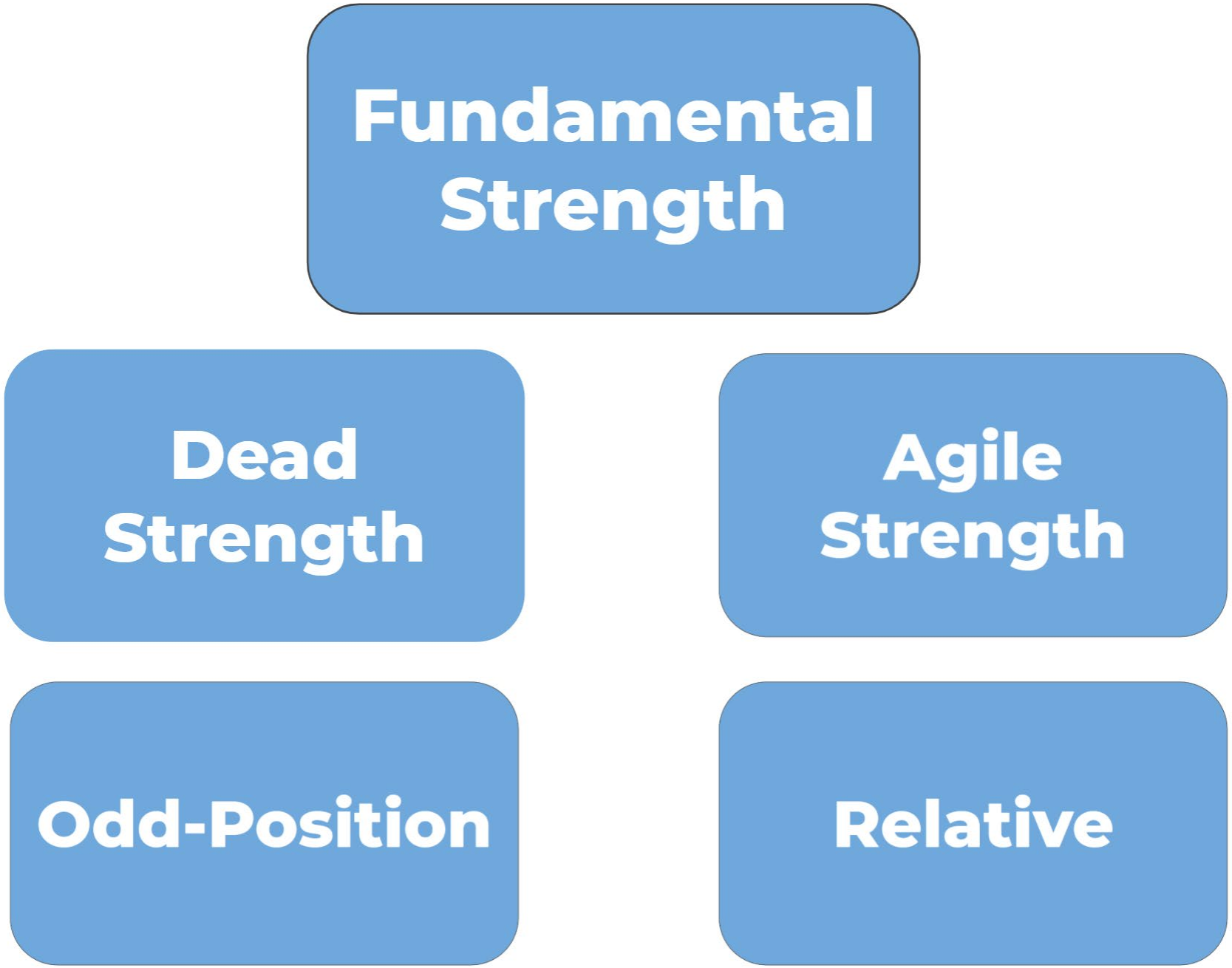
Week 7 Strength Programming

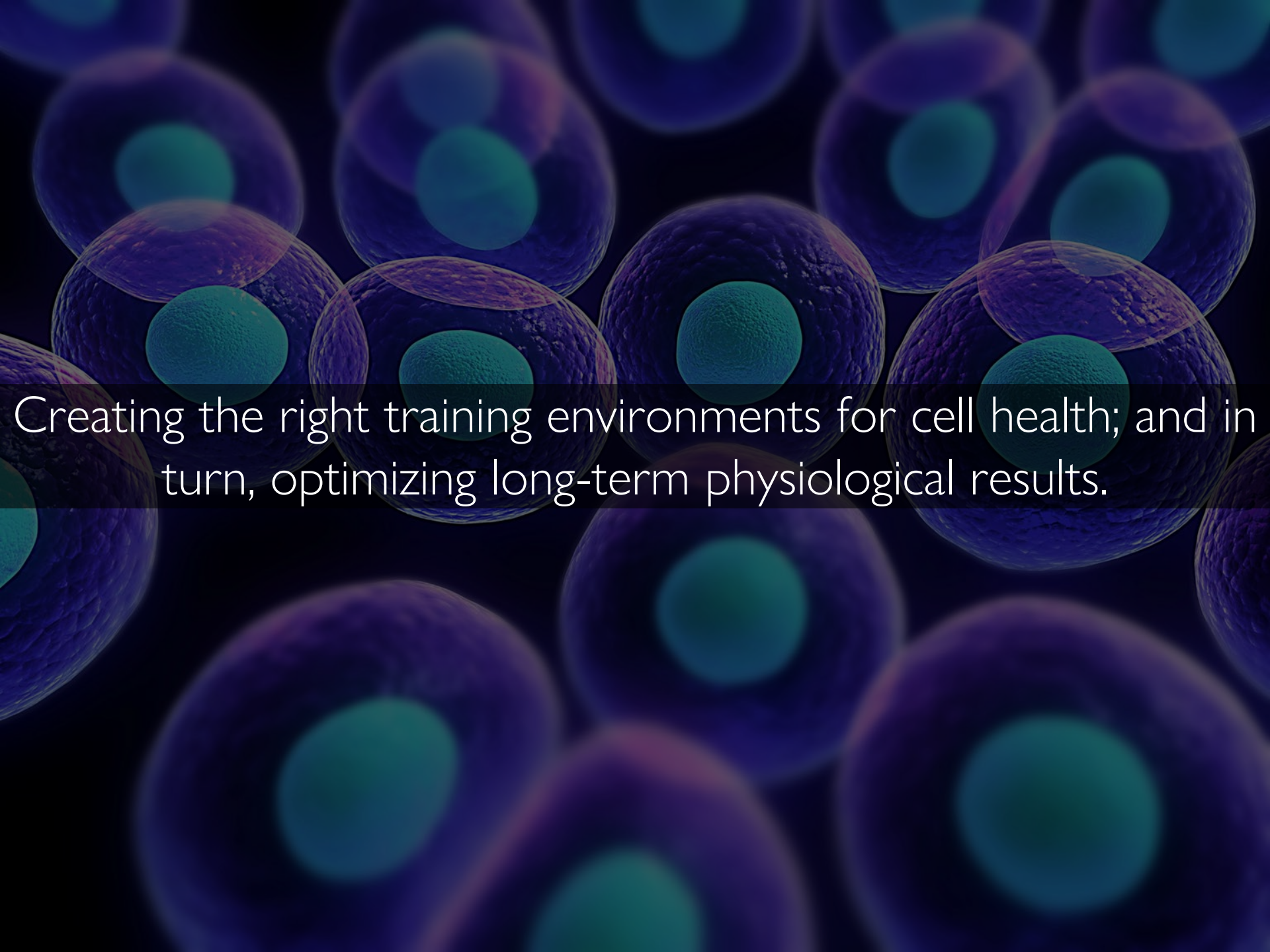
Muscular Strength

Muscular strength training focuses primarily on developing muscle force mainly in a single plane of motion through high loads.

Movement Strength

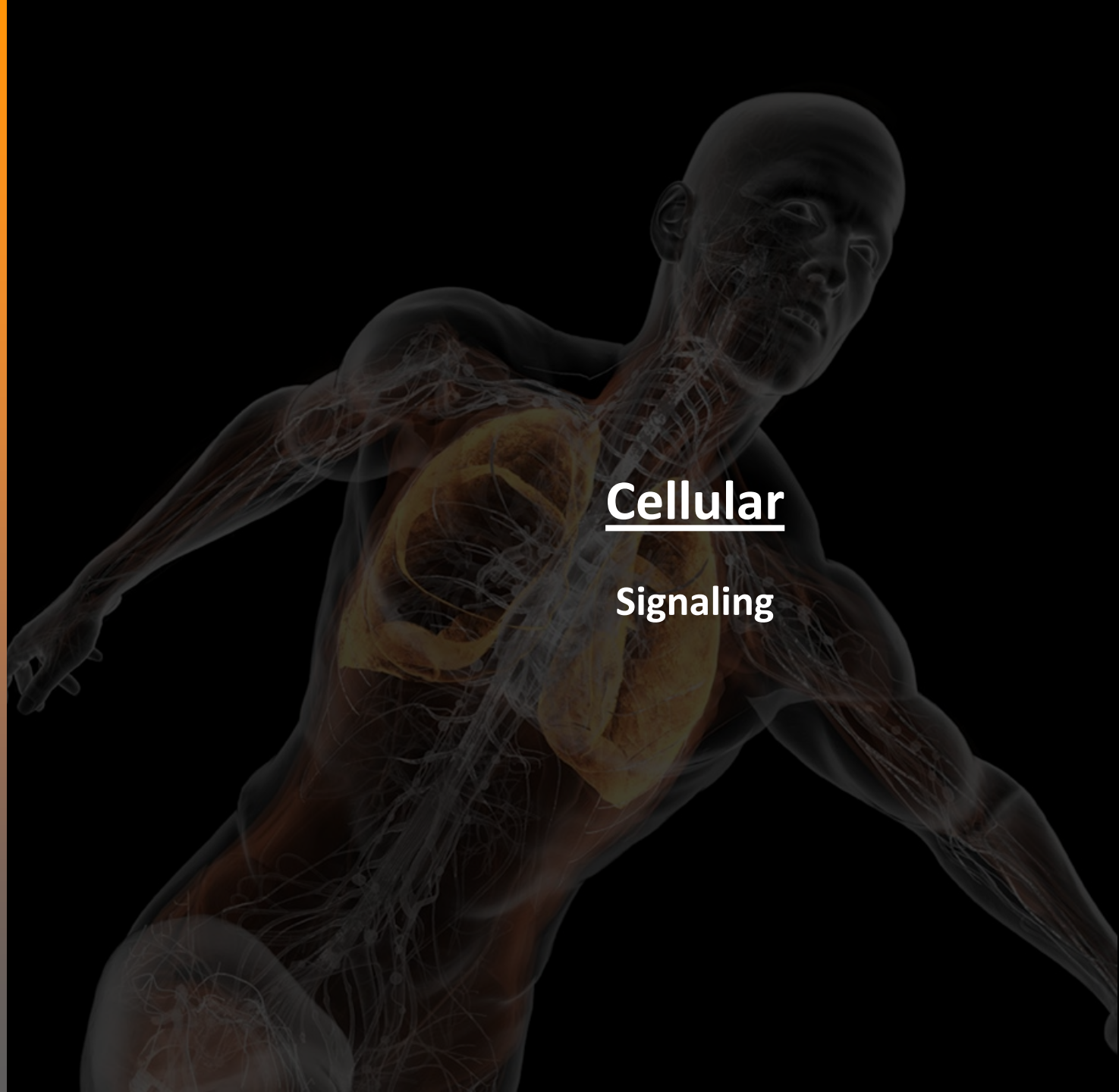
Movement strength training applies sub-maximal load and variable loading positions during multi-directional movement.


Fundamental Strength
Dead Strength
Agile Strength
Odd-Position
Relative


Creating the right training environments for cell health; and in turn, optimizing long-term physiological results.

1

The Context



Cell Signaling

Role

- Governs cellular activities
- Coordinates cell actions
- Allows for development, tissue repair, optimal immunity and homeostasis

Cell Signaling

Classification

- Mechanical Signals

- Biochemical Signals

Cell Signaling

Classification

- Mechanical Signals → Mechanotransduction
- Biochemical Signals

Cell Signaling

Classification

- Mechanical Signals
- Biochemical Signals

Intracrine (signals affect target cell)

Autocrine (signals affect target cell, mediated by receptors eg. immune cells)

Juxtacrine (signals affect adjacent cells)

Paracrine (signal affect cells in vicinity eg. neurotransmitters)

Endocrine (signal affects distant cells systemically eg. hormones)

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Molecules used for Signaling

- Hormones
- Neurotransmitters
- Cytokines

Cell Signaling

Molecules used for Signaling

- Hormones → Major signaling molecule for the endocrine system
  e.g. IGF-1, HGH, angiotensin
- Neurotransmitters → Signaling molecules of the nervous system
  e.g. catecholamines
- Cytokines → Signaling molecules of the immune system
  e.g. growth factors, immune responses

2

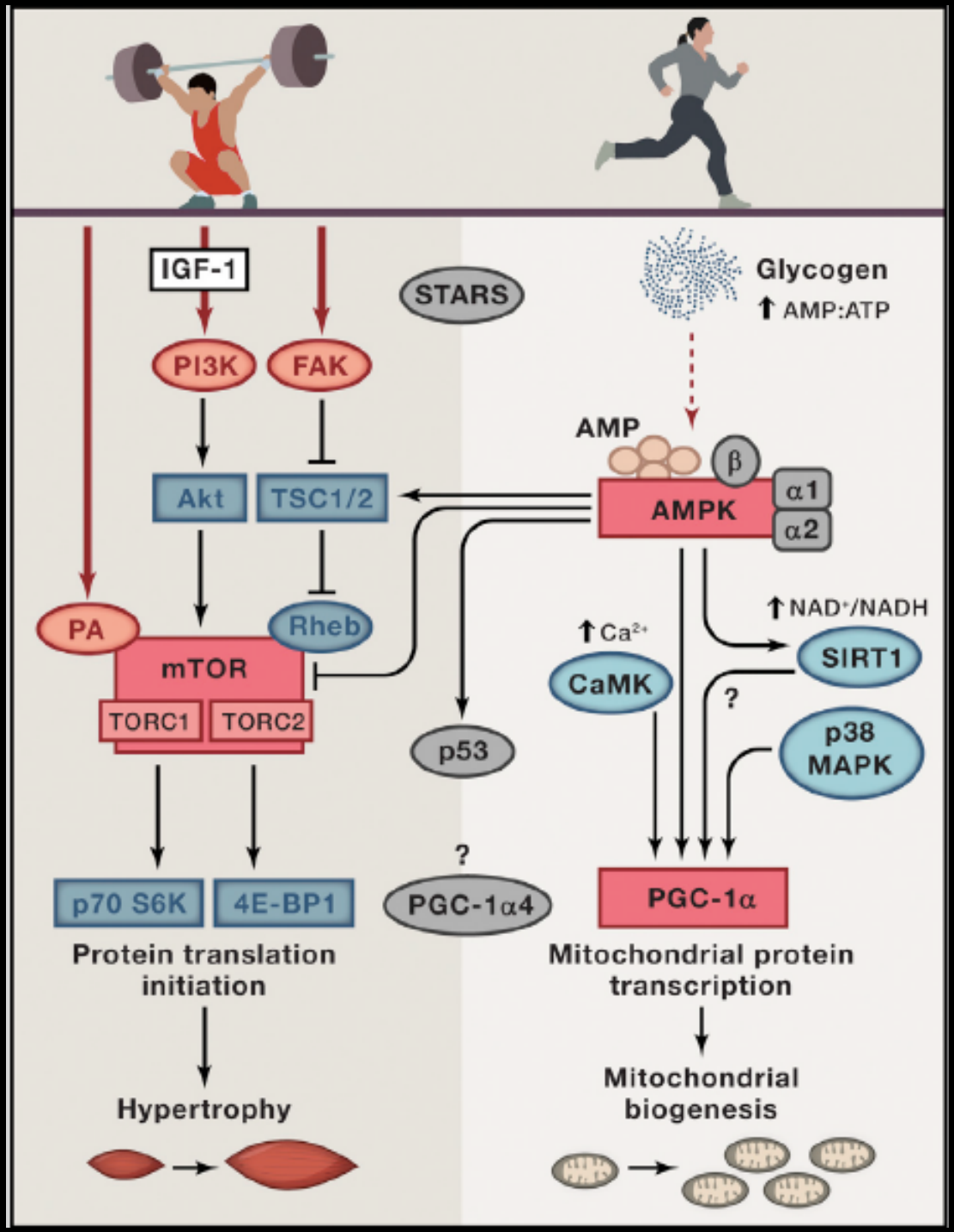
The
mplication

Cellular Signaling

mTOR v. AMPK


SERVICES


ROGUE
CrossFit
JUDGE


IGF-1
PI3K
FAK
STARS
Glycogen
↑ AMP:ATP
AMP
β
α1
α2
AMPK
Akt
TSC1/2
PA
Rheb
mTOR
TORC1
TORC2
↑ NAD⁺/NADH
↑ Ca²⁺
SIRT1
CaMK
?
p38 MAPK
p53
?
PGC-1α4
PGC-1α
p70 S6K
4E-BP1
Protein translation initiation
Mitochondrial protein transcription
Hypertrophy
Mitochondrial biogenesis

mTOR Pathway

A pathway that regulates cell growth, cell proliferation, cell motility, protein synthesis, autophagy,

This pathway is a major regulator of growth, that is to say cell size control, and does it at all different levels (cell, organ, body size)

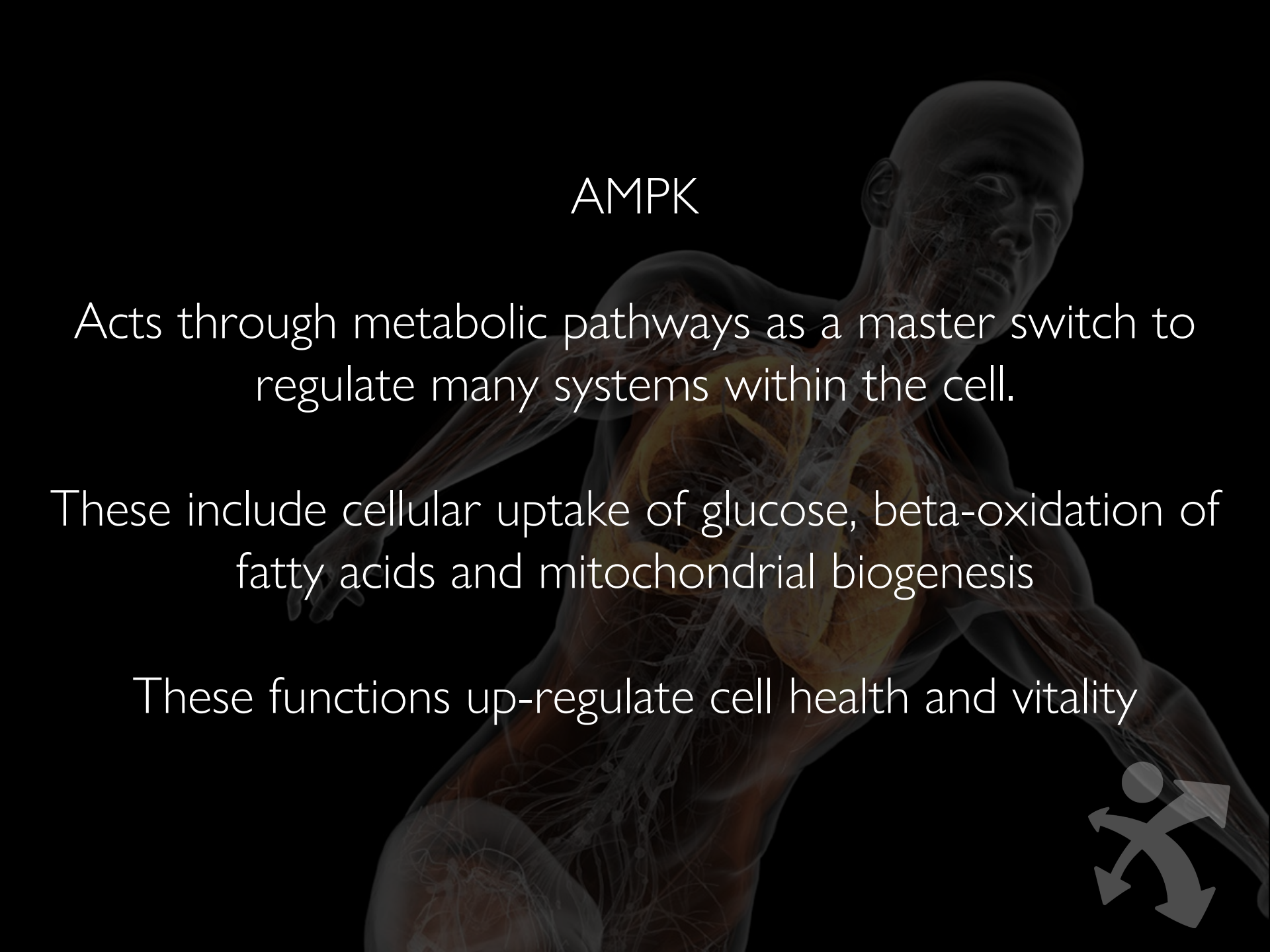
mTOR Pathway

2 known pathways (mTORC1 and mTORC2)

Responds to stress (mechanotransduction), nutrients (glucose, amino acids - fed v. fasted states), growth factor (IGF-1, insulin)

Major regulator of anabolic and catabolic processes

Decreased mTOR activity is linked with increased lifespan

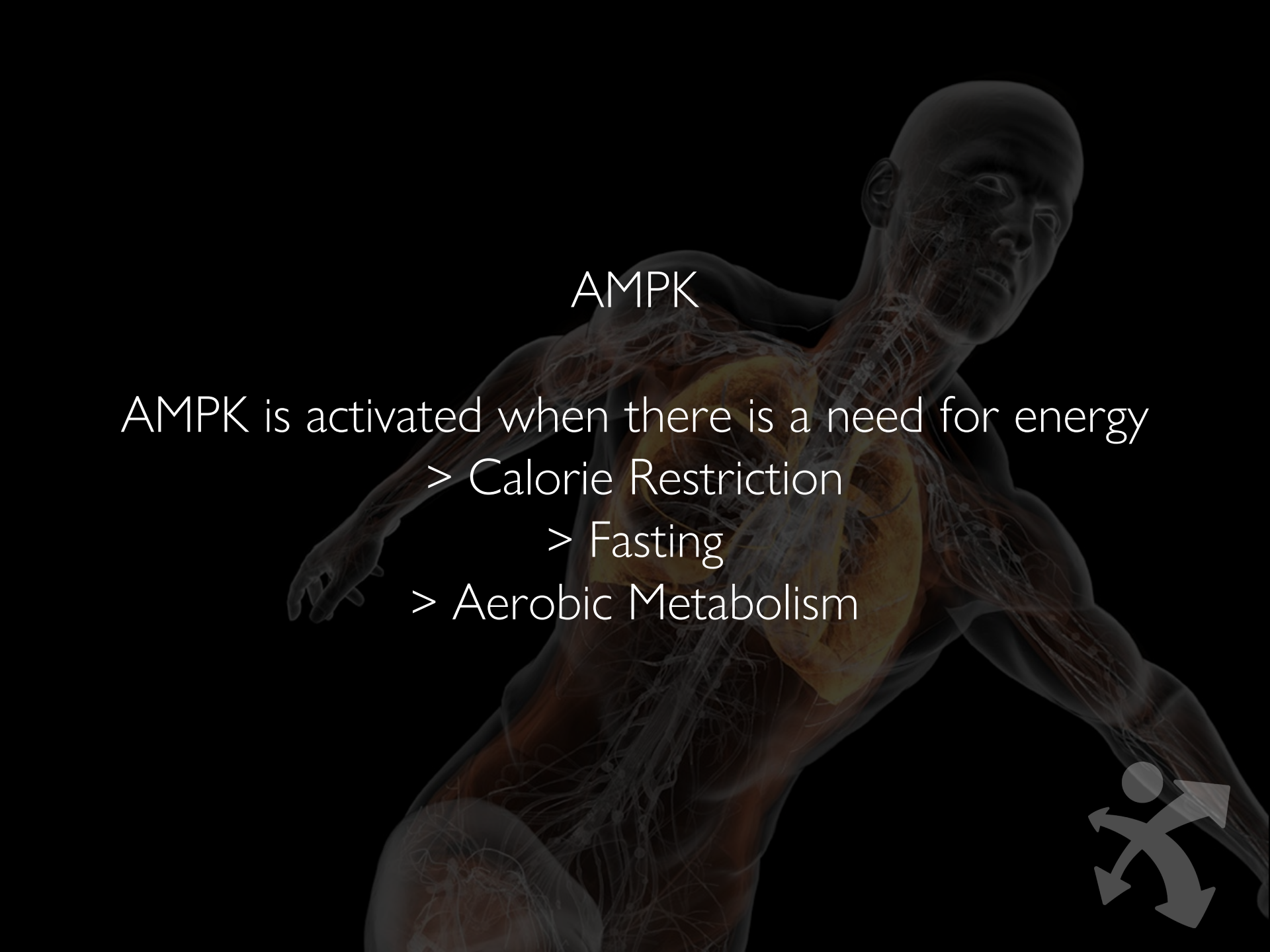


AMPK

Acts through metabolic pathways as a master switch to regulate many systems within the cell.

These include cellular uptake of glucose, beta-oxidation of fatty acids and mitochondrial biogenesis

These functions up-regulate cell health and vitality



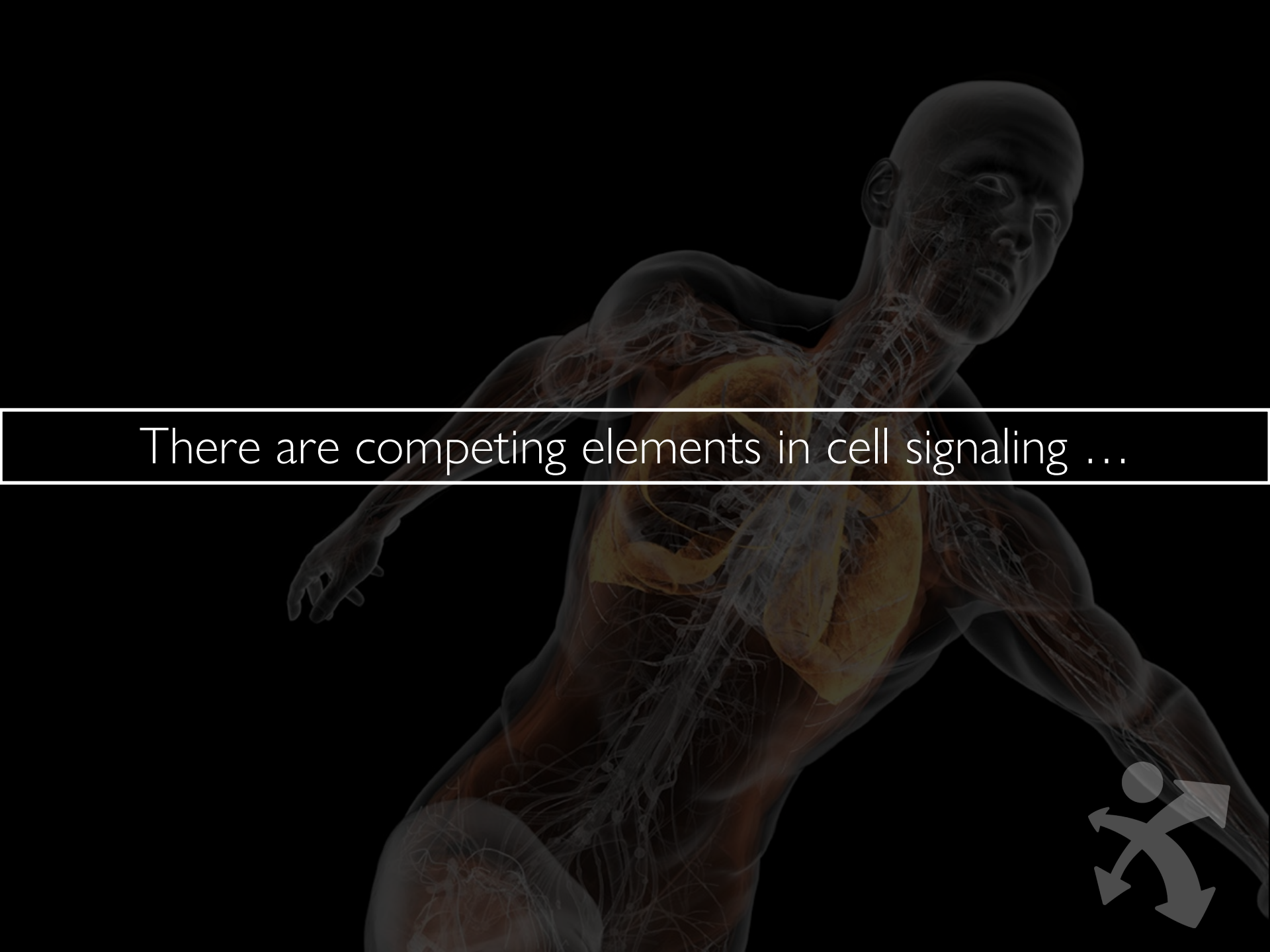
AMPK

AMPK is activated when there is a need for energy

> Calorie Restriction

> Fasting

> Aerobic Metabolism



There are competing elements in cell signaling …

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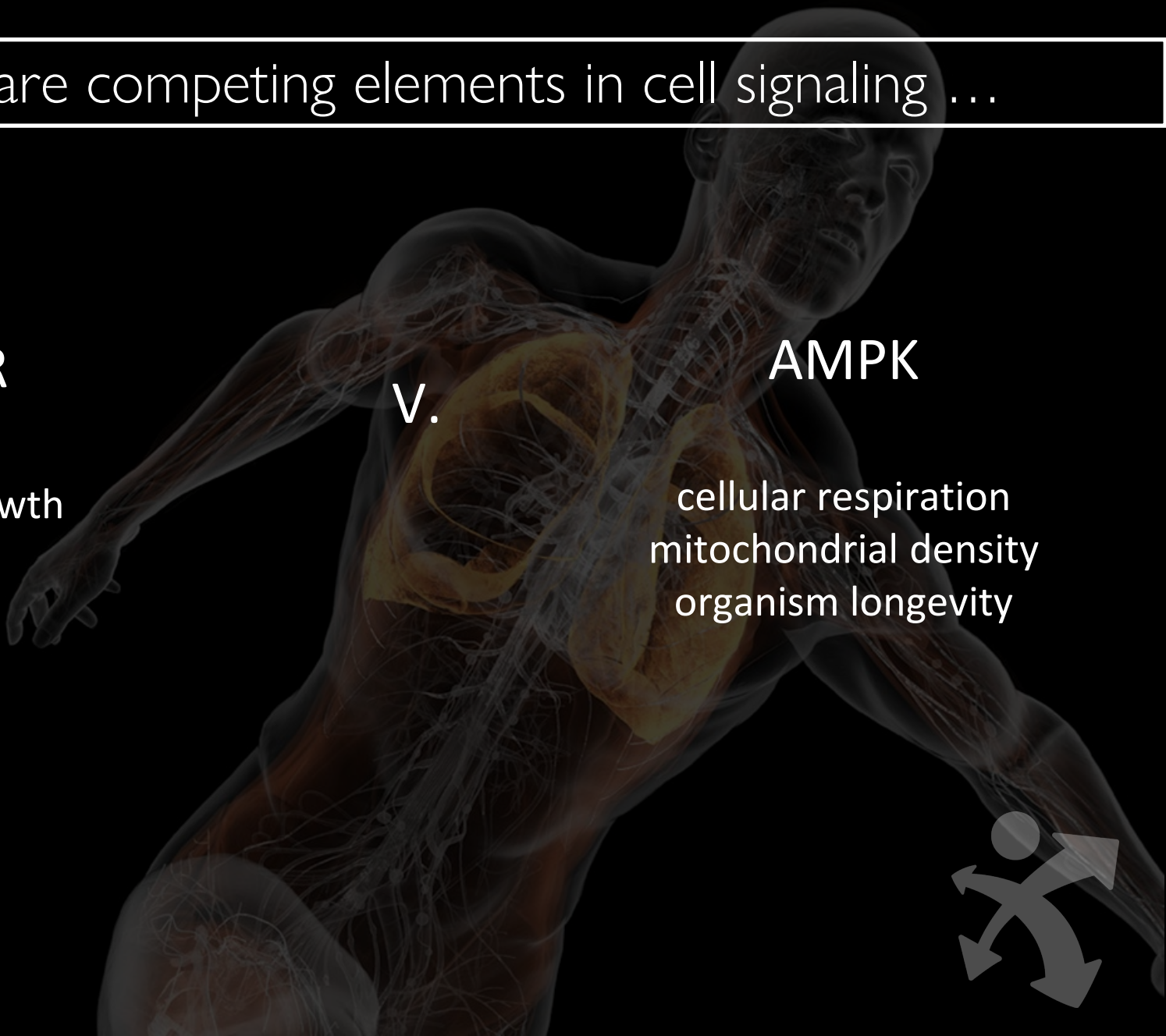


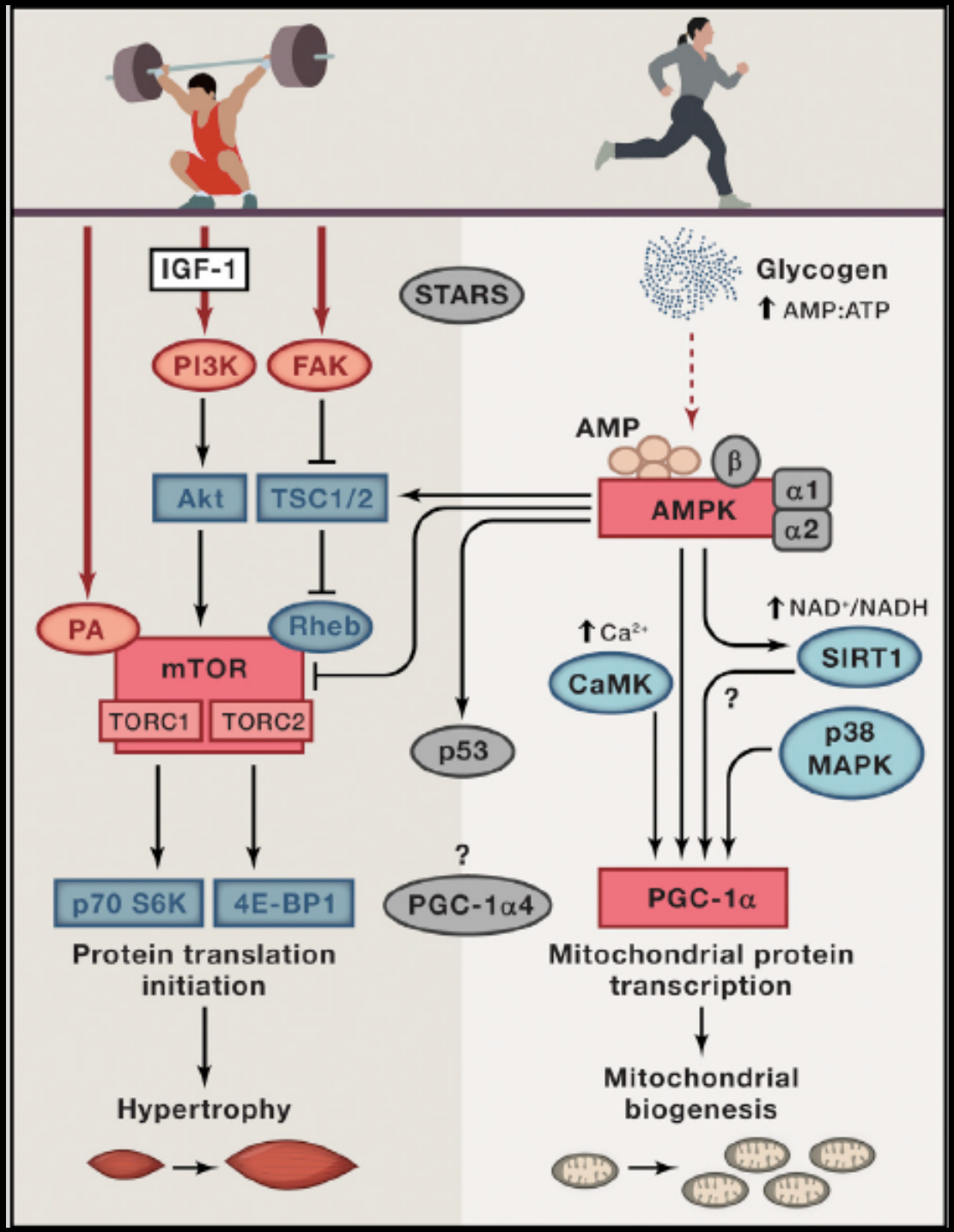
mTOR

muscle growth

V.

AMPK

cellular respiration
mitochondrial density
organism longevity


IGF-1
PI3K
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Glycogen
↑ AMP:ATP
AMP
β
α1
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AMPK
Akt
TSC1/2
PA
Rheb
mTOR
TORC1
TORC2
↑ NAD⁺/NADH
↑ Ca²⁺
SIRT1
CaMK
?
p38 MAPK
p53
?
PGC-1α4
PGC-1α
p70 S6K
4E-BP1
Protein translation initiation
Mitochondrial protein transcription
Hypertrophy
Mitochondrial biogenesis