Adult human pancreas = 80 gm, 99% exocrine produced by pancreatic acini.

Endocrine pancreas located in islets of Langerhans, about 2 million/pancreas:

Cells: (p 631)
1) alpha cells produce glucagon
2) beta cells produce insulin
3) delta cells produce somatostatin (growth hormone inhibiting hormone)
4) F cells produce pancreatic polypeptide: inhibits gall bladder contract, reg absorption

**INSULIN:**
PRODUCED WHEN BLOOD GLUCOSE rises above 100 mg/100 mL. (and arginine and leucine)
Binds to receptors on surface of insulin dependant cells (not brain &kidneys), activates kinases

1) Accelerates glucose uptake in peripheral cells
2) Accelerate glucose utilization (second message activates glycolysis)
3) stimulates glycogen synthesis in skeletal muscles and liver
4) stimulates triglyceride formation and absorption in adipose tissue
5) stimulates amino acid absorption and protein synthesis

Parasympathetic NS stimulates its release, sympathetic inhibits.

**GLUCAGON:** 29 AA long, triggers cAMP in target cells, esp in liver

Produced when blood glucose drops below 70 mg/dL

1) hydrolysis of glycogen in skeletal muscle and liver
2) hydrolysis of triglyceride (fatty acids released into blood)
3) stimulates liver to convert amino acids to glucose (gluconeogenesis)

hypoglycemia (anxious, nervous, trembles, sweats, hyperglycemia)

**DIABETES MELLITUS**
Blood glucose levels so high that kidneys excrete it. (glycosuria, polyuria), but cells do not take up glucose:
cells constantly starving for glucose
two types:
type I: insulin dependent juvenile onset
type II: insulin independent mature onset (responds to lifestyle changes)

**SIDE EFFECTS OF DIABETES:**
vascular changes: (due to capillaries being damaged)
retina capillaries proliferate, hemorrhage diabetic retinopathy
diabetic nephropathy
diabetic peripheral neuropathy
cardiac circulation degenerates, early heart attack
reduced blood flow to peripheral tissues infection, ulceration, gangrene

lens occludes, often cataract