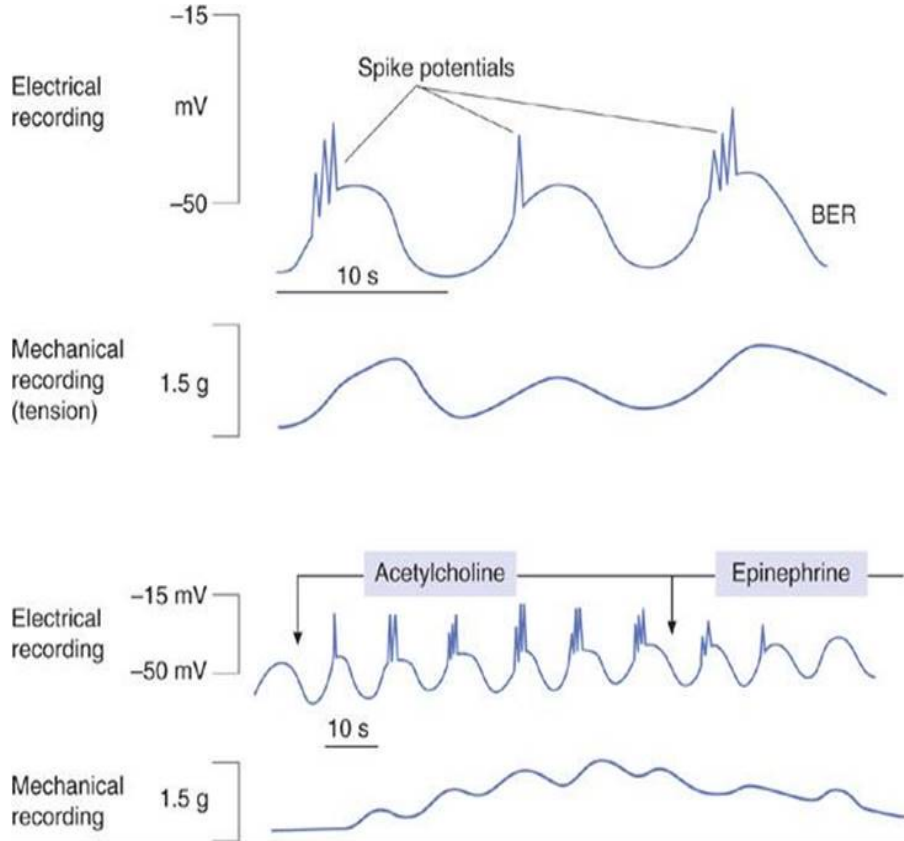


Integrated GI / HPB

GI Motility

ELECTRICAL



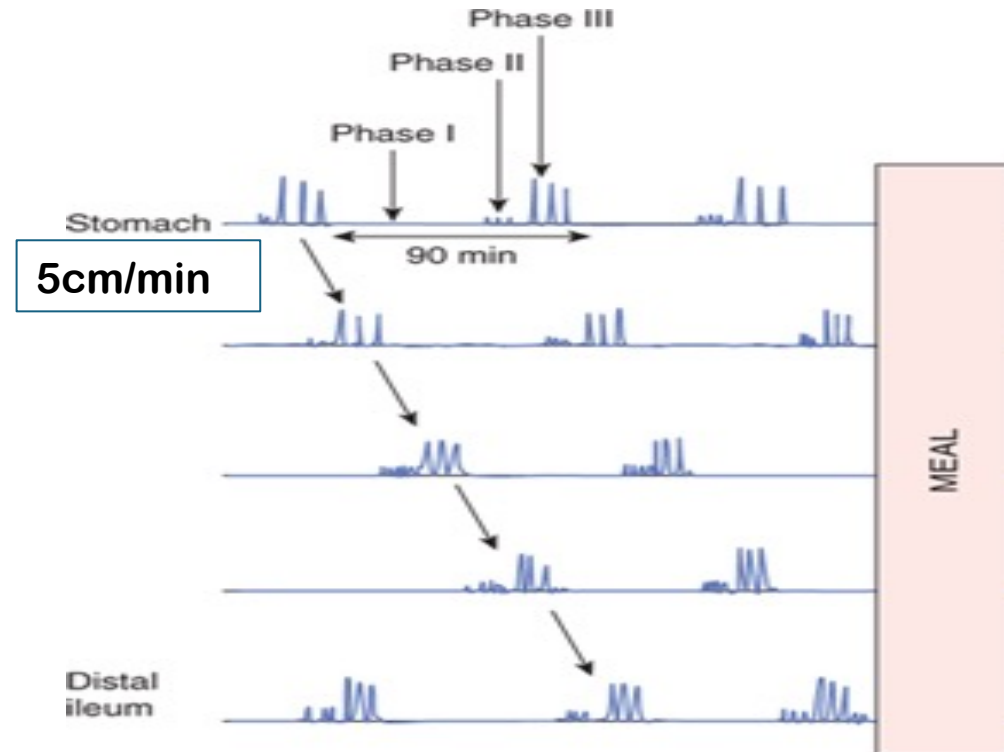
Stomach-4
Duodenum-12
Jejunum-11
Ileum-8
Cecum-2
Sigmoid-6

MECHANICAL

Segmentation

Peristalsis

MMC



GI reflexes

Deglutition Reflex

Centre:

- Elevates soft palate
- Closes glottis
- Relaxes UES

Enterogastric

CCK, secretin, Peptide Y
Fat > protein > Carbs
Acidity
Osmolarity

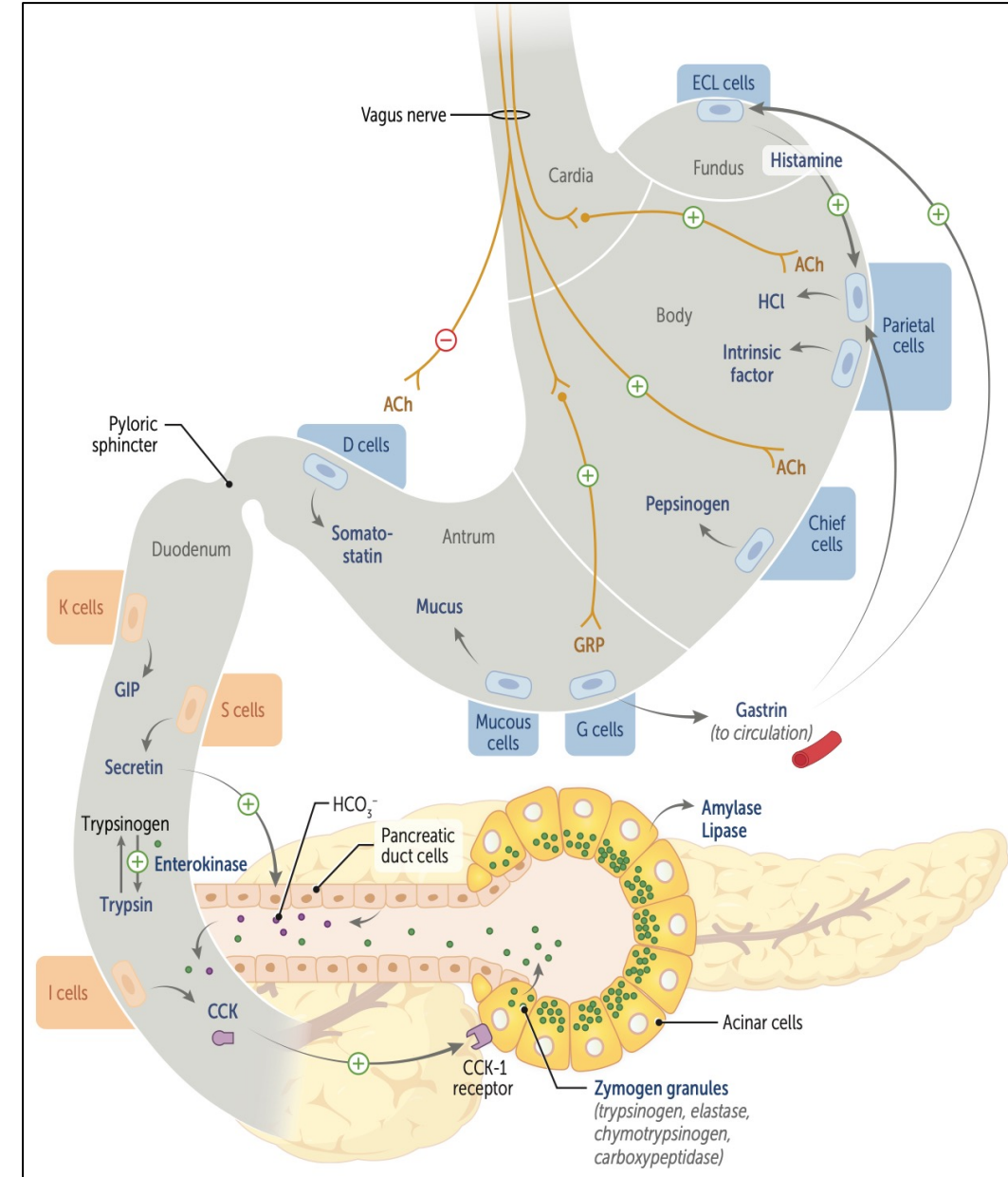
Gastrocolic Gastro-ileal

Defecation

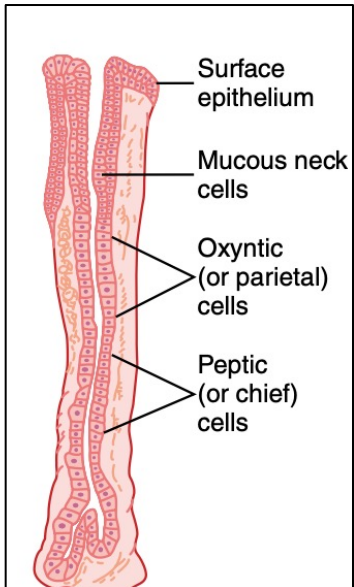
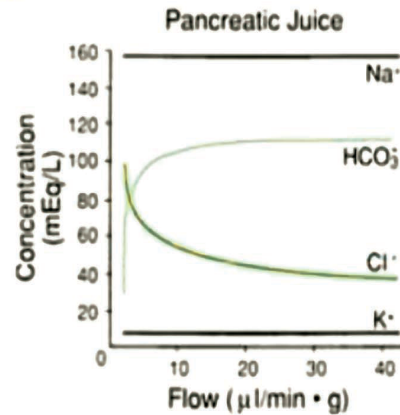
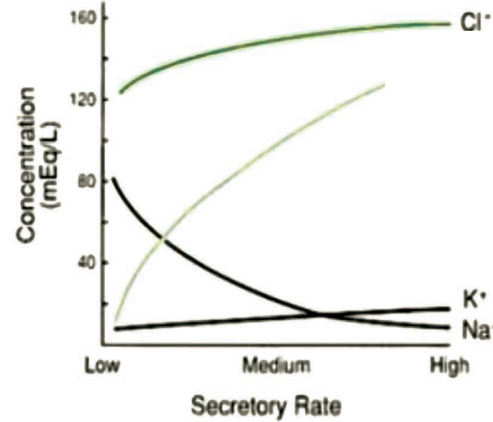
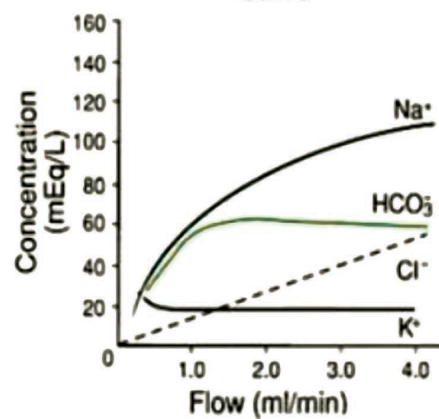
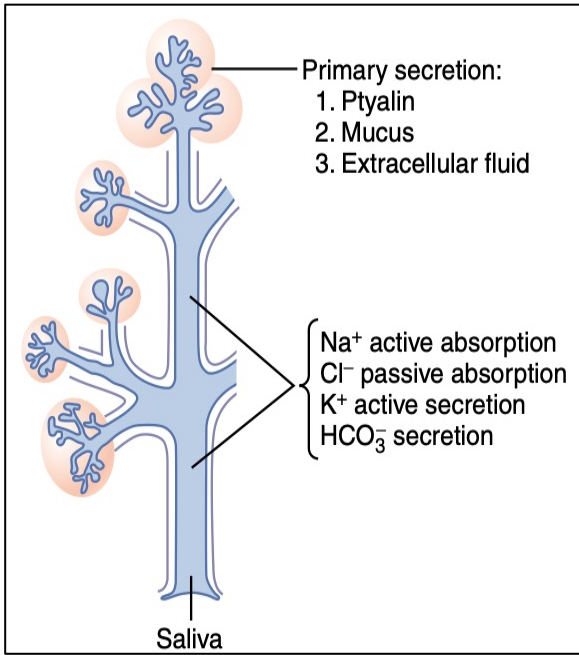
- Rectal distension → relaxation of Internal sphincter → External sphincter relaxation
- First urge to defecate:
- Involuntary defecation:

GI hormones

HORMONE	ACTION
Gastrin G cells (Antrum, duodenum)	↑ gastric acid secretion / Motility Increased in:
Cholecystikinin I cells (antrum, SI)	↑ pancreatic secretion ↑ gallbladder contraction (Cholagogues) VS Choloretics– Bile salts
Secretin S cells (duodenum)	↑ pancreatic HCO ₃ ⁻ secretion ↑ bile secretion
Somatostatin D cells (pancreatic islets) Analogue:	↓ Gastric acid pepsinogen secretion ↓ Pancreatic and SI fluid secretion ↓ Insulin and glucagon release ↓ Gallbladder contraction (s/e:)
GLP=GIP K cells (duodenum, jejunum)	↓ gastric H ⁺ secretion ↑ insulin release INCRETIN EFFECT:
Vasoactive intestinal polypeptide Parasympathetic ganglia	↑ intestinal water and electrolyte secretion VIPoma:



GI secretions

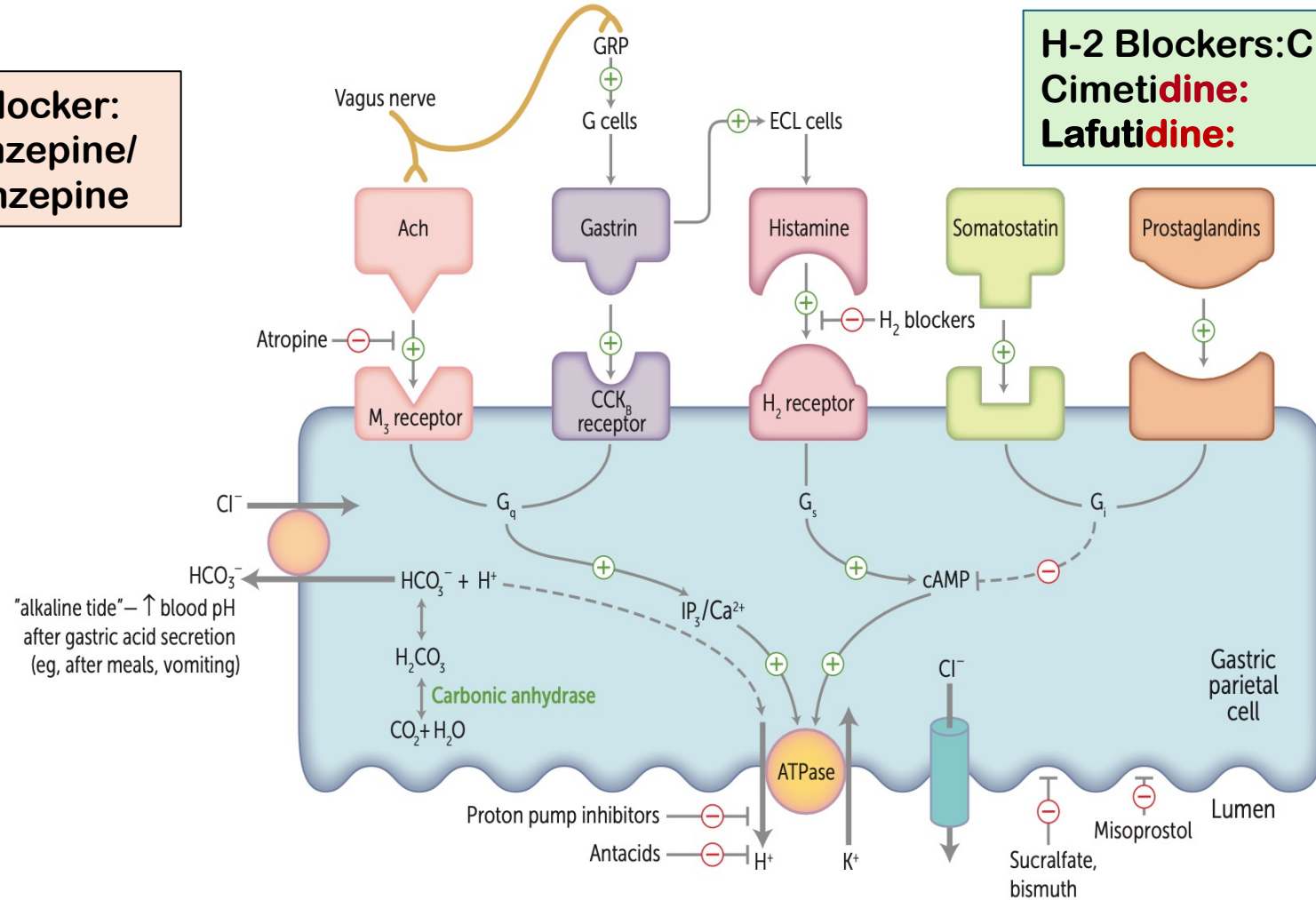


Secretion	Volume (ml)	pH
Saliva	1000	6.0–7.0
Gastric	1500	1.0–3.5
Pancreatic	1000	8.0–8.3
Bile	1000	7.8
Small intestine	1800	7.5–8.0
Brunner's gland	200	8.0–8.9
Large intestinal	200	7.5–8.0
Total	6700	

Max K concentration:
 Max K amount:
 Lowest Na concentration:

Acid-suppressants

M1 blocker:
Pirenzepine/
Telenzepine



H-2 Blockers: Cimetidine, famotidine, nizatidine
Cimetidine:
Lafutidine:

Antacids:
Al OH + Mg OH

CaCO₃



PPI: Omeprazole, lansoprazole, pantoprazole-DOC-Hit and run
S/E: C.difficile, AIN, pneumonia, B12 deficiency, Fracture risk
Omeprazole: CYP2C19-Clopidogrel
Vanoprazan:

Triple drug therapy:
CAP: Clarithromycin + Amoxicillin + PPI
Quadruple:

CONSTIPATION

Bulk forming: **Methylcellulose**

Osmotic: **Lactulose, PEG-DOC IBS-C**

Hepatic encephalopathy

Stimulant: **Senna, Bisacodyl**

Cl channel activator: **Lubiprostone**

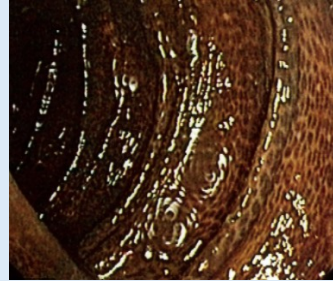
Guanylate cyclase Agonist: CFTR +-**Linacotide, Plecanatide**

5HT-4 agonist: **Prucalopride**

NHE3 inhibitor: **Tenapanor**

Peripheral opioid inhibitor: For post-op ileus

Alvimopan, Naloxegol, Methylnaltrexone



DIARRRHEA

u Agonist: **Loperamide (DOC-IBS-D)**

Diphenoxylate-atropine:

Enkephalinase inhibitor: **Racecodotril**

5HT3 antagonist: **Alosetron**

Bile acid binding resins: **Colesevelam, colestipol, cholestyramine**

Direct spasmolytic:

Rome IV Criteria

Recurrent abdominal pain ≥ 1 day/week in the last 3 months, associated with ≥ 2 of the following:

- Related to defecation
- Associated with change in frequency
- Associated with a change in form of stool

Miscellaneous

ANTI-EMETICS

5 HT3 blocker: Ondansetron (shortest), Palonosetron (longest, most potent)
 DOC-Post-op/ Post-chemo, Post-RT, Pregnancy
 s/e: Headache, QT prolong, Constipation

NK1 / Substance P inhibitor:

CB1 agonist: Dronabinol, Nabilone

PROKINETICS

D2 blockers :

- Metoclopramide:
- Domperidone:

5HT4 +: Mosapride, Prucalopride

CCK antagonist: Dexloxiglumide

Motilin agonist: Erythromycin

Morning sickness:

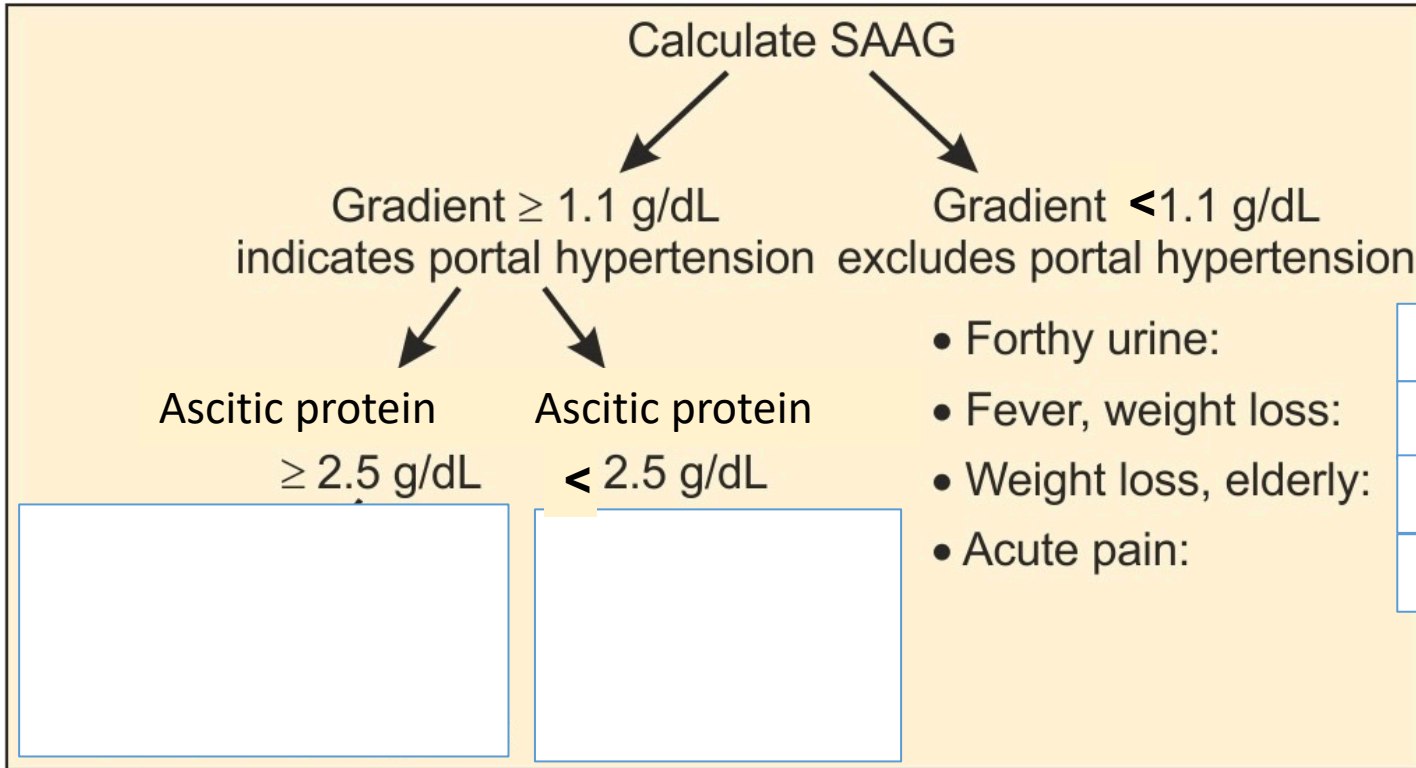
Sea sickness:

Motion sickness:

Mountain sickness:

GASTRITIS	<i>H. pylori</i> -Associated	Autoimmune
Location	Antrum	Body
Acid production	Increased to slightly decreased	Decreased
Gastrin	Normal to markedly increased	Markedly increased
Association	<ul style="list-style-type: none"> • Adenocarcinoma • Lymphoma • Lower SES 	<ul style="list-style-type: none"> • Atrophy • Pernicious anemia • Adenocarcinoma • Carcinoid tumor

Ascites



VOLUME
USG-
SHIFTING DULLNESS-
FLUID THRILL-

MANAGEMENT:

MILD-

MOD-

SEVERE-

Spontaneous bacterial peritonitis:

Chronic diarrhea

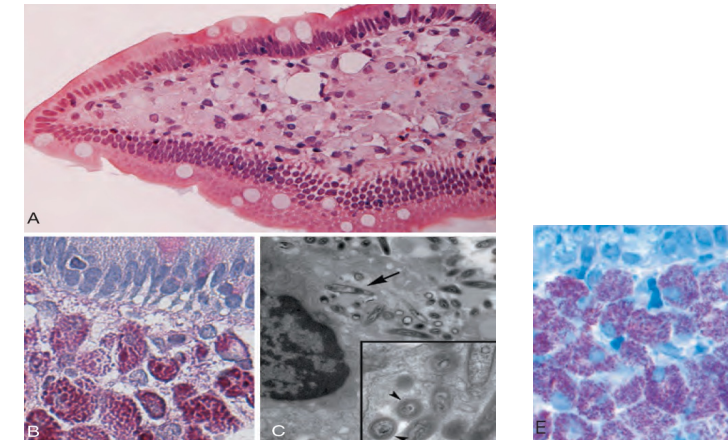
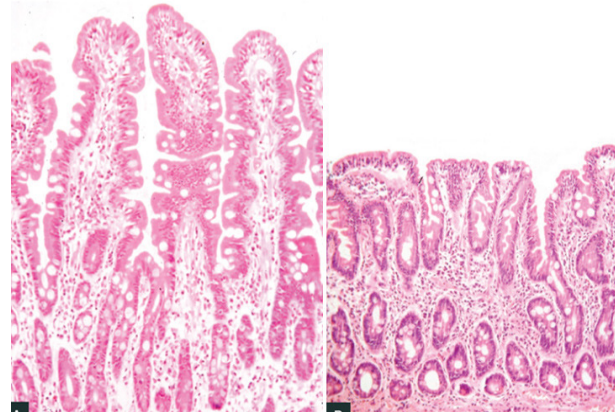
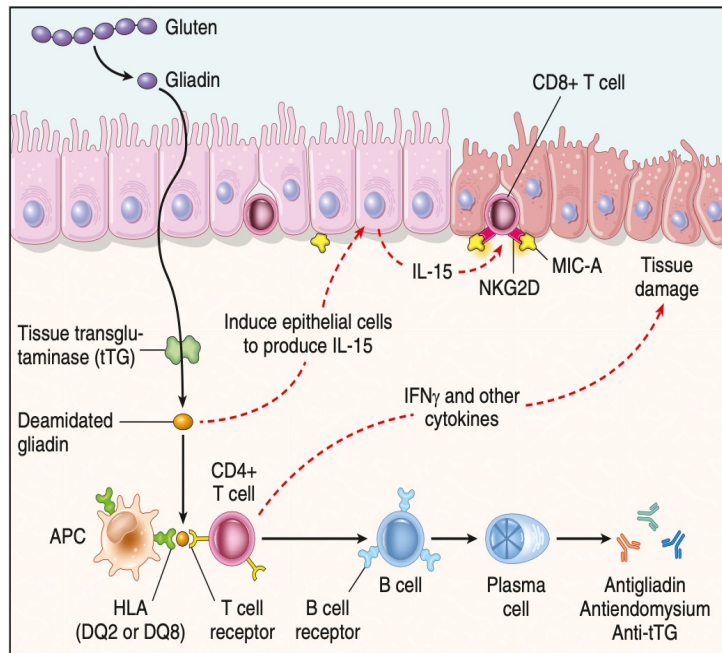
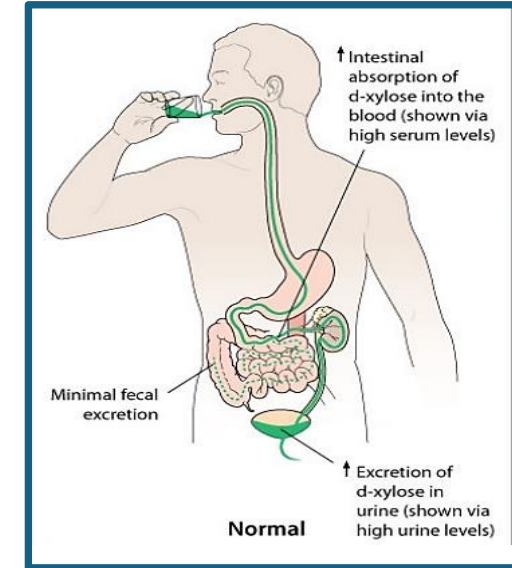
$$\text{Stool osmotic gap} = 290 - 2 \times (\text{stool Na} + \text{stool K})$$

LOW <50:
-ZES
-Carcinoid

HIGH >50

Positive hydrogen breath test :

Stool fat >7 %
D-xylose - /N **D-xylose +/Abn**
Fecal elastase



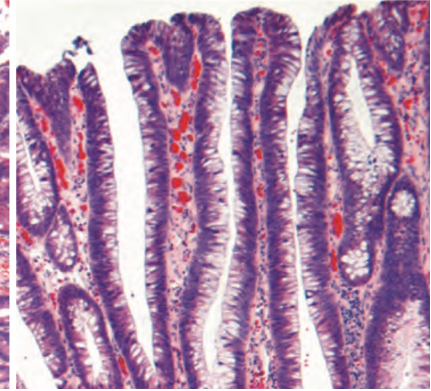
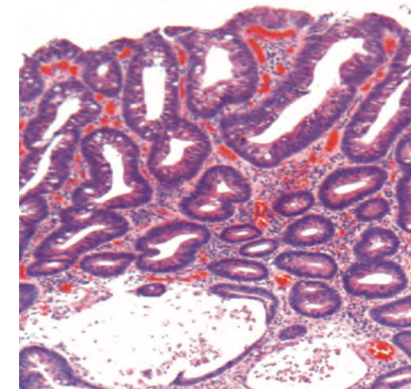
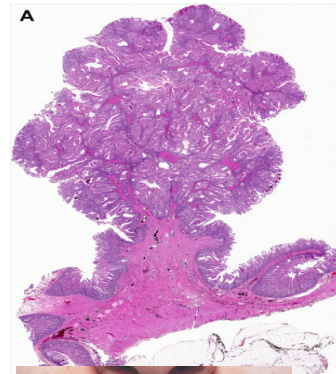
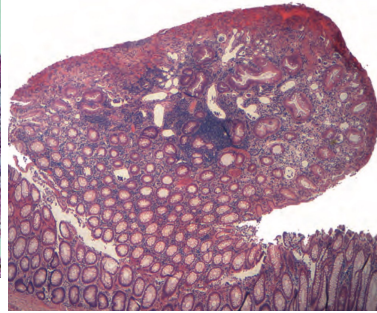
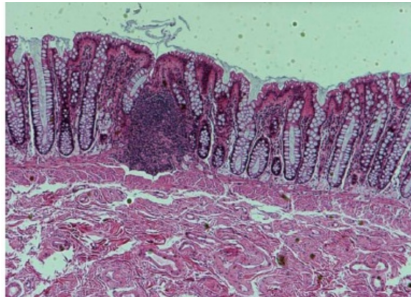
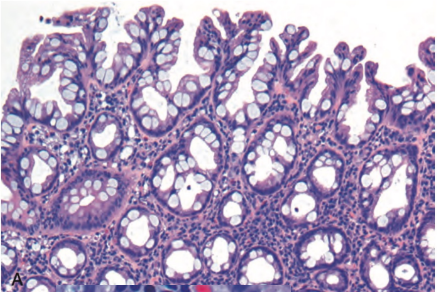
HLA-DQ2/ DQ8
Anti-TTG
Marsh staging
Dermatitis herpetiformis
Rx:

Rx:

Polyps

Non-neoplastic

Neoplastic



Rectal bleeding
Mucus discharge

4yr old

Pulmonary AVM



Cowden syndrome
Cronkhite-Canada syndrome
TSC
Bannyan-Ruvalcaba-Riley syndrome

11yr old with intussusception
STK11/LKB1
Colon/ stomach/ SI/Thyroid/
breast/ lung/gonadal-
Sertoli/Leydig
Max-

Familial colorectal cancers

APC at 5q21

APC
 β -catenin

K-RAS at 12p12

TP53 at 17p13
LOH at 18q21
(SMAD 2 and 4)

Telomerase
Other cancer
genes

MLH1, MSH2
(MSH6, PMS1, PMS2)

TGFBR2, BAX, BRAF,
TCF4, IGF2R, others

AD, >100 polyps, earlier age
100% risk of ca colon
Left colon MC
Gardner:

Turcot:

AR, <100 polyps, later
Duodenal adenomas,
ovarian and bladder
cancers

Revised Amsterdam Criteria II (HNPCC / Lynch)

- At least three relatives with an HNPCC-associated cancer (*colorectal, endometrial, small bowel, ureter, or renal pelvis*)
- One should be a first-degree relative
- At least two successive generations affected
- At least one should be diagnosed before 50 years

MSH2/MLH1

AD, 80% risk of ca colon
Right colon

SURVEILLANCE- Annual colonoscopy

APC-linked

Start at age 10–12 years every 1–2 years

MUTYH-linked

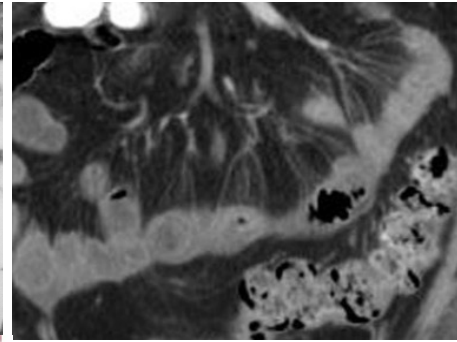
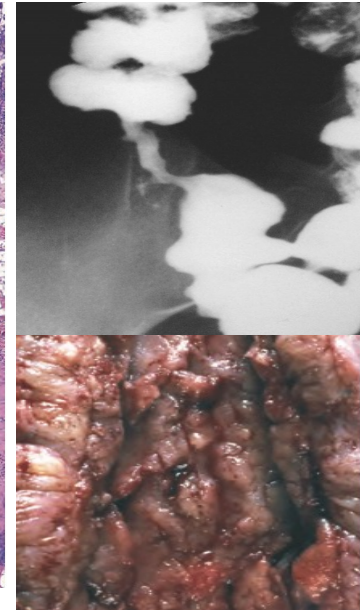
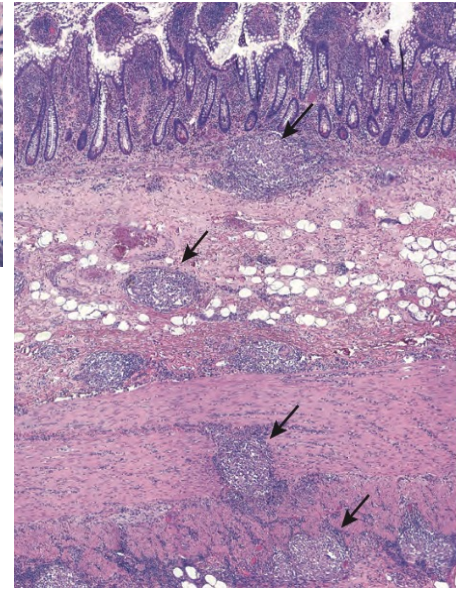
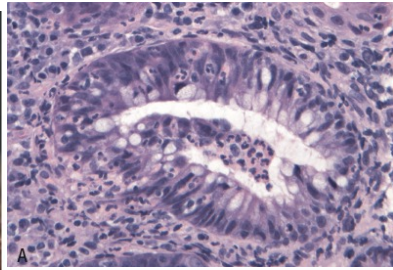
Start at age 20–25 years every 1–2 years

IBD

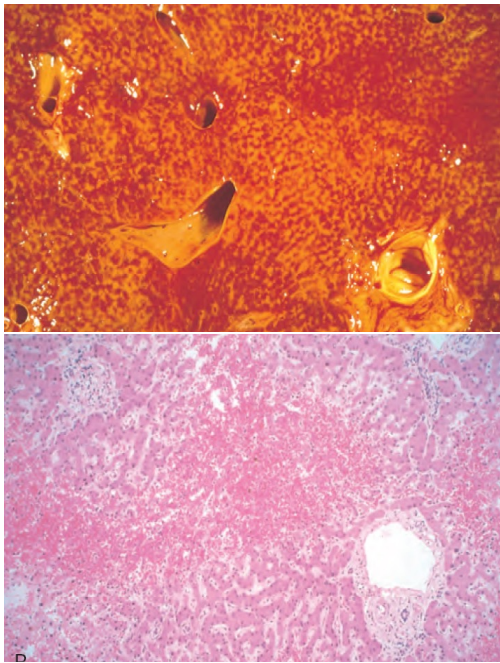
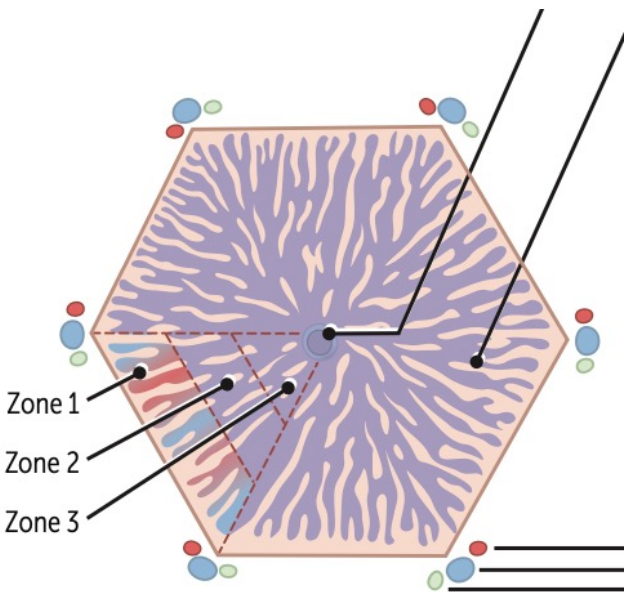
	Ulcerative colitis	Crohn's disease
MC site		
Wall layer		
Stricture, Fistula, Abscess		
Skip lesions		
Antibody		
H/P		
Earliest imaging finding		
Classification		Age at diagnosis (A)/ Location (L)/ Behavior (B)
Extra-intestinal manifestations	Rash (pyoderma gangrenosum, erythema nodosum), eye inflammation (episcleritis, uveitis), oral ulcerations (aphthous stomatitis), Peripheral arthritis, Ank spondylitis	
Management		

Fecal lactoferrin, Fecal calprotectin

Smoking, Childhood appendectomy:



Cirrhosis



A diagram of a human body with various symptoms of cirrhosis labeled by system. The symptoms are grouped into several categories:

- Integumentary**
 - Jaundice
 - Spider angiomas*
 - Palmar erythema*
 - Purpura
 - Petechiae
- Effects of portal hypertension**
 - Esophageal and gastric varices (→ hematemesis/melena)
 - Caput medusae
 - Anorectal varices
 - Ascites
 - Spontaneous bacterial peritonitis
- Reproductive**
 - Testicular atrophy*
 - Gynecomastia*
 - Amenorrhea
- Neurologic**
 - Hepatic encephalopathy
 - Asterixis ("flapping tremor")
- Gastrointestinal**
 - Anorexia
 - Nausea, vomiting
 - Dull abdominal pain
 - Fetor hepaticus
- Hematologic**
 - Thrombocytopenia
 - Anemia
 - Coagulation disorders
 - Splenomegaly
- Renal**
 - Hepatorenal syndrome
- Metabolic**
 - Hyperbilirubinemia
 - Hyponatremia
- Cardiovascular**
 - Cardiomyopathy
 - Peripheral edema

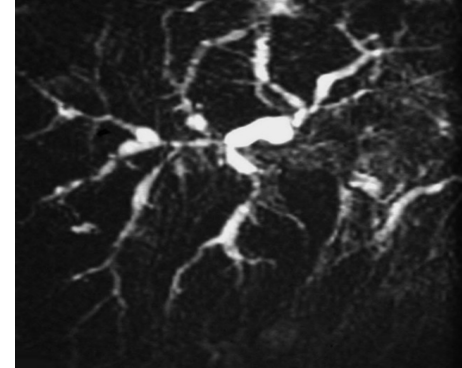
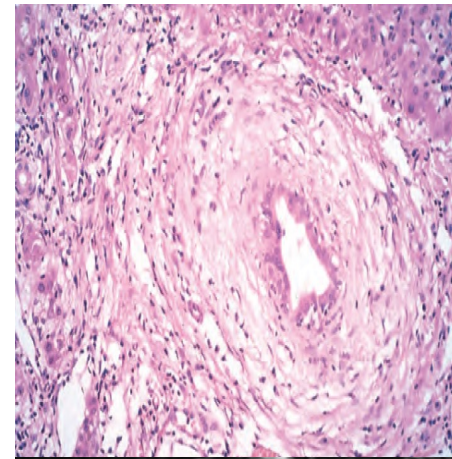
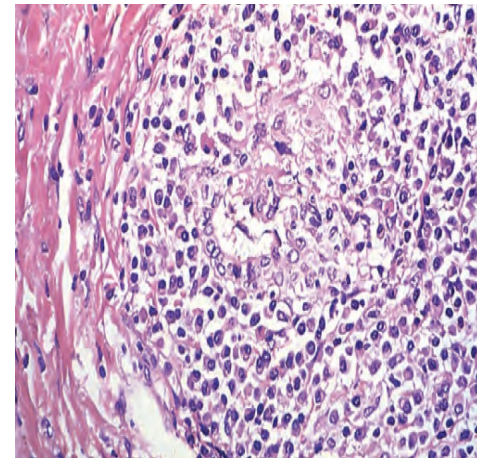
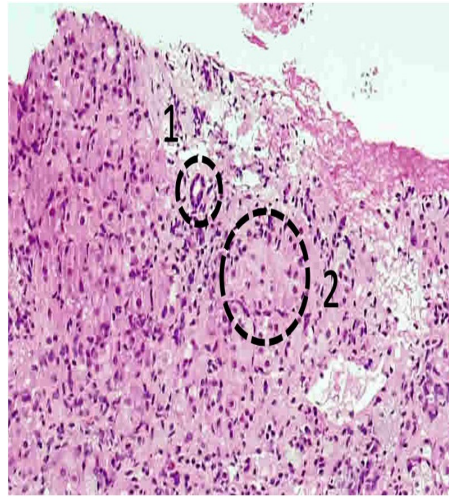
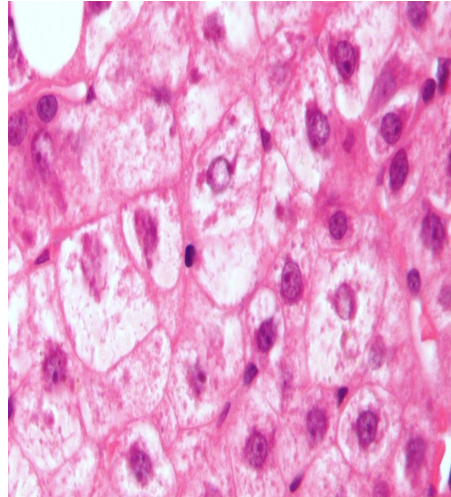
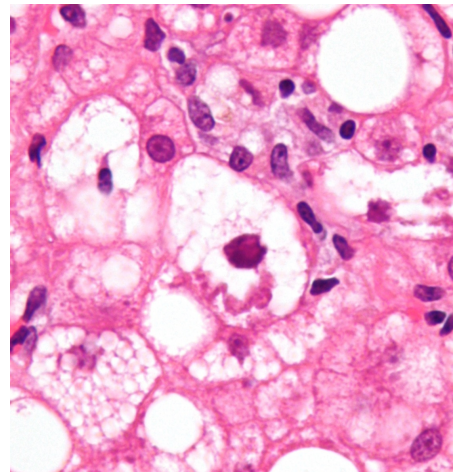
Space of Disse:
ITO Cells/ Stellate cells

HEPATIC ENCEPHALOPATHY
EARLIEST SYMPTOM:
SPECIFIC SIGN:
EEG:
Staging:
Mx:

Platypnea
Orthodeoxia

AKI
FeNa <1%
No s/o shock

Approach to liver diseases



AST > ALT > 2:1, AST < 400
CK 8/18
Intermediate filaments
Lille index
Macrovesicular steatosis

ALT > AST
Councilman bodies
Portal tract expansion
Macrovesicular steatosis

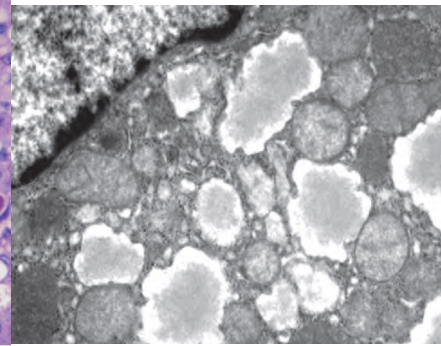
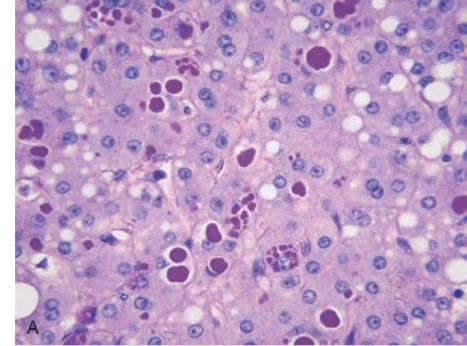
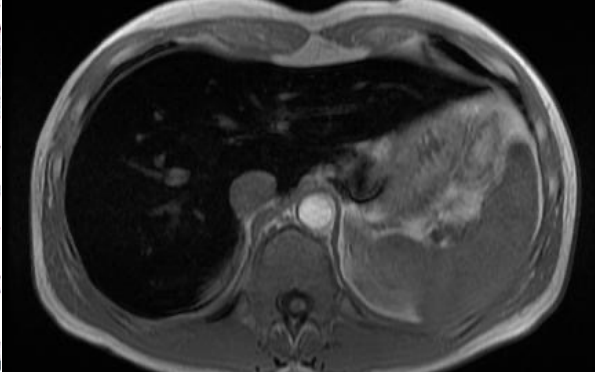
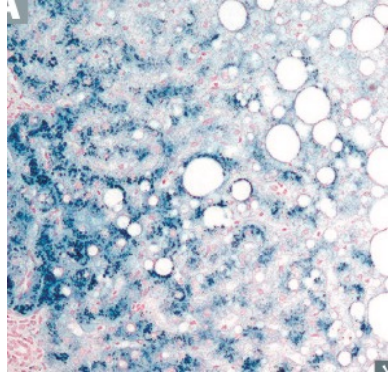
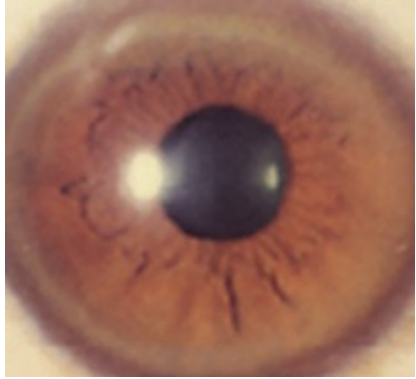
ANA, SMA:
LKM-1, SLA, LC:

Ground glass hepatocytes, Orcein Shikata stain

Maddrey's Discriminant
Function (MDF)
PT/ Bilirubin
>32:

NASH: ONLY APPROVED:
Off-label: Vit E/ Metformin
Liraglutide / Pioglitazone
Saroglitazor
Lanifibranor

Metabolic Liver diseases



ATP 7B-Chr 13
Ceruloplasmin:
Urine copper:
KF rings-
Neuro-
Hepatic-
TOC:
With hepatic
decompensation-

HFE-Chr 6
Hepcidin
Liver, Pancreas, Pituitary, Skin
RCM/ DCM
Hook shaped metacarpals

Chr: 14
M subtype:
Z subtype:

Viral hepatitis

Risk of chronic Hepatitis:

HBV:

HCV:

Hep A/HepE:

MC acute hepatitis:

Management of Hep C

HCV-non-specific: INF-a, Ribavirin

HCV specific:

NS5B Polymerase Inhibitors

•Sofosbuvir/ Deleobuvir

•**NS5A** Replication Complex Inhibitors

•Velpatasvir/ Daclatasvir/ Ledipasvir

•**NS3/4A** Protease Inhibitors

•Telaprevir/ Boceprevir/ Simeprevir

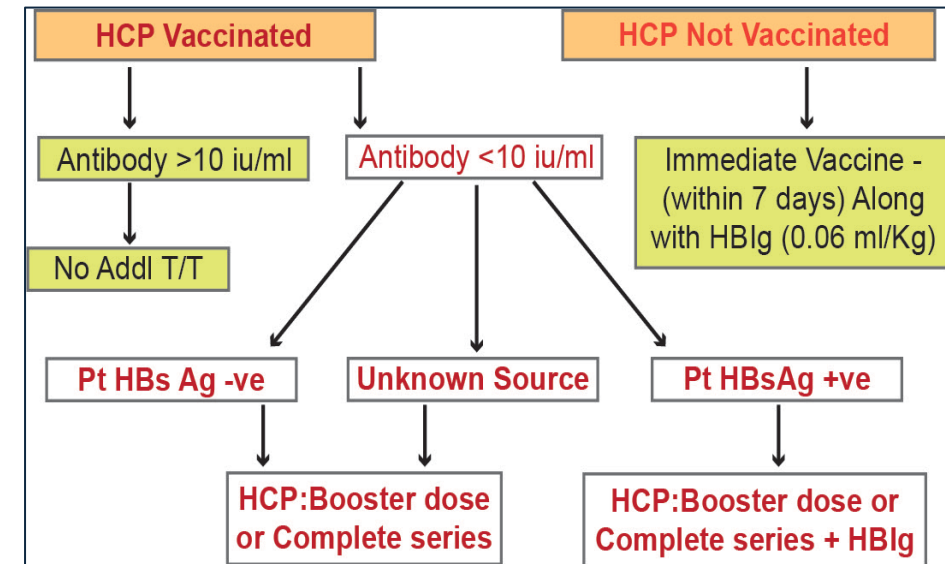
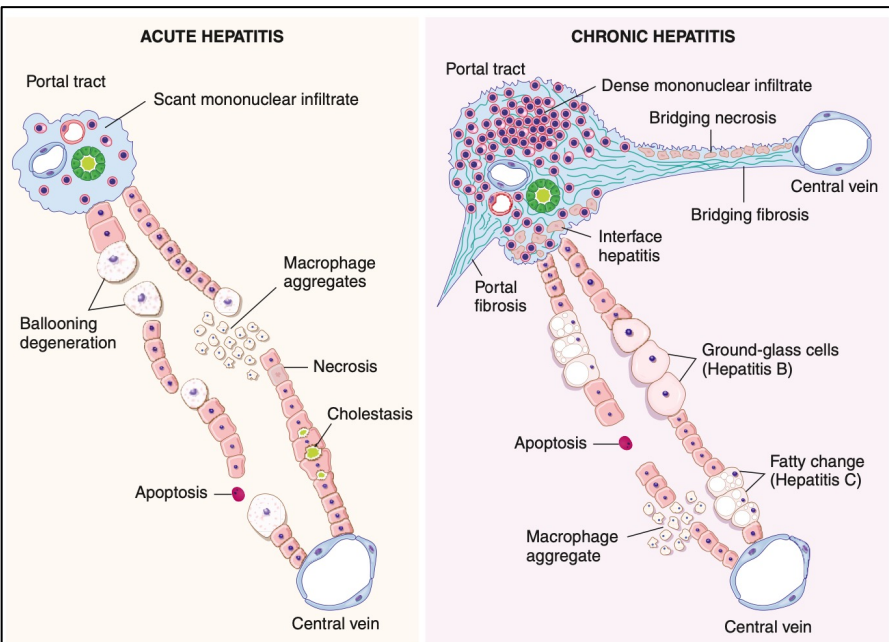
MANAGEMENT of Hep B:

HBV DNA >2000IU/ml :

Tenofovir + Entecavir x 12wks

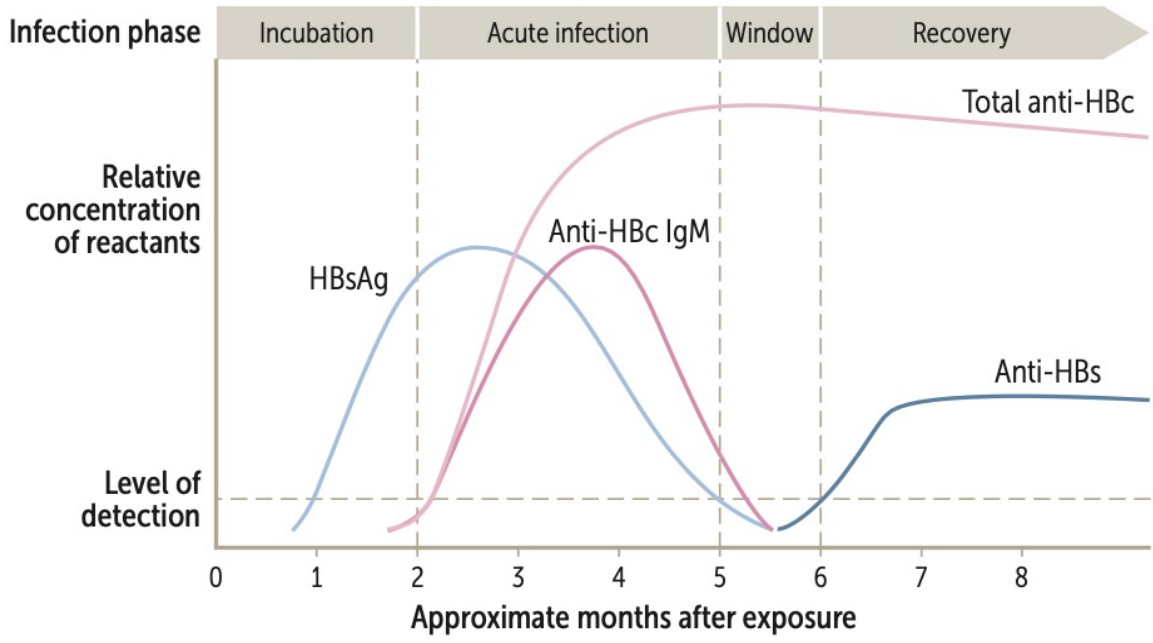
IFN-a

Post-exposure prophylaxis: Hep B



Non-responder : anti-HBs < 10 after 2 full series

HBIG × 2 doses: 4 weeks apart
No further vaccine



HBsAg	Anti-HBs	Anti-HBc	HBeAg	Anti-HBe	Anti-HDV	Anti-HCV	HCV RNA	Anti-HEV	
+	-	IgM	+	-	-	-	-	-	
+	-	IgG	+	-	-	-	-	-	
+	-	IgG	-	+	-	-	-	-	ALT normal HBV DNA <2000
+	-	IgG	-	+	-	-	-	-	ALT raised HBV DNA >2000
+	-	IgM	+	-	+	-	-	-	
+	-	IgG	+	-	+				
-	-	IgM	+	-	-	-	-	-	
-	+	IgG	-	+	-	-	-	-	
-	-	IgG	-	+/-	-	-	-	-	
-	+	-	-	-	-	-	-	-	
-	-	-	-	-	-	+	-	-	
-	-	-	-	-	-	+	+	-	