	Parotid gland 	× PANS (secreto-motor) & Sensory: **Auriculotemporal** nerve {**Inferior salivary Nucleus** → **tympanic** branch of **glossopharyngeal** N.→ **Lesser petrosal** nerve parasympathetic preganglionic fibres → **otic ganglia** → **auriculotemporal** nerve parasympathetic postganglionic fibres}			

sheet	PART	INNERVATION	BLOOD SUPPLY	VENOUS DRAINAGE	LYMPH DRAINAGE
	Submandibular gland Sublingual gland	× PANS (secreto-motor): **facial** nerve × Sensory: **lingual** nerve {**Superior salivary Nucleus** → **Chorda tympani** branch from facial nerve parasympathetic preganglionic fibres + **lingual** nerve → **submandibular ganglia** → parasympathetic postganglionic fibres **directly** to gland}			
	Pharynx 	× Nasal pharynx: **maxillary** nerve × Oral pharynx: **glossopharyngeal** nerve × Laryngeal pharynx: **internal laryngeal** nerve (Vagus Nerve)	× **Ascending pharyngeal** artrey × **tonsillar** branch of facial artery × branches of **maxillary** & **lingual** arteries	Veins correspond to the arteries and drain into **IJV**	× Directly: **deep cervical** LNs × Indirectly: **retropharyngeal** or **paratracheal** nodes into **deep cervical** nodes
	Palatine Tonsils 	Branch from **maxillary** nerve	**tonsillar** branch of the facial artery	Join **external palatine** vein, **pharyngeal** or the **facial** vein (→IJV)	**upper deep cervical** lymph nodes
Self-study sheet	Esophagus 	× SANS: sympathetic trunk × PANS: Vagus Nerve × lower part of its thoracic course surrounded by the **esophageal nerve plexus**	× upper 1/3: **inferior thyroid** artery × middle 1/3: **descending thoracic aorta** branches × lower 1/3: **left gastric** artery branches	× upper 1/3: **inferior thyroid** veins × middle 1/3: **azygos** veins × lower 1/3: **left gastric** vein (→Portal V.)	× upper 1/3: **deep cervical** nodes × middle 1/3: **superior & posterior mediastinal** nodes × lower 1/3: nodes along the **left gastric blood vessels** and **celiac nodes**
	Pyloric sphincter 	SANS: motor fibres, celiac ganglion T6-T9 PANS: inhibitory fibres, vagus Nerve × **Anterior nerve of Latarjet** (←anterior **vagal** trunk) × **Posterior nerve of Latarjet** (←posterior **vagal** trunk)			Superior pyloric (Suprapyloric) & inferior pyloric (Subpyloric) lymph nodes

sheet	PART	INNERVATION	BLOOD SUPPLY	VENOUS DRAINAGE	LYMPH DRAINAGE
	stomach 	Nerves from the **celiac plexus** SANS: {carries pain sensation} PANS: × posterior surface: **posterior gastric** nerve ←**right vagus** nerve × anterior surface: **anterior gastric** nerve ←**left vagus** nerve	× upper right: **Left gastric** artery (←celiac artrey) × lower right: **Right gastric** artery (←hepatic artrey) × Fundus: **short gastric** artrey (←splenic artrey) × upper greater curvature: **left gastroepiploic** artery (←splenic artrey) × lower greater curvature: **right gastroepiploic** artery (←gastroduodenal artrey ←hepatic artery)	{Veins correspond to the arteries} × **left & right gastric** veins (→directly to portal vein) × **short gastric & left gastroepiploic** vein (→splenic vein) × **right gastroepiploic** vein (→superior mesenteric vein) superior mesenteric + splenic vein →portal vein	× **right & left gastric** LNs × **right & left gastroepiploic** nodes × **short gastr**ic nodes. All drain into **celiac** LNs
4	Anterior abdominal wall 	× **Thoracoabdominal nerve**: Lower 6 thoracic nerves & 12th subcostal nerve × **Dermatomes**: (nerves to the *skin* of abdomen, Anterior lateral cutaneous nerve terminal branches of Thoracoabdominal nerve) **T7:** *above umbilicus, below xiphoid process* **T10**: *surrounding umbilicus* **L1**: *below umbilicus, above symphysis pubis* × **LI nerve**: **Iliohypogastric** & **Ilioinguinal** nerves	× **Superior Epigastric** artery (←Internal Thoracic A. ← Subclavian A.) × **Inferior Epigastric** artery (←external iliac A.) × lower 6 **Intercostal** arteries × 4 **Lumbar** arteries (abdominal aorta) *supply abdominal muscles* × **Deep circumflex** artery (←external iliac artery) *supplies abdomen in the anterior superior iliac spine region*	× Above umbilicus: **Lateral Thoracic** Vein (→Axillary Vein) & **Superior Epigastric** Vein (→Internal Thoracic Vein) × Below umbilicus: **Inferior Epigastric** Vein (→External Iliac Vein) × Paraumbilical Veins: **Ligamentum teres** {remnant of the umbilical vein} (→Portal Vein)	× Above the umbilicus: **Ant. Axillary** lymph nodes × Above the iliac crest: **Post. Axillary** lymph nodes × Below the umbilicus & iliac crest: **Superficial Inguinal** lymph nodes
5	Testes 	Vasomotor/sensory sympathetic fibres around **Testicular** Artery (← **renal** or **aortic** sympathetic plexus)	**Testicular** Artrey (←abdominal aorta-L2)	**Pampiniform** plexus →**Testicular** V → Right side into **IVC** and Left side into **left Renal** Vein	**Testicular** Lymph Vessels →lumbar **para-aortic** Lymph nodes-L1

sheet	PART	INNERVATION	BLOOD SUPPLY	VENOUS DRAINAGE	LYMPH DRAINAGE
	Scrotum 	× same sympathetic fibres to testes × **ilioinguinal** nerve-L1 × **genital** branch of **genitofemoral** nerve *also supplies cremasteric muscle*			scrotum+skin: **inguinal** lymph nodes in the femoral triangle
7	Duodenum 	nerves from the **celiac plexus** & **Superior mesenteric plexus** × SANS × PANS: **vagus** Nerve	× Upper half {1st + ½ of 2nd part}: **foregut; superior pancreaticoduodenal** artery (←gastroduodenal artery ←celiac trunk) × Lower half {½ of 2nd +3rd + 4th part}: **midgut; inferior pancreaticoduodenal** artery (←superior mesenteric artery)	× Upper half {1st + ½ of 2nd part}: **superior pancreaticoduodenal** vein (→portal vein) × Lower half {½ of 2nd +3rd + 4th part}: **inferior pancreaticoduodenal** vein (→superior mesenteric vein)	× Drainage upward: **pancreaticoduodenal** nodes →**gastroduodenal** nodes →**celiac** nodes × Drainage downward: **pancreaticoduodenal** nodes →**superior mesenteric** nodes
8	Jejunum 	nerves from the **Superior mesenteric plexus** × SANS: **T6-9** × PANS: **vagus** Nerve	× **Midgut;** vasa recta ←series of arcades ←**jejunal** arteries ←superior mesenteric artery	**superior mesenteric** vein (join the splenic vein to form the portal vein)	**Midgut**; intermediate mesenteric nodes →**superior mesenteric** nodes
	Ileum 		× **Midgut;** vasa recta ←series of arcades ←**ilial** arteries ←superior mesenteric artery × end of ilium: **ileocolic** artery (←superior mesenteric artery)		
	Cecum 	nerves from the **superior mesenteric plexus** × SANS: **greater splanchnic** nerve (T6-9) synapses in **celiac** ganglia & **lesser splanchnic** nerve synapses in **superior mesenteric** ganglia × PANS: **vagus** nerve	anterior and posterior **cecal** arteries (←**ileocolic** artery ←Superior mesenteric artrey)	anterior and posterior **cecal** veins (→superior mesenteric vein)	mesenteric nodes →**superior mesenteric** nodes

sheet	PART	INNERVATION	BLOOD SUPPLY	VENOUS DRAINAGE	LYMPH DRAINAGE
9	Appendix 	nerves from **Superior Mesenteric plexus** SANS(vasomotor): accompanied by afferent pain **sensation** nerve fibres and enter the spinal cord at the T10 level PANS: vagus neve × skin over umbilicus: **T10 dermatome**	**Appendicular** artery (←posterior cecal artery ←ilio-cecal artery ←superior mesenteric artery)	**Appendicular** vein (→posterior cecal vein)	one or two nodes in the **mesoappendix** →**superior mesenteric** nodes
	Ascending Colon 	nerves from **Superior Mesenteric plexus** × SANS: **superior mesenteric** ganglia T6-T9 × PANS: **vagus** nerve	× **right colic** artrey (←superior mesenteric artrey) × beginning of the ascending colon: **ileocolic artery** (←superior mesenteric artery)	Veins correspond to the arteries and drain into **superior mesenteric** vein	**colic** nodes →**superior mesenteric** nodes
	Transverse Colon 	× Proximal 2/3: **sup mesenteric plexus** SANS: **superior mesenteric** ganglia T6-T9 PANS: **vagus** N. × Distal 1/3: **inf mesenteric plexus** SANS: **inferior mesenteric** ganglia L1-L2 PANS: **sacral** spinal nerves S2-S4	× Proximal(medial) 2/3: **midgut**; **middle colic** artery (← superior mesenteric artery) × Distal(lateral) 1/3: **hindgut; left colic** artery superior & inferior branches (← inferior mesenteric artery)	Veins correspond to the arteries and drain into **superior & inferior mesenteric** veins	× Proximal 2/3: **colic** nodes →superior mesenteric nodes × Distal 1/3: **colic** nodes →inferior mesenteric nodes
	Descending Colon 	nerves from the **inferior mesenteric plexus** × SANS: **inferior mesenteric** ganglia L1-L2 × PANS: **sacral** spinal nerves S2-S4	× **left colic** {mainly} (←inferior mesenteric artery) × end of descending colon: **sigmoid** branches (←inferior mesenteric artery)	Veins correspond to the arteries and drain into **inferior mesenteric** veins	**colic** nodes & **inferior mesenteric** nodes
10	Liver 	nerves from the **celiac plexus** (**hepatic plexus**) × SANS × PANS: large hepatic branch ←anterior **vagus** trunk	× **Hepatic portal vein** (formed by superior mesenteric & splenic vein union) {75-80%, nutrients} × **Hepatic artery** (←celiac trunk) {20-25%, oxygen}	central vein →hepatic veins →**I.V.C**	1/3 – 1/2 of total body lymph × **hepatic** LNs in porta hepatis →celiac nodes × few lymph vessels pass from the bare area through the diaphragm to posterior **mediastinal** LNs →right thoracic duct

sheet	PART	INNERVATION	BLOOD SUPPLY	VENOUS DRAINAGE	LYMPH DRAINAGE
	Common bile duct 		Small arteries from: × **cystic** artery × **Posterior superior pancreaticoduodenal** artery		
	Gallbladder 	× nerves from the **celiac** plexus × SANS × PANS: **vagus** nerve × {Hormonal stimulation: **CCK**}	× **Cystic** artery (←right Hepatic artery ←proper hepatic artery ←common hepatic artery) × Supply directly from the **liver**	× **Cystic** vein → right portal vein × **Small vessels** run between **liver** and gallbladder	**Cystic** LNs →hepatic LNs →celiac lymph nodes
11	Pancreas 	nerves from the **celiac** & **superior mesenteric** plexus × SANS: **celiac** & **superior mesenteric** ganglia × PANS: **vagus** nerve	× Pancreatic arteries ←**splenic** artrey × tail, body, neck & upper half of head: **foregut; superior pancreaticoduodenal** (←gastroduodenal artery ←hepatic artery) × lower half of head & uncinate process: **midgut**; **inferior pancreaticoduodenal** artery (←superior mesenteric artrey)	Veins correspond to the arteries and drain into the **splenic and superior mesenteric vein before draining into the portal vein**	**Pancreatic** LNs + splenic LNs →pancreaticosplenic LNs → superior mesenteric LNs →celiac lymph nodes
	Spleen 	nerves from the **celiac** plexus and accompany the **splenic** artery × SANS × PANS	**splenic** artrey (divides into about six branches in the hilum) ←celiac artery	**splenic** vein (formed by tributaries in the hilum) joins the superior mesenteric vein to form the portal vein	**Splenic** LNs →Pancreatic LNs →pancreaticosplenic LNs →superior mesenteric LNs →celiac lymph nodes
14	Sigmoid Colon 	nerves from the **inferior hypogastric plexuses** × SANS: **inferior mesenteric** ganglia L1-L2 × PANS: **pelvic splanchnic** spinal nerves S2-S4	**Sigmoid** arteries (←inferior mesenteric artery)	**Sigmoid** veins (→inferior mesenteric vein →portal vein)	**Sigmoid** LNs →inferior mesenteric nodes (pre-aortic LNs)

sheet	PART	INNERVATION	BLOOD SUPPLY	VENOUS DRAINAGE	LYMPH DRAINAGE
	Rectum 	nerves from the **inferior hypogastric plexuses** × SANS × PANS {sensitive only to **stretch**}	× **superior rectal** artery (←inferior mesenteric artery) *supplies mucous membrane* × **middle rectal** artery (←anterior division of the internal iliac artery) *supplies junction between the rectum and anal canal* × **inferior rectal** artery (←internal pudendal artery ← internal iliac artery)	× **superior rectal** vein (→inferior mesenteric vein →portal vein) × **middle rectal** vein (→internal iliac vein →IVC) × **Inferior rectal** vein (→internal pudendal →internal iliac vein →IVC) {form a porto-systemic anastomosis: **hemorrhoidal/rectal venous plexus**}	× Upper part: **inferior mesenteric** LNs. × Lower part: **internal iliac LNs** →common iliac LNs.
	Anal Canal 	× above the pectinate line(upper half): **inferior hypogastric plexus** and **pelvic splanchnic** nerves {sensitive only to **stretch**} × below the pectinate line(lower half): **somatic inferior rectal nerves** {sensitive to **pain, temperature, touch**} × external anal sphincter: **inferior rectal** Nerve (←pudendal nerve) and by a branch from the 4th sacral nerve	× above the pectinate line(upper half): **superior rectal** artery × below the pectinate line(lower half): **middle rectal** artery (direct) & **inferior rectal** artery (indirect) ←internal iliac artery	× internal rectal venous plexus: **superior rectal** vein × external rectal venous plexus: upper: **superior rectal** vein middle: **middle rectal** vein lower: **inferior rectal** vein	× above the pectinate line: **internal iliac** nodes × below the pectinate line: **superficial inguinal** nodes

Ascending aorta

- Right coronary artrey
- Left coronary artrey

Aortic arch

- Left common carotid artrey
  - Internal carotid artrey (ICA)
  - External carotid artrey (ECA)
- Left subclavian artrey
- Right brachiocephalic artrey
  - Right common carotid artrey
  - Right subclavian artrey

Abdominal aorta – T12

ANTERIOR

- Celiac trunk – L1 {foregut}
  - Left gastric artrey
  - Splenic artrey
    - Pancreatic artrey
    - Short gastric artrey
    - Left gastroepiploic artrey
  - Common hepatic artrey
    - Right gastric artrey
    - Gastroduodenal artrey
      - Right gastroepiploic artrey
      - Superior pancreaticoduodenal artrey
    - Right and Left hepatic arteries
      - Cystic artrey (from right branch)
- Superior mesenteric artrey (SMA) – L2 {midgut}
  - inferior pancreaticoduodenal artery
  - middle colic artery
  - right colic artery
  - jejunal and ileal arteries
  - ileocolic artery
    - superior branch
    - inferior branch
      - anterior cecal artrey
      - posterior cecal artrey
        - appendicular artrey
- Inferior mesenteric artrey (IMA) – L3 {hindgut}
  - left colic artery
  - sigmoid arteries
  - superior rectal artery
- Testicular/ovarian artrey

POSTERIOR

- Median sacral artrey
- 4 Lumbar Arteries

LATERAL

- Inferior phrenic artrey
- Middle suprarenal artrey
- Renal arteries

Common iliac arteries (right and left)

{terminal branches of abdominal aorta}

- External iliac artrey
  - Continue: femoral artrey > popliteal artrey > tibial artrey
  - Inferior epigastric artrey
  - Deep circumflex iliac artrey
- Internal iliac artrey

ANTERIOR

  - obturator artery
  - inferior gluteal artery
  - umbilical artery
  - Uterine artery ♀ / deferential artrey ♂
  - Vaginal artrey ♀
  - inferior vesical artery
  - middle rectal artery
  - internal pudendal artery
    - inferior rectal artrey

POSTERIOR

  - iliolumbar artrey
  - lateral sacral arteries
  - superior gluteal artrey

*Only branches relevant/within the course are mentioned

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