

PANCREATIC ENDOCRINE FUNCTION

29 Feb 1996, 29 Feb 2000, 9Mar09

Martini 5th: p. 605-, 6th: 631-634, 7th: 616-620, 8th: 631-635

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

