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Muscle Physiology

mTOR Part 6 of 7

mTOR is turned on by:
>Need
>Nutrition
>Assumption of nutrition

AMPK (Gray character) turns of atrophy by:
—Turns off mTOR and turns on protein degration!
>FOXO>Lysosomal system/Ubiquitin Proteasome System>Protein Degration
>UIK1>Lysosomal system>Protein Degration
—Turn this off:
>TSC1/2>Rheb>mTOR>P70S6K>rpS6>Translation
>Raptor>p7-S6k/4E-BP1

AMPK balances Renin-Angio-Aldosterone: increases blood pressure and blood volume (fluid retention)

AMPK and insulin both regulate glucose intake (but differently)
>ATP goes through hydrolysis, binds to gamma unit on AMPK (stops glycogen synthase), which activates GLUT4/LKB1
>Unlike insulin, AMPK needs exercise

Eccentric Loading
>More disruption to sarcolemma (Arachidonic acid), increased PLA2, COX activity, meaning more prostaglandins and MAPK signaling
>Increased PKB activation
>Triggering ILGF (Mechano-growth factor)
>Reduces myostatin (inhibits PKB)
>Increased Integrin signaling
-Slow eccentric stress may generate more MGF than fast eccentric stress
-Size principle (high load)
-although: low load, blood flow restriction, GH and MAPK

Aerobic + Anaerobic
>Aerobic:
ATP> ATPase>ADP>Adenylale Kinase> AMP (binds to gamme on AMPK and LKB1 binds to alpha unit> AMPK (inhibits raptor) (activates TSC2)> FOXO/UIK1>Lysosomal system> Protein degration
—Promotes mitochondria biogenesis (not mTOR)
>Anaerobic:
mTOR and p70s6k activation… Hypertrophy (inhibits TSC1/2)
>Concurrent training:
-Power (RFD) is generated from strength training only
Specificity of Adaptation
>Applying uniaxial loads activates mTOR signaling different than multi axial loads
>Alfredson protocol (requires mechanical loading)
Nutrition:
>Carbs and AMPK
-Keto; AMPK inhibits mTOR
-Glycogen loading inhibits AMPK

>Protein
- Leucine, lysine and arginine (90% activation mTOR)