

mTOR Part 1 of 7

What is hypertrophy?

- >Muscle metabolism: Constantly growing and changing in size
- >Protein turnover (70% in skeletal muscle) Constantly anabolic and catabolic process
- >Hypertrophy: synthesis outpaces degradation

Review: Actin, Myosin, Titin, Nebulan, Tropomyosin, Troponin (Cross-Bridge)

What causes hypertrophy?

- >stress generates adaptation
- >Specificity of adaptation
- >Cell signaling cascade

mTOR (mostly complex 1)

mTOR is a kinase, a major hub that regulates growth states
(two complexes)

ie; Growth Hormone: JAK STACK

ie; Insulin: PKB

ie; Epi: PKA, phosphorylase kinase, phosphorylase a, g1 phosphate
(or) hormones-sensitive lipase, MAG, Glycerol & fatty acid

Reminder: AMP does not activate PKA

Insulin binds to receptor

PI3K activated. PKB gets activated

PKB phosphorylates PDE

PDE converts cAMP to AMP, thus PKA doesn't get activated

Thus, HSL and perilipin doesn't get phosphorylated

Thus, no lipolysis

Insulin>PI3K (PIP2 to PIP3)>PIP3>PKB>PDE3B (inhibits lipolysis) and mTOR

Insulin signaling:

AKT(PKB)>Tuberan (turn off RHEB)>mTOR

P70S6K turns on protein synthesis (after mTOR)

PKB:

- >Proliferation before growth
- >Man of many hats (proliferation, growth, angiogenesis, glucose uptake, survival)
- >Inhibition of FOXO helps with hypertrophy

Integrins (mechanoreceptors)

Wnt increases mTORC1 by inhibiting TSC1/2. Which inhibits GSK3 (that promotes TSC1/2)

mTOR complex 1 is a bunch of proteins!

>MLST8, mTOR, PRAS40, Raptor, Deptor

>necessary for S6K (necessary for protein synthesis)

>4EBP1 (inhibiting)

mTOR complex 2

>Rictor (insensitive)