

mTOR Part 3 of 7

What are the things that turn on mTOR (and induce hypertrophy)?

- >Immune/chemicals

  - arachidonic acid is released during exercise, which is a substrate of COX.

Prostaglandins are synthesized and signal MEK-ERK (ie; MAPK) pathway. MEK-ERK and mTOR cross-talk at TSC1/2 and Raptor; hypertrophy

Interleukin-15; released during tissue damage that promotes protein synthesis and inhibit protein degradation. (Pathway: PI3K-mTOR)

- Myostatin; inhibition of PKB

Wnt signaling increase mTORC1 by inactivating TSC1/2. Wnt pathway inhibits GSK3, a kinase that promotes TSC1/2

- >Mechanical tension

  - Relay messages based off mechanical loads

- >Titin and integrins/cadherins

  - >Titin stabilizes myosin, provides elasticity of sarcomere, mechanotransduction

    - >Integrins and cadherins (cell to cell) are transmembrane proteins

- >Inter, intra cell

  - Eccentric loading increases mTOR

    - >PI3K, MAPK, DGK pathway

- >Endocrine

- >Nutrition,

What happens if you load your muscle in the presence of rapamycin?

- You abolish the hypertrophic response.

- >Wortmannin (PI3K inhibitor)

Use wortmannin to inhibit PI3K and you do not see inhibition of mTOR- induced hypertrophy from mechanical stimuli

Some of the signal transduction pathways may be mediated by the chemicals released during metabolic stress and tissue damage.

- ie; ROS