

## **Physiology week 21 – Gastrointestinal VIVAs**

### **Describe the metabolism of bilirubin:**

- breakdown of haemoglobin leads to bilirubin which is bound to albumin in the circulation.
- In the liver actively transported as it dissociates and free bilirubin enters the hepatic cell where it is conjugated by glucuronyl transferase with 2 molecules of uridine diphosphoglucuronic acid (UDPGA) to form bilirubin diglucuronide and UDP
- The diglucuronide is more water soluble than free bilirubin
- Mostly excreted via bile in bile ducts and excreted via intestines
- Gut bacteria convert most to urobilinogens
- Some bile pigments/urobilinogens/unconj bili reabsorbed in portal circulation – most resecreted – entero-hepatic circulation
- Small amounts urobilinogen in blood excreted in urine – urobilinogen; and faeces - stercobilinogen
- A small amount enters the blood and is measurable as conjugated bilirubin

### **What factors regulate gastric secretion?**

- neural and hormonal OR
- cephalic, gastric and intestinal
- Cephalic: food in mouth – vagus, psychologic states eg anger, hostility – hypersecretion
- Gastric: food in stomach, local receptors eg to amino acid and protein digestions – post ganglionic neurons – parietal cells – acid secretion
- Intestinal: fats, CHO, and acid in duodenum inhibit gastric acid secretion and pepsin secretion as well as motility by neural and hormonal mechanisms eg peptide YY
- Neural: vagal increases gastric secretion in G cells by GRP. Gastrin stimulates gastric acid and pepsin secretion as well as motility.
- Hypoglycaemia via vagus to stimulate acid and pepsin secretion
- Also alcohol and caffeine stimulate gastric secretion

### **What are the principal functions of the liver?**

1. Bile formation (500mls/day) – excretion, elimination, digestion
2. synthesis – protein/coags/binding proteins/albumin
3. inactivation/detox – drugs/toxins/active circ substances
4. nutrient vitamin absorption, metabolism, control (eg glucostat), AAs, lipids, fat sol vits etc
5. immunity – Kupffer/macrophages in sinusoid endothelium

### **Name the principal pancreatic enzymes and the substances upon which they act:**

- trypsin: proteins, polypeptides
- chymotrypsin: protein, polypeptides
- elastase: elastin and some other proteins
- carboxypeptidase A and B: proteins, polypeptides
- Colipase: fat droplets
- Pancreatic lipase: triglycerides
- Bile salt-acid lipase: cholesterol esters
- Pancreatic alpha-amylase: starch
- Ribonucleases: RNA
- Deoxyribonucleases: DNA
- Phospholipase A2: phospholipases

### **Describe the regulation of pancreatic juice secretion:**

- primarily under hormonal control
- secretin acts on the duct to cause production of copious amounts of very alkaline pancreatic juice poor in enzymes
- as flow of pancreatic juice increases it becomes more alkaline because exchange of HCO<sub>3</sub><sup>-</sup> for Cl<sup>-</sup> in the distal duct is inversely proportional to flow
- CCK acts on acinar cells to cause the release of zymogen granules and pancreatic juice rich in enzymes
- Ach also stimulates release of zymogen granules (minor effect ?basis of vagally-mediated pancreatic juice secretion in response to sight/smell of food)

### **Describe the composition of pancreatic juice:**

#### **Describe the regulation of secretion of pancreatic juice:**

Secretin – HCO<sub>3</sub><sup>-</sup>, 1500ml/day; bile secretion

CCK- releases zymogen granules (also vagal Ach)