

Lecture 23

Saturday, July 17, 2021

04:09

Hormone Actions

- Hormone signaling
 - o Autocrine: VEGF, MGF, immune chemicals (e.g. interleukins), myostatin, etc.
 - o Paracrine: fibroblast growth factor, transforming growth factor, clotting factors, myostatin, etc.
 - o Endocrine: insulin, glucagon, leptin, ghrelin, testosterone, estrogen, GH, IGF-1, myostatin, etc.
- Cell signaling cascades: lipolysis
 - o Lipolysis is regulated by
 - Epinephrine
 - Glucagon
 - Atrial natriuretic peptide
 - *Growth hormone* - amplifies other effects; interacting with other things and doesn't necessarily have its own affect
 - *Cortisol*
 - *Tumor necrosis factor*
 - Insulin
 - LOTS OF STUFF
- IR - insulin receptor
- IRS - insulin receptor substrate
- GLUT4 - glucose transporter 4
- GSV - GLUT4 storage vesicle
- Insulin
 - o AMP does NOT do cellular signaling
 - o Cyclic AMP DOES do cellular signaling
- Hormones and protein metabolism
 - o A muscle cell has a bunch of nuclei
 - o Each nucleus controls a nuclear domain
 - Nuclear domain - a region of the muscle protein
 - o This isn't the extent of anabolic and catabolic pathways
 - o Anabolic includes: GH, thyroid hormones, lipids

(prostaglandins), proteins (interleukins), insulin, mechanical loads, etc.

- Follistatin - glycoprotein (binding protein) that binds to TGF- β proteins (transforming growth factor)
 - o [J Lo has nothing on Belgian Blue Cows]
 - o Myostatin is a myokine (little protein) produced by muscle cells that acts locally
 - o It inhibits Akt (PKB), inhibiting protein synthesis through the mTOR signaling cascade, *and* binds to the activin II receptor, which initiates a cell signaling cascade that prevents myoblasts from differentiating into mature muscle fibers
- IGF-1 - hormone that is similar to insulin in molecular structure (and function)
- Endocrine - produced in liver; autocrine/paracrine - produced by muscle cells
- Androgens - steroid hormones that bind to androgen receptors, e.g. testosterone, dihydrotest, and androstenedione
 - o Synthesized from cholesterol (why? Because it's a steroid!)
 - o Women's serum concentrations don't vary much throughout the day; and the rise during sleep is attenuated in older men
- Testosterone is the primary androgen interacting with skeletal muscle
 - o Tons of effects [Jensen: "who cares" lmao]
- Test levels in young men are diurnal; old men is pretty steady
- Low-fat, high-fiber diet decreased serum and urine androgens in men
 - o Cholesterol (LDL and HDL) decreased
 - o BUT test levels go down since test is synthesized from cholesterol
- Growth hormone effected by tons of factors
 - o Sleep, food and exercise (depends on nature of exercise)
 - o Women may have higher baseline levels than men, but peaks aren't as high as men
- Long intense exercise is big stimulator for growth hormone
- GH release is initiated by hypothalamus
 - o GH-releasing hormone stimulates the ant. Pituitary to release GH
- GH functions: make you Richard Kiel
 - o "and you can count on MF waiting for you in the parking lot"

~ and you can see them in the waiting for you in the parking lot