

NSCA

COACHES

CONFERENCE 2023

JANUARY 4 – 6, 2023

Charlotte, NC & Online | 2.0 CEUs

#NSCACoaches23

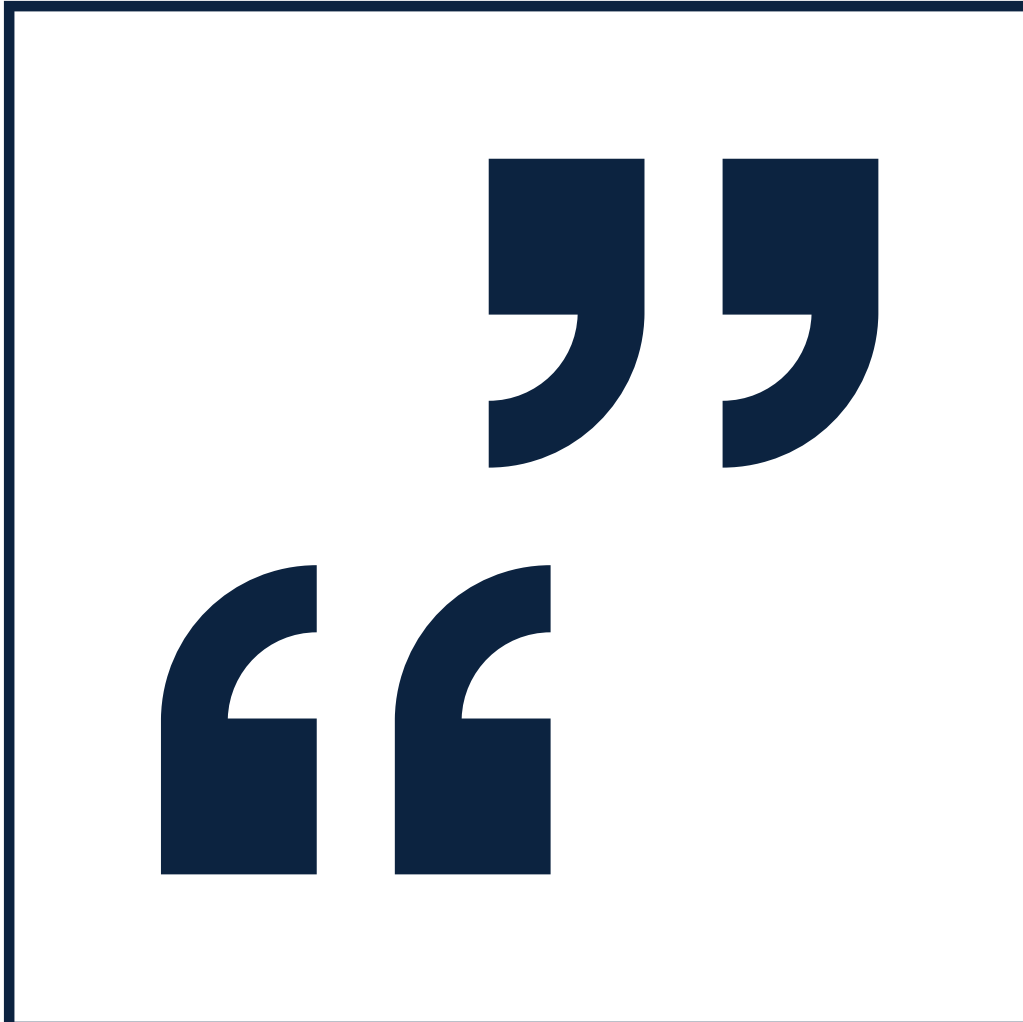
CONFLICT OF INTEREST STATEMENT

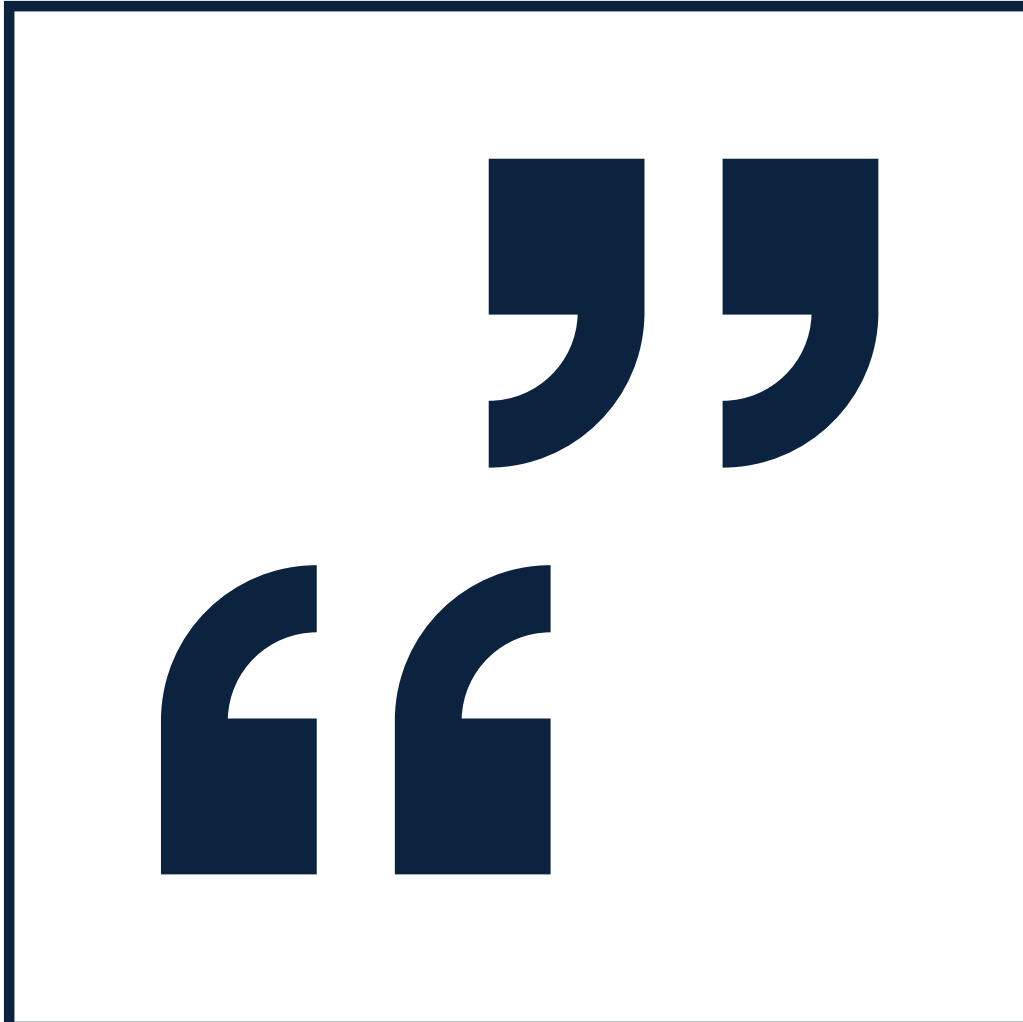
I HAVE NO ACTUAL OR POTENTIAL CONFLICT OF INTEREST IN RELATION TO THIS PRESENTATION.



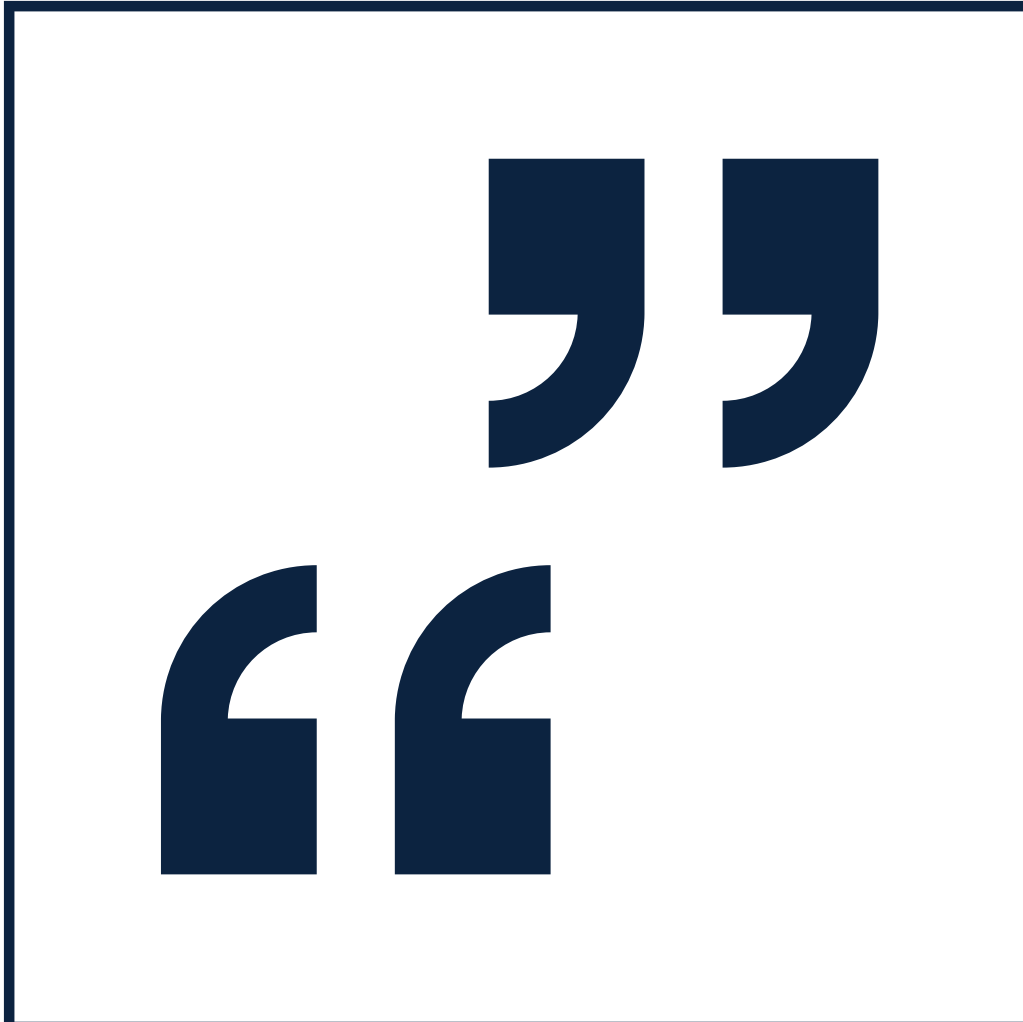
John P. Wagle, PhD, MBA
Cardiovascular Demands of Baseball Pitching





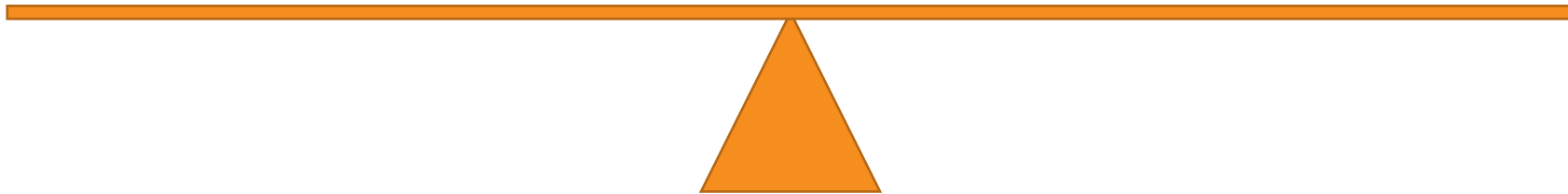


THE PERSON WHO GRASPS PRINCIPLES CAN
SUCCESSFULLY SELECT THEIR OWN METHODS
HARRINGTON EMERSON

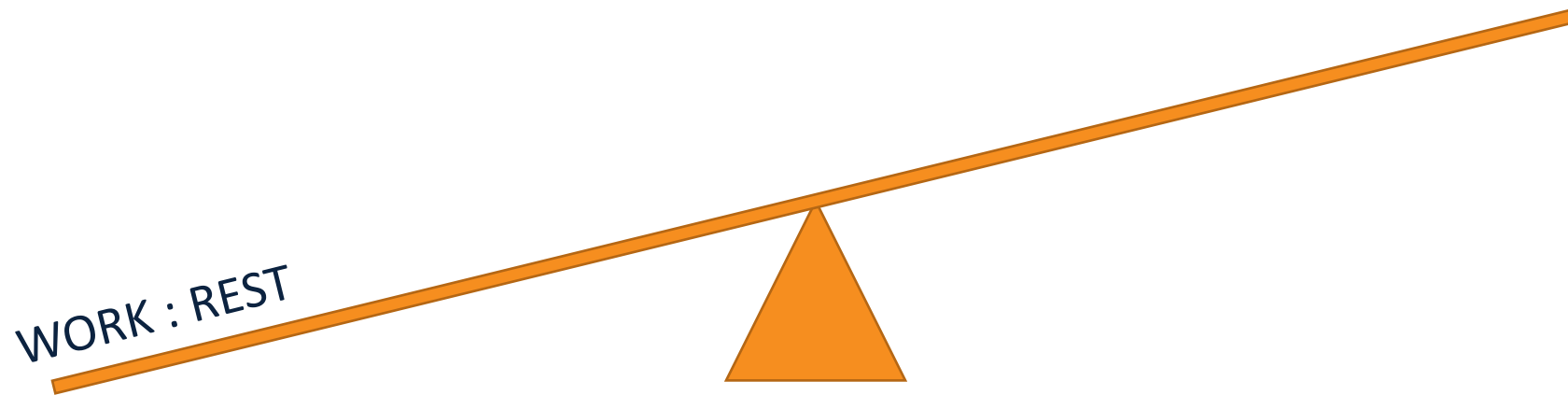


THE DOSE MAKES THE POISON
PARACELSUS

HOW SHOULD PITCHERS CONDITION?



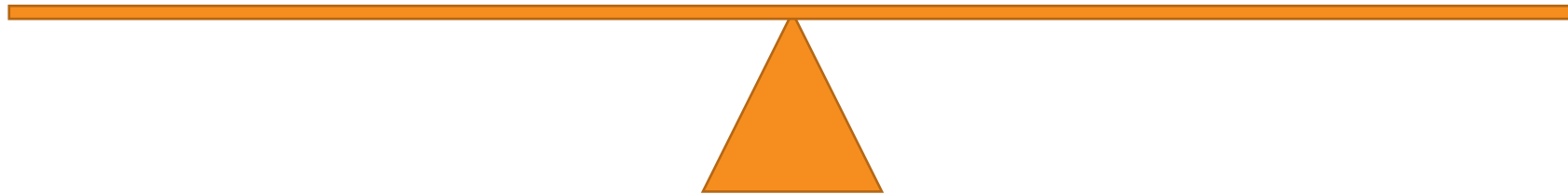
HOW SHOULD PITCHERS CONDITION?



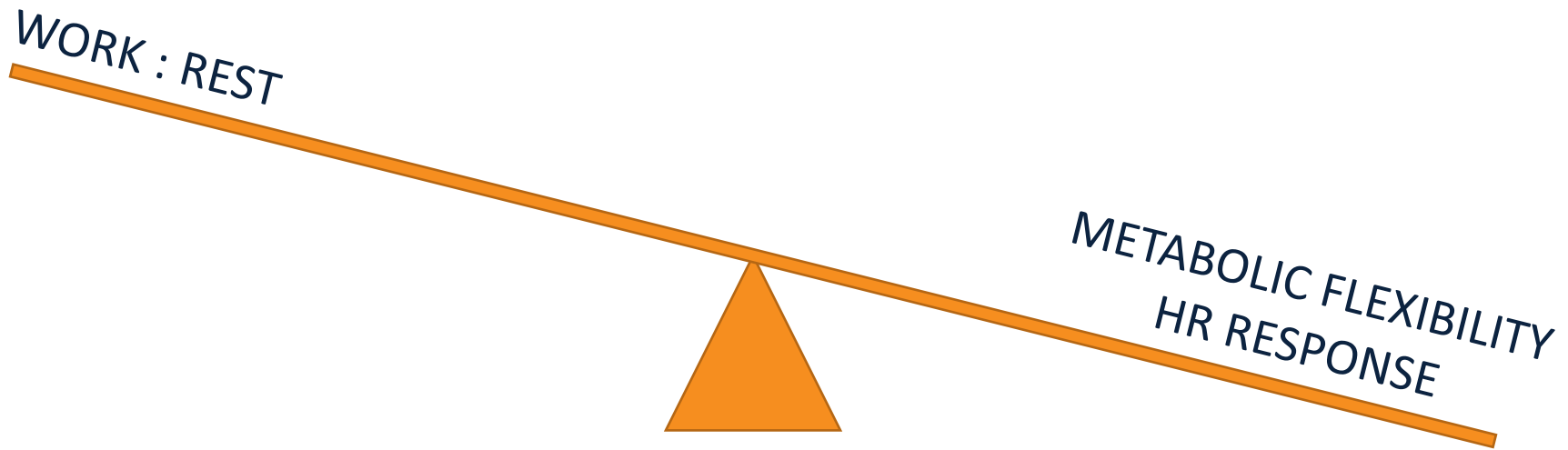
HOW SHOULD PITCHERS CONDITION?

WORK : REST

HR RESPONSE



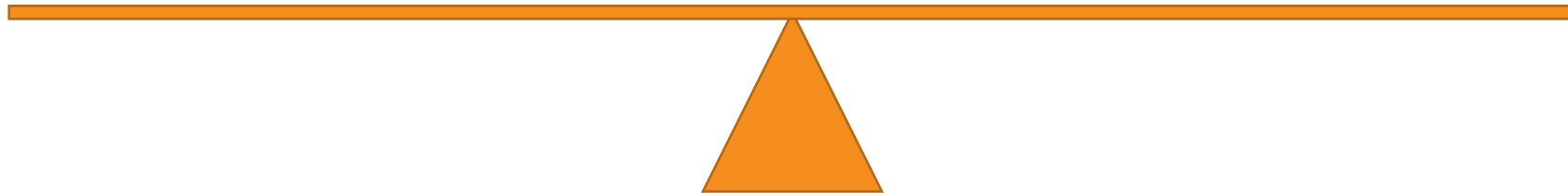
HOW SHOULD PITCHERS CONDITION?



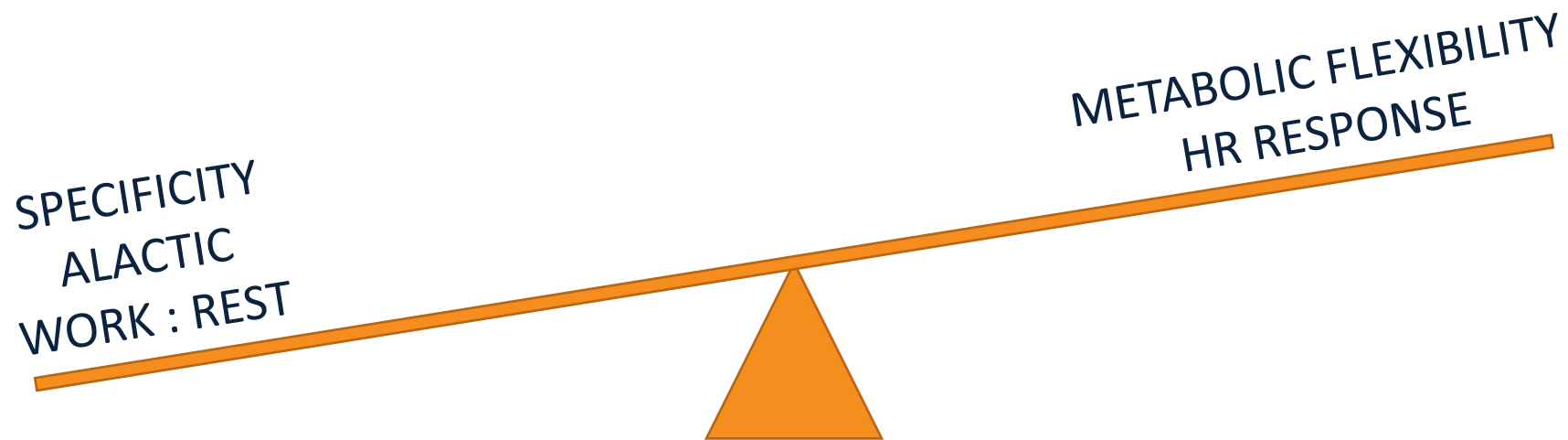
HOW SHOULD PITCHERS CONDITION?

ALACTIC
WORK : REST

METABOLIC FLEXIBILITY
HR RESPONSE



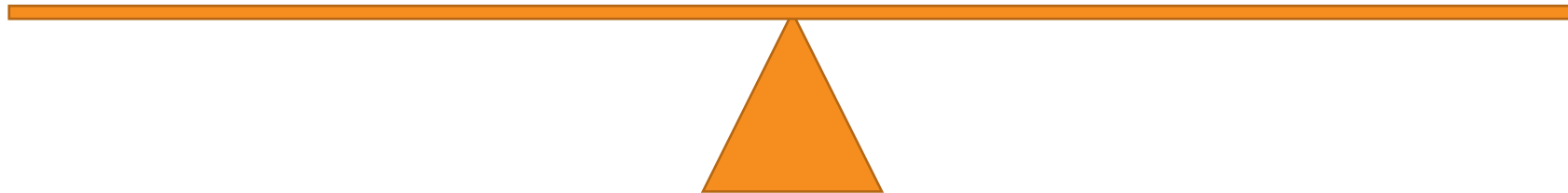
HOW SHOULD PITCHERS CONDITION?



HOW SHOULD PITCHERS CONDITION?

SPECIFICITY
ALACTIC
WORK : REST

REDUCE ALLOSTATIC LOAD
METABOLIC FLEXIBILITY
HR RESPONSE



HOW SHOULD PITCHERS CONDITION?

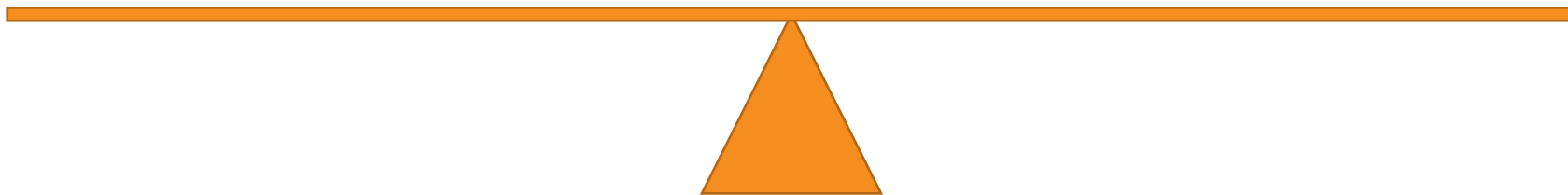
SPECIFICITY
ALACTIC
WORK : REST

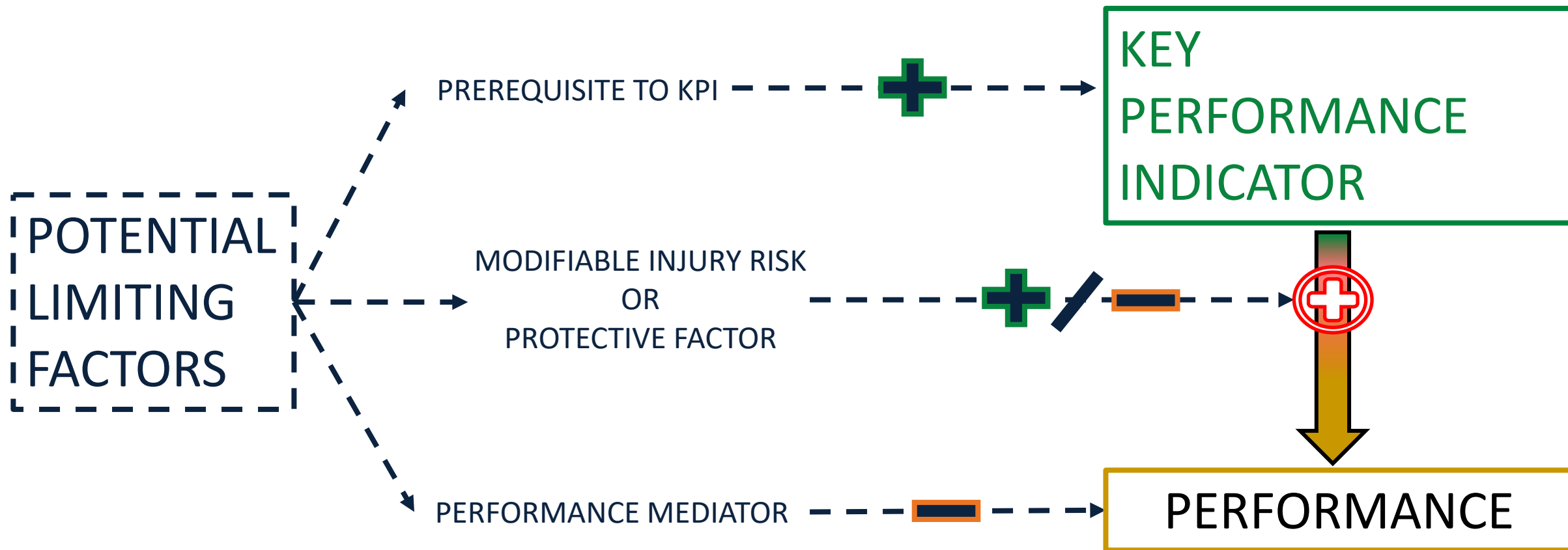
SUCCESS LEAVES CLUES
REDUCE ALLOSTATIC LOAD
METABOLIC FLEXIBILITY
HR RESPONSE

HOW SHOULD PITCHERS CONDITION?

PSYCHOPHYSIOLOGICAL
SPECIFICITY
ALACTIC
WORK : REST

SUCCESS LEAVES CLUES
REDUCE ALLOSTATIC LOAD
METABOLIC FLEXIBILITY
HR RESPONSE

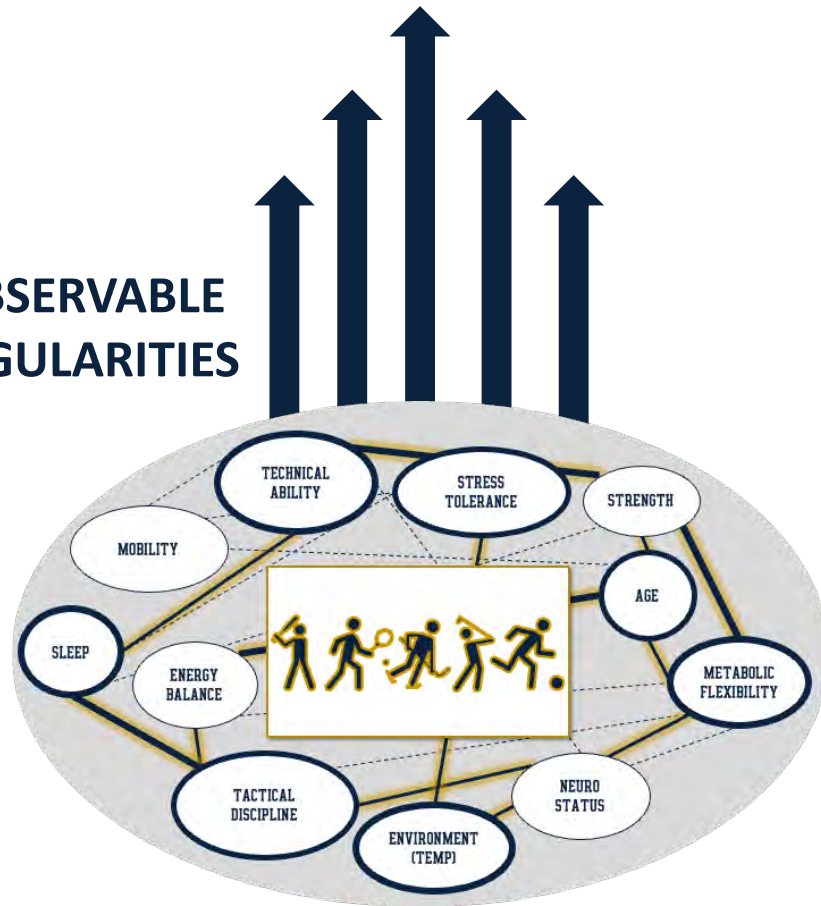






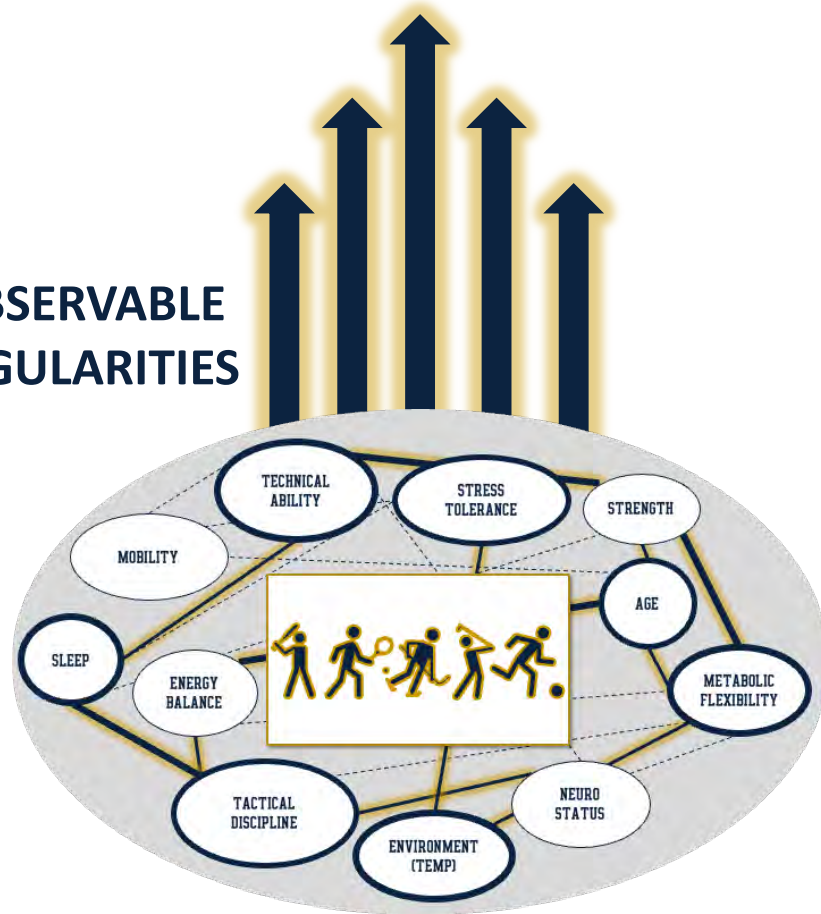
EMERGENT HEALTH & PERFORMANCE OUTCOME

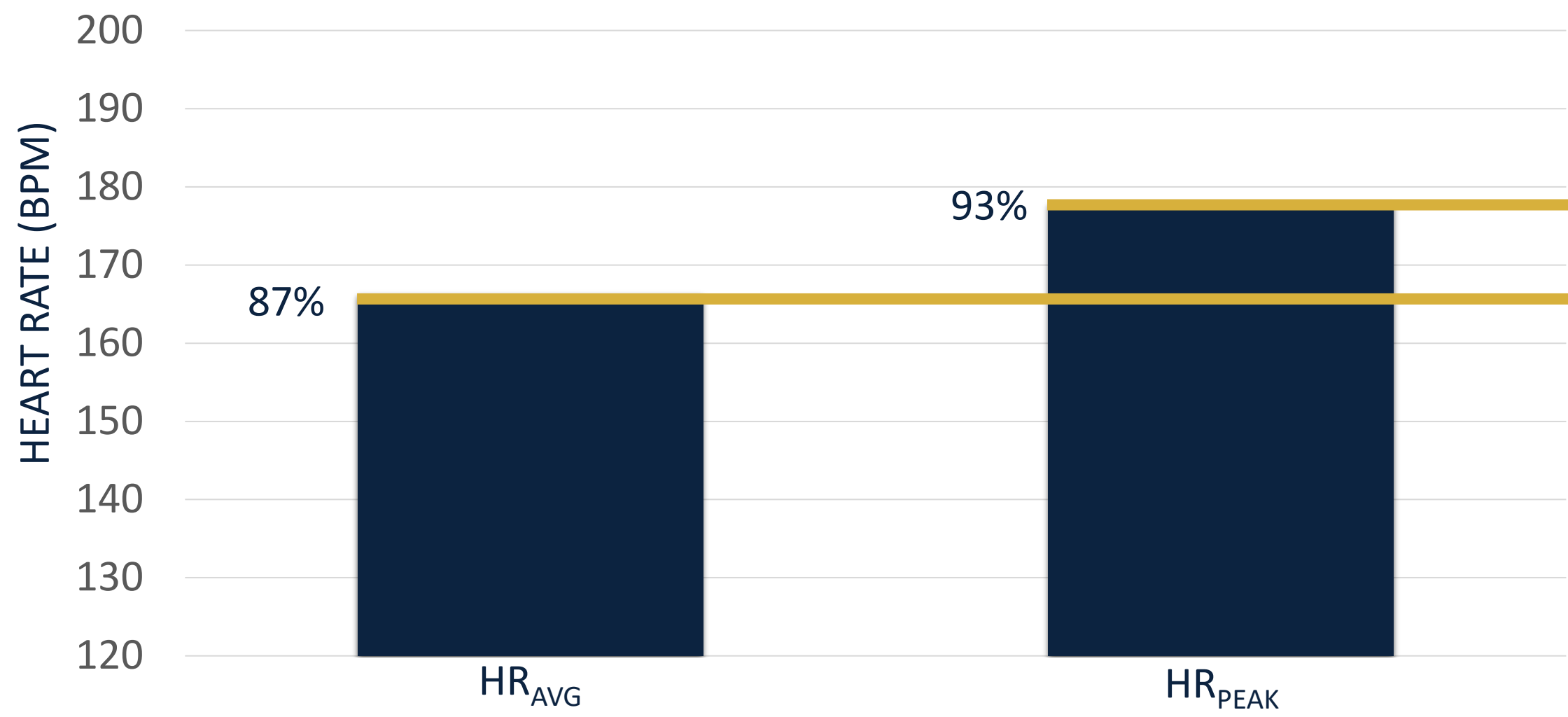
OBSERVABLE
REGULARITIES



EMERGENT HEALTH & PERFORMANCE OUTCOME

OBSERVABLE
REGULARITIES



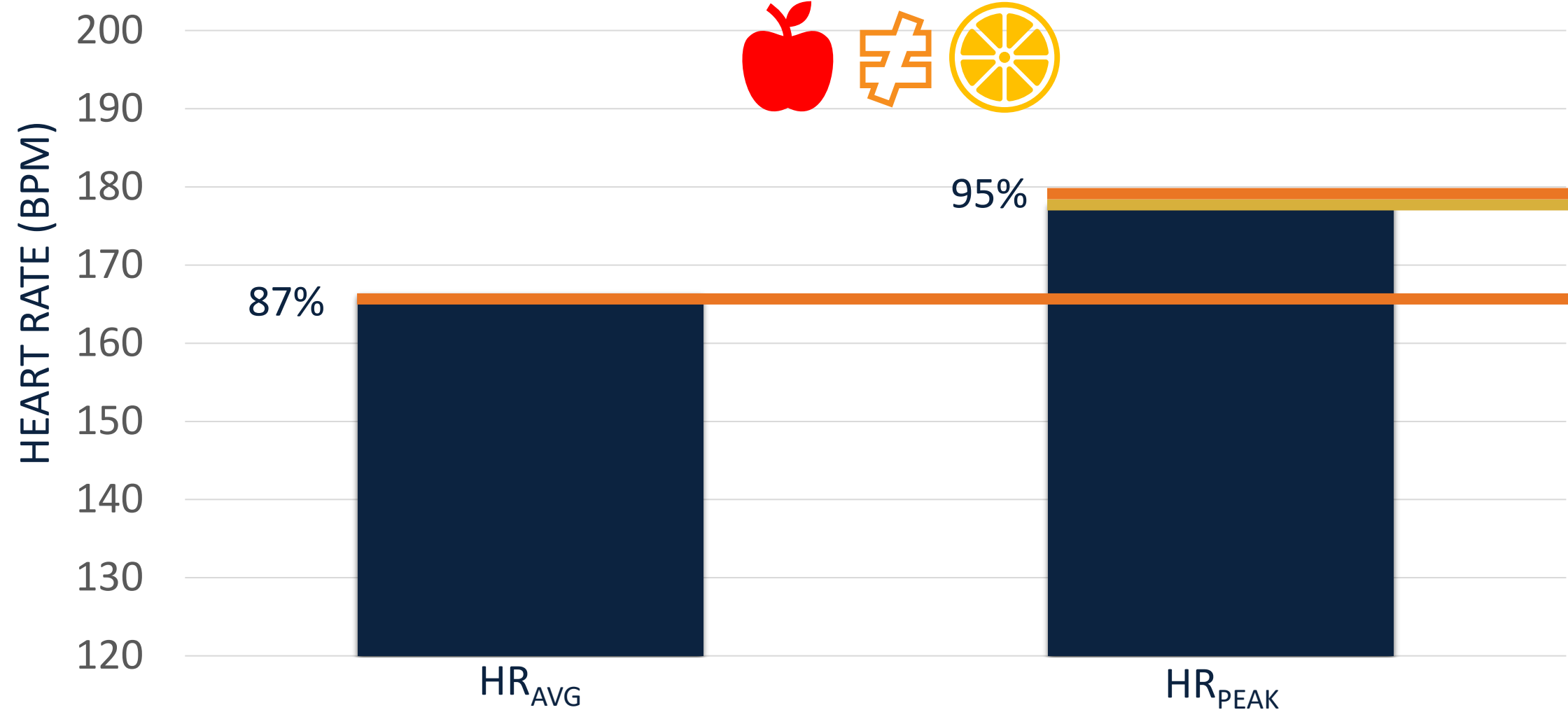


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Cardiovascular Demands of Baseball Pitching



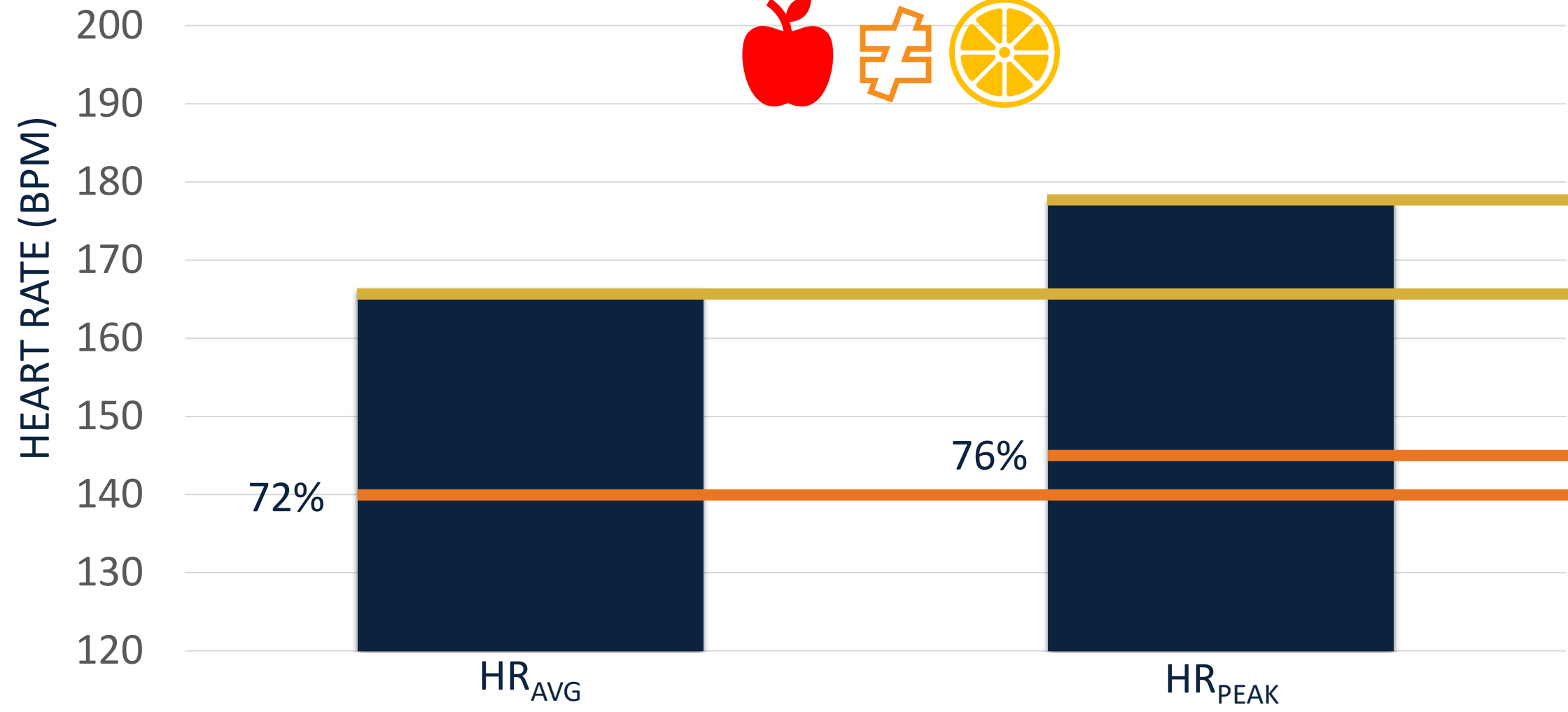


STOCKHOLM & MORRIS, 1968





POTTEIGER ET AL., 1992





CORNELL ET AL., 2016



HEART RATE (BPM)

200
190
180
170
160
150
140
130
120

85%

91%

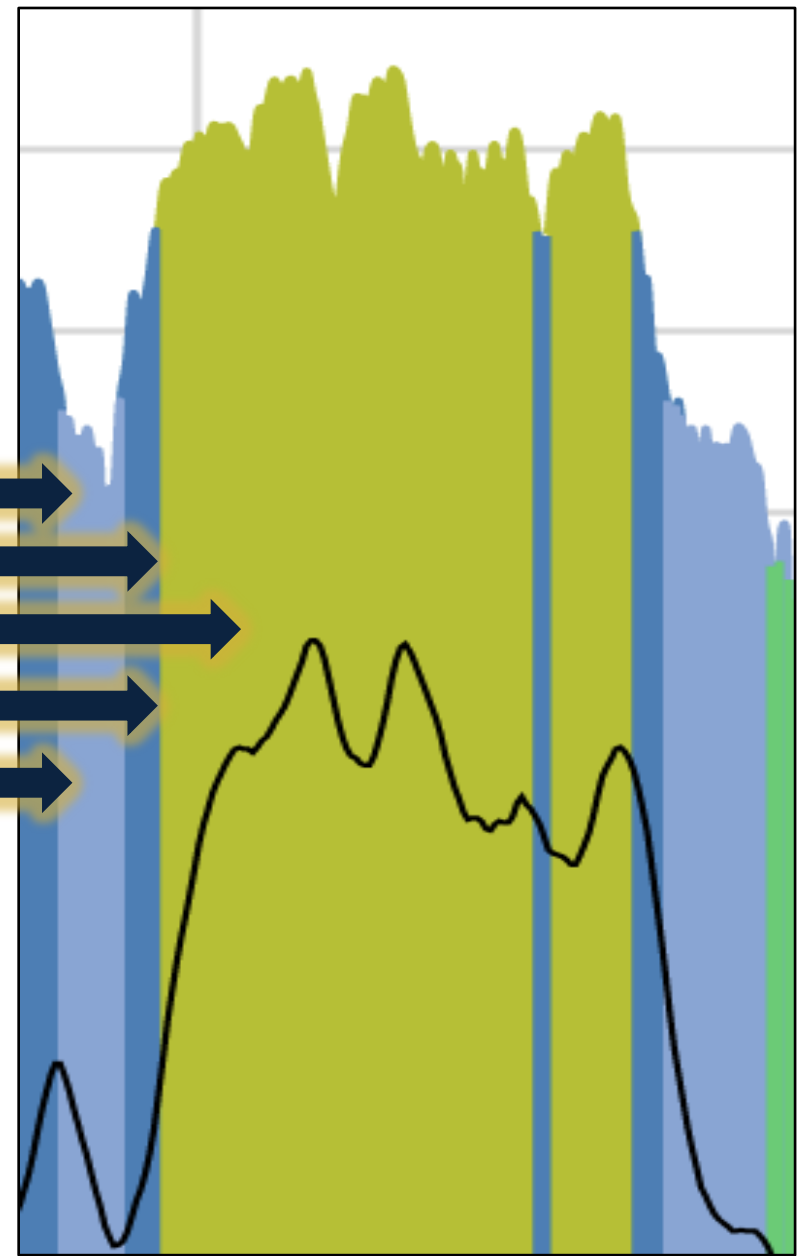
HR_{AVG}

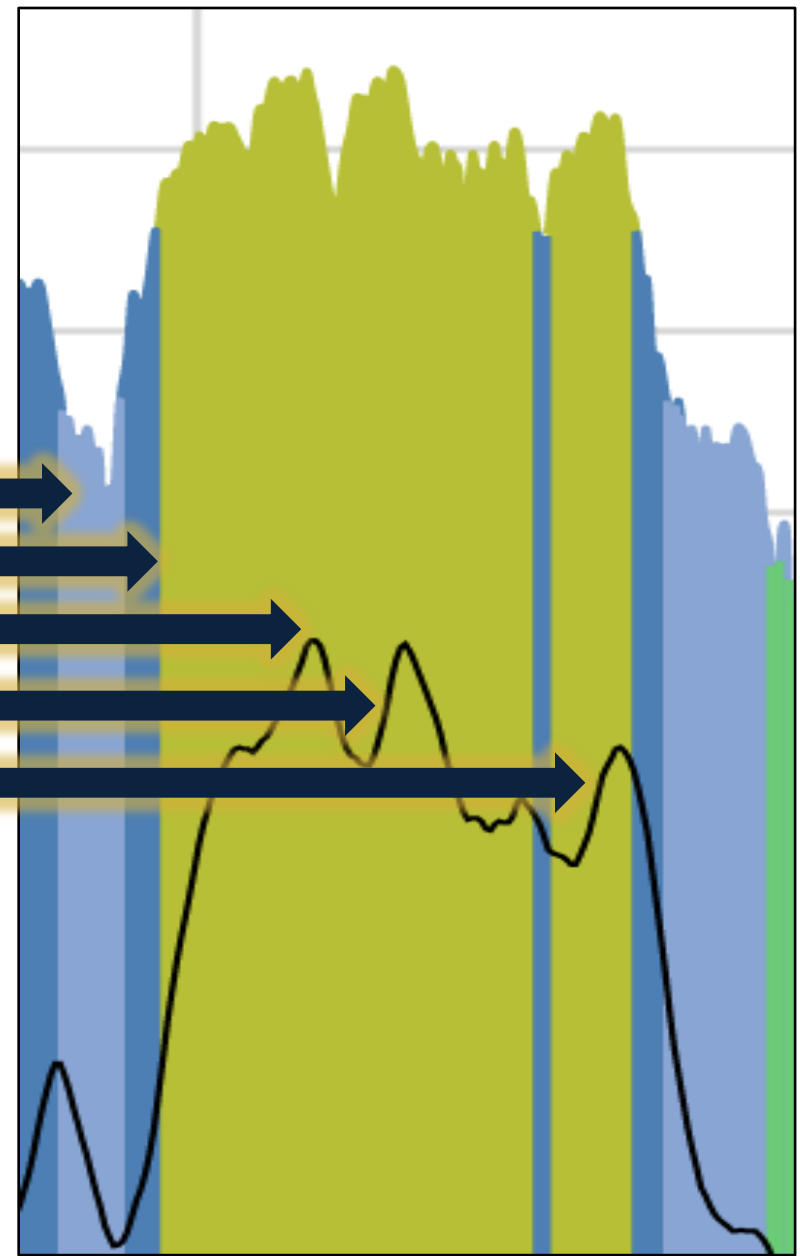
HR_{PEAK}

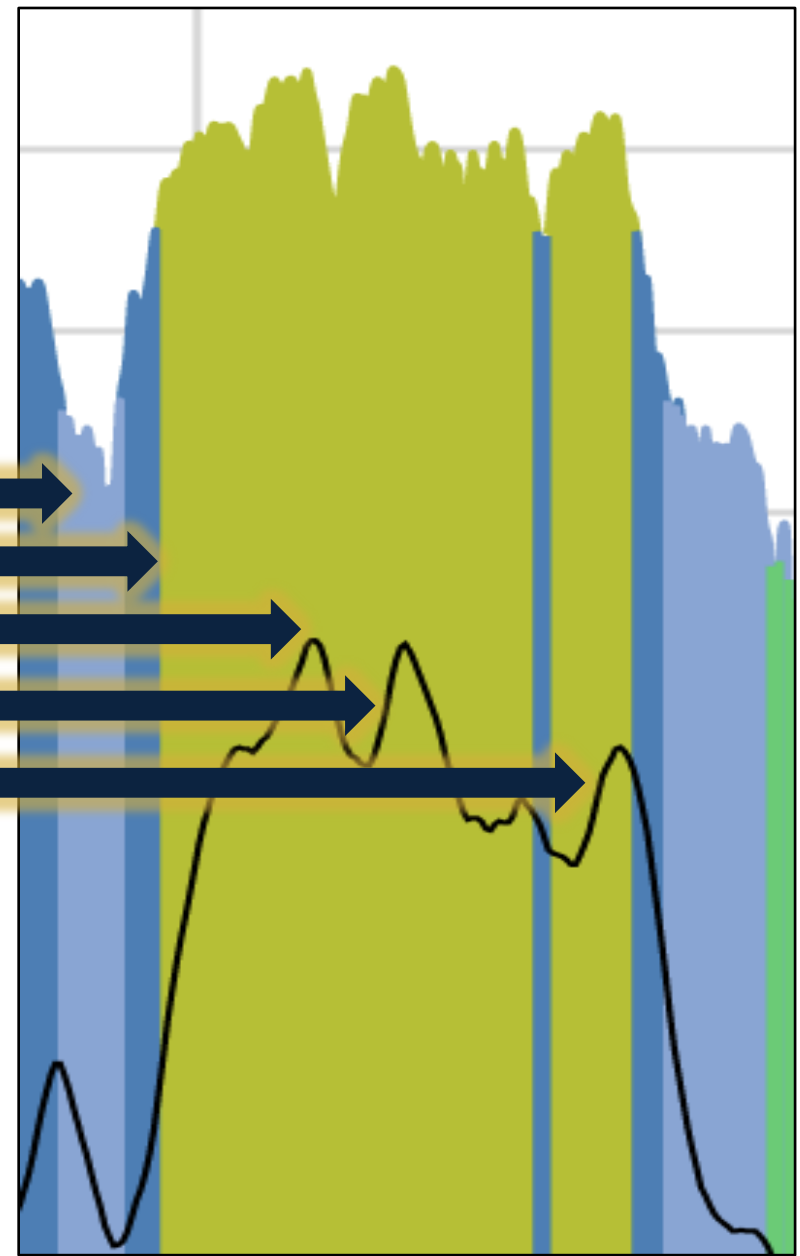


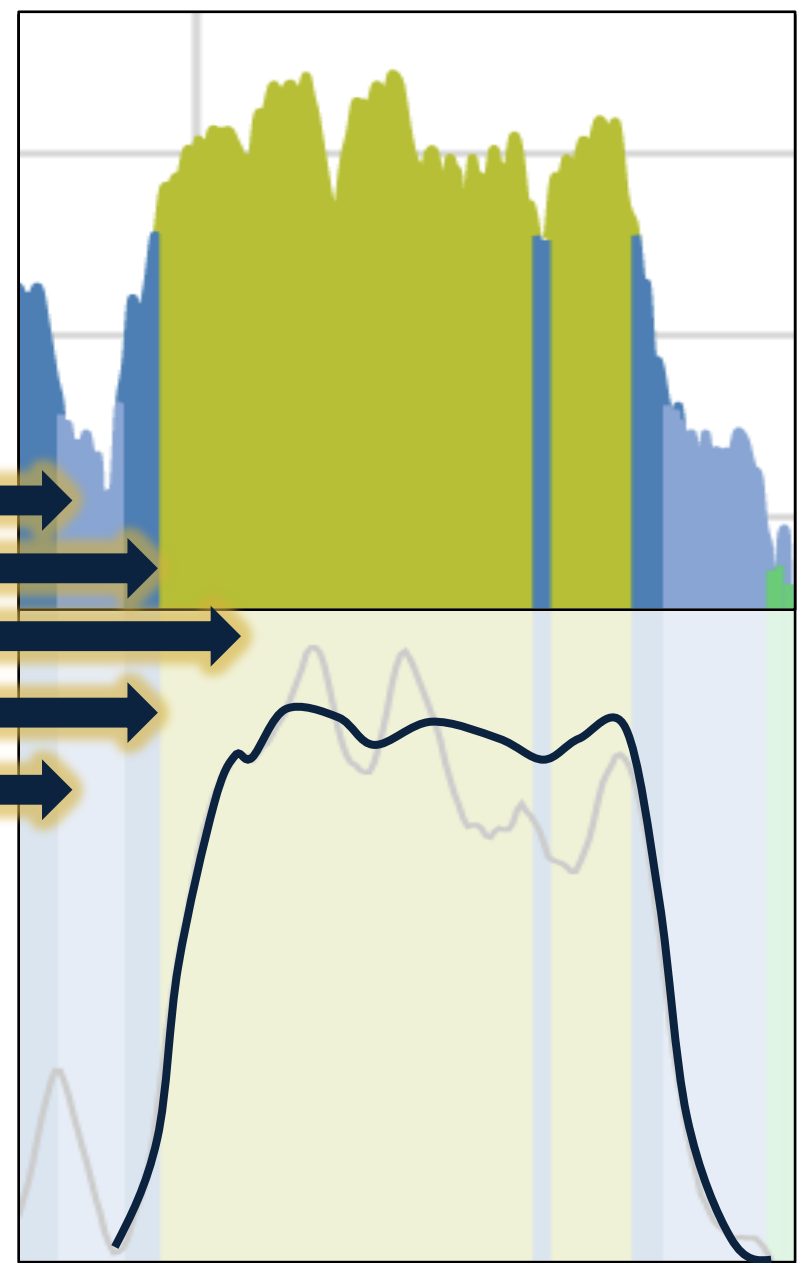
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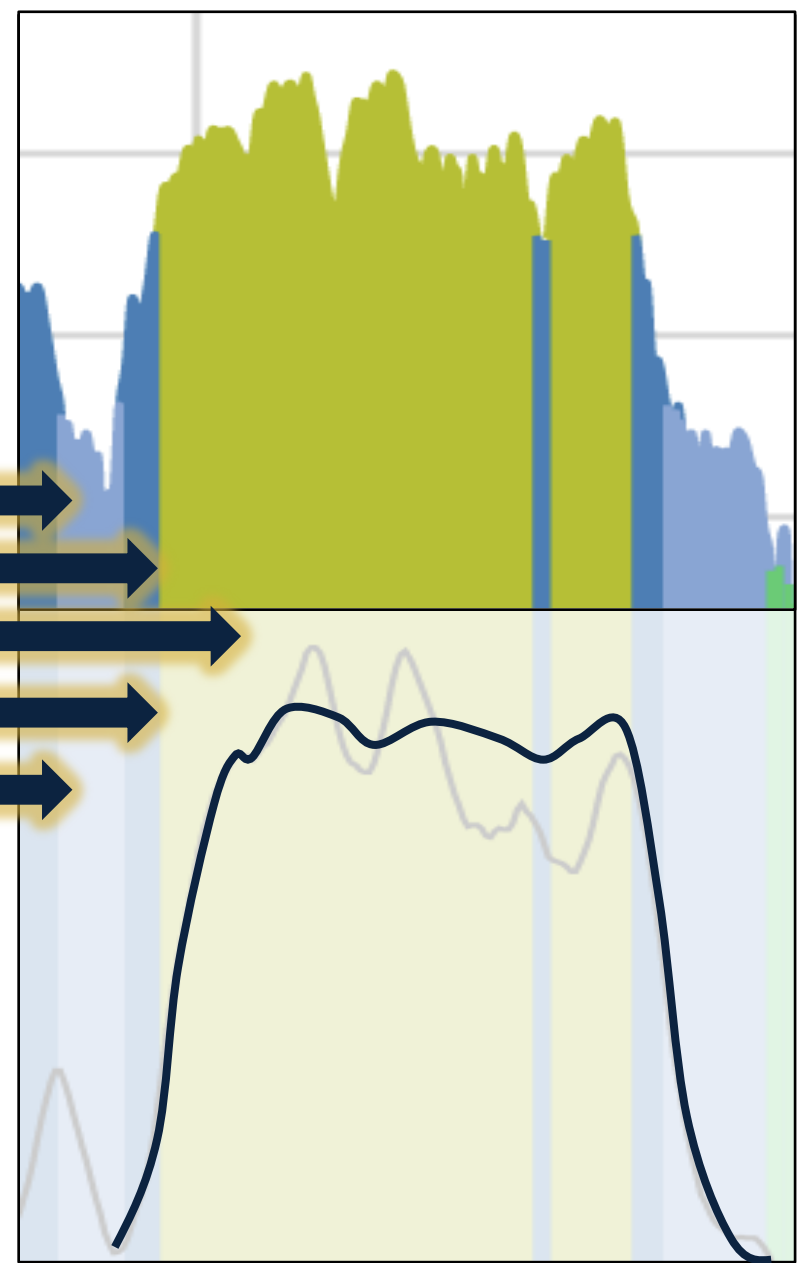


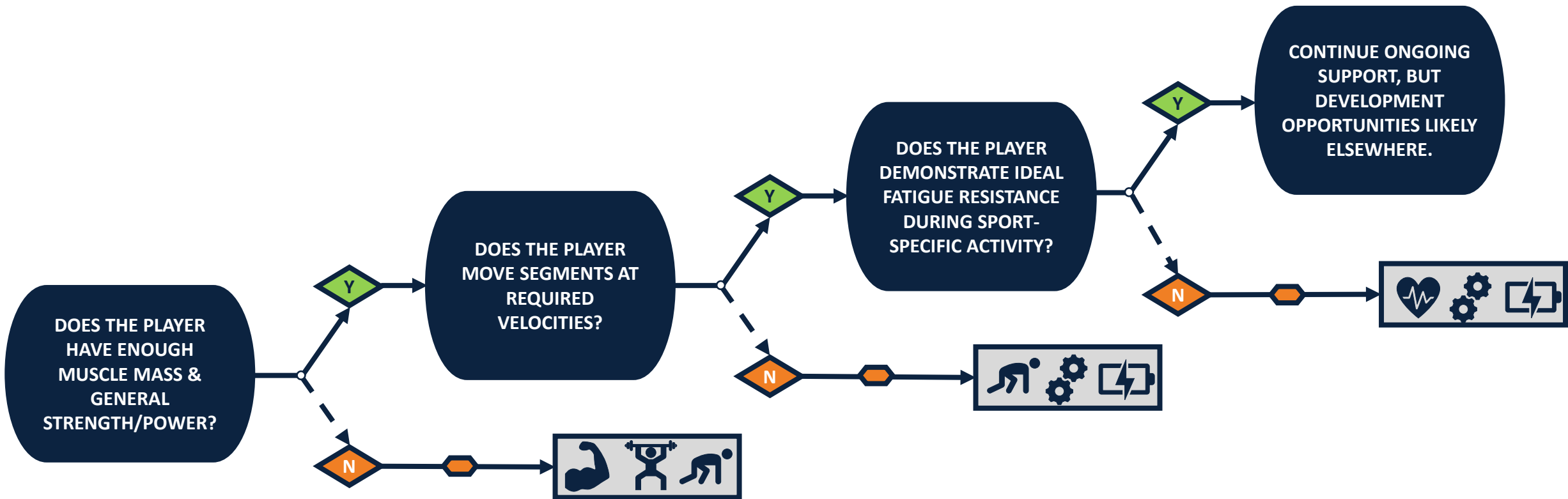


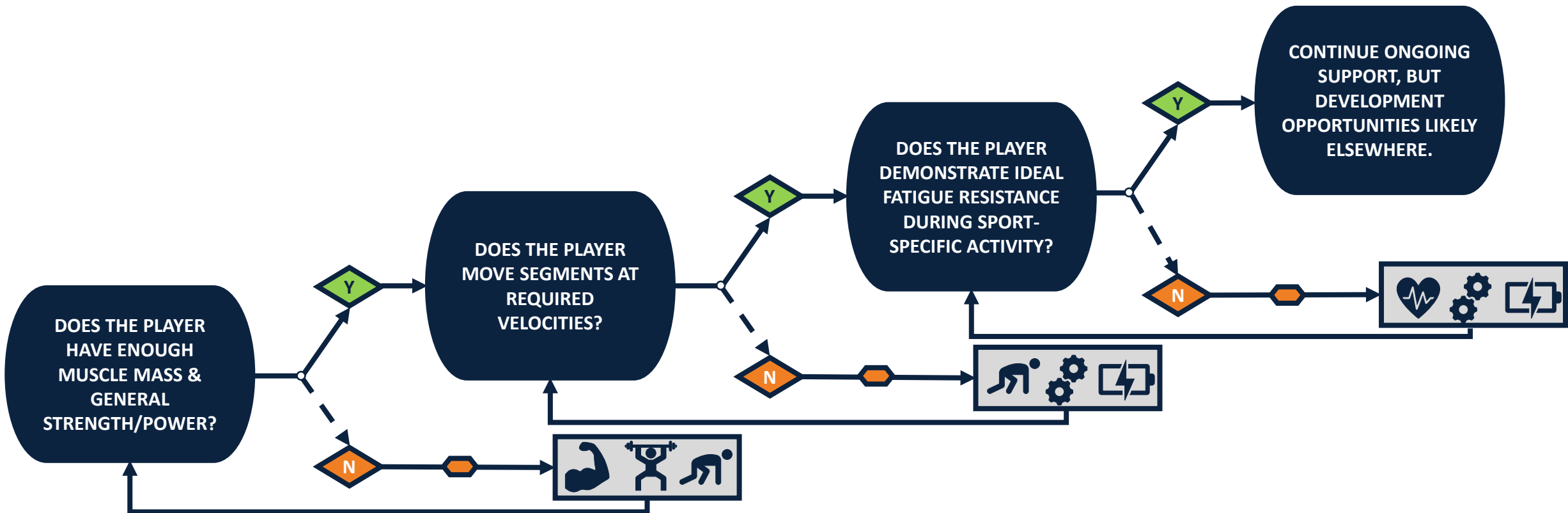


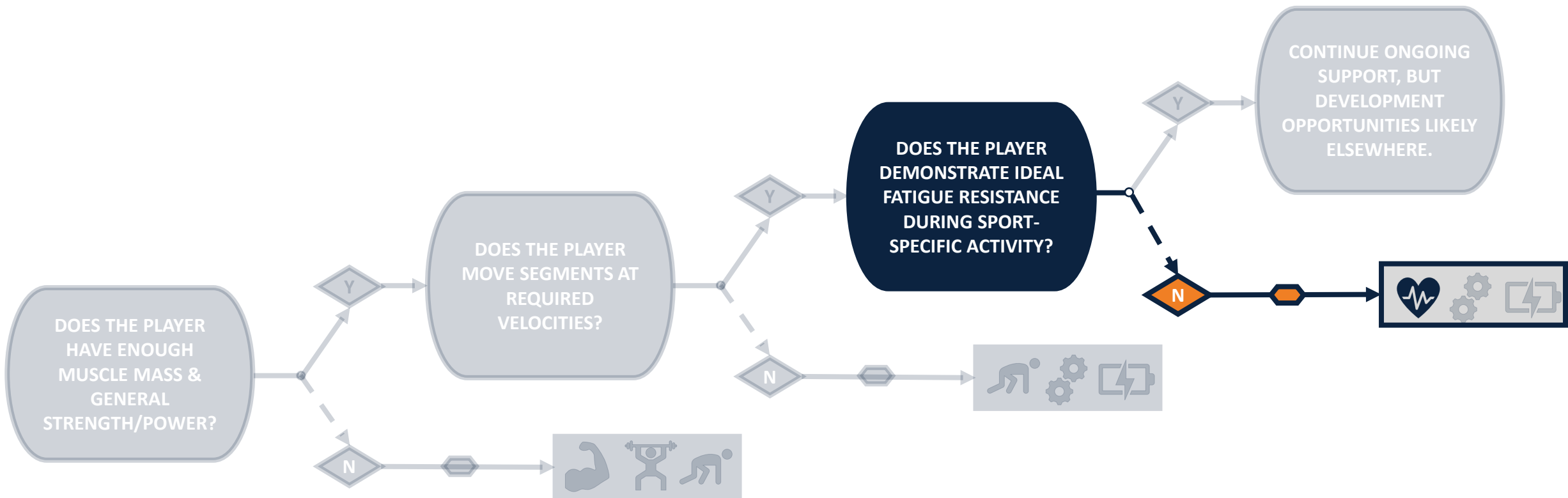




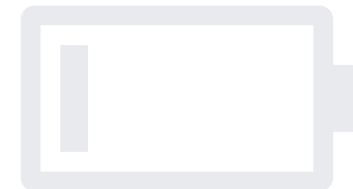
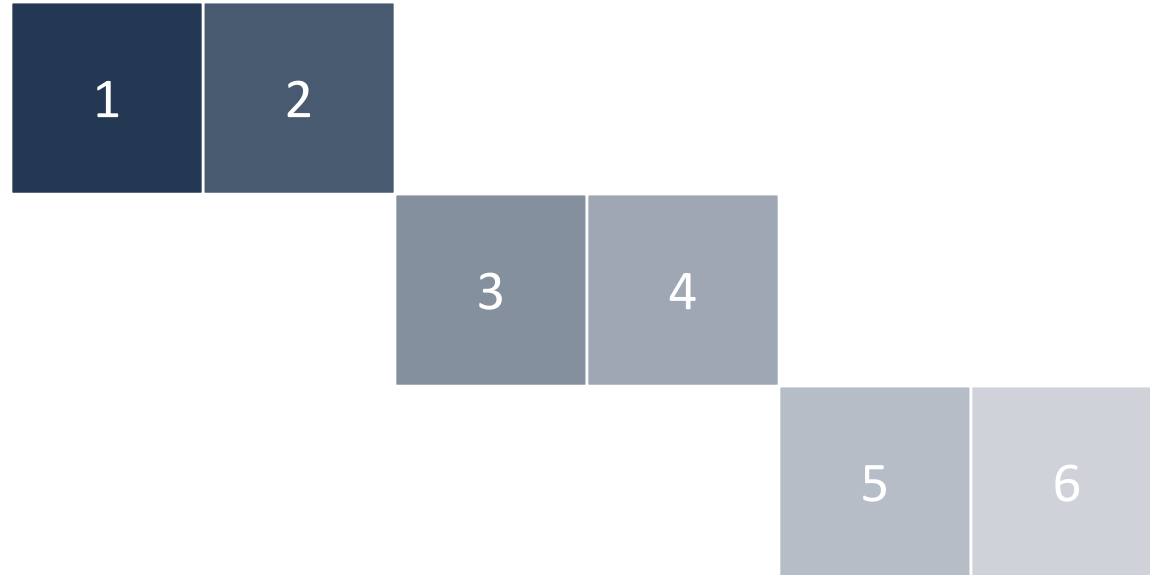








IDEAL FATIGUE RESISTANCE



EVIDENCE-BASED PRACTICE

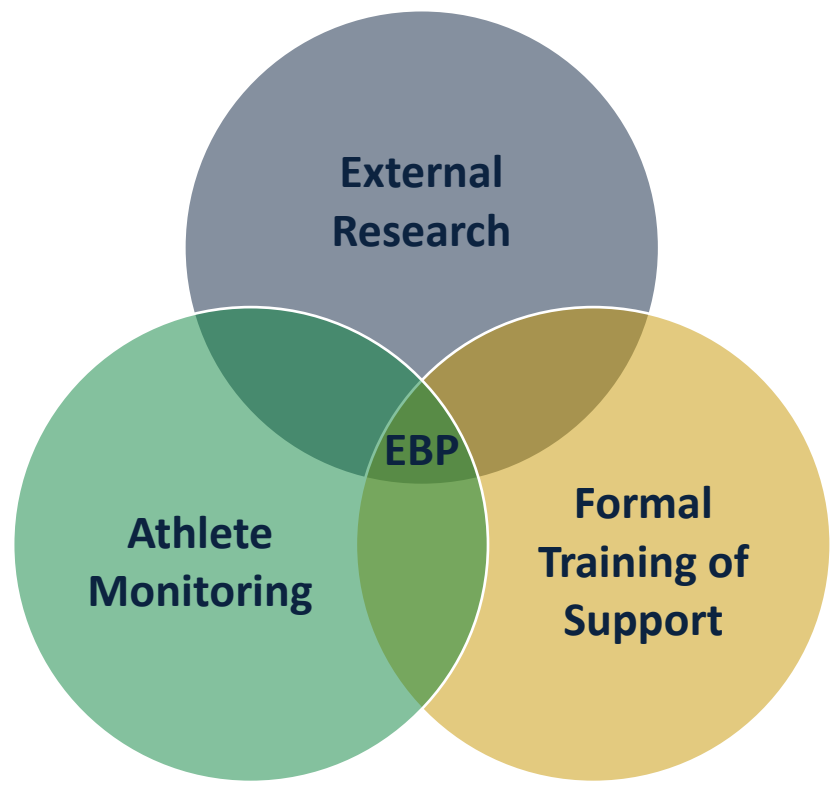


Iñigo San-Millán

PRACTICE-BASED EVIDENCE

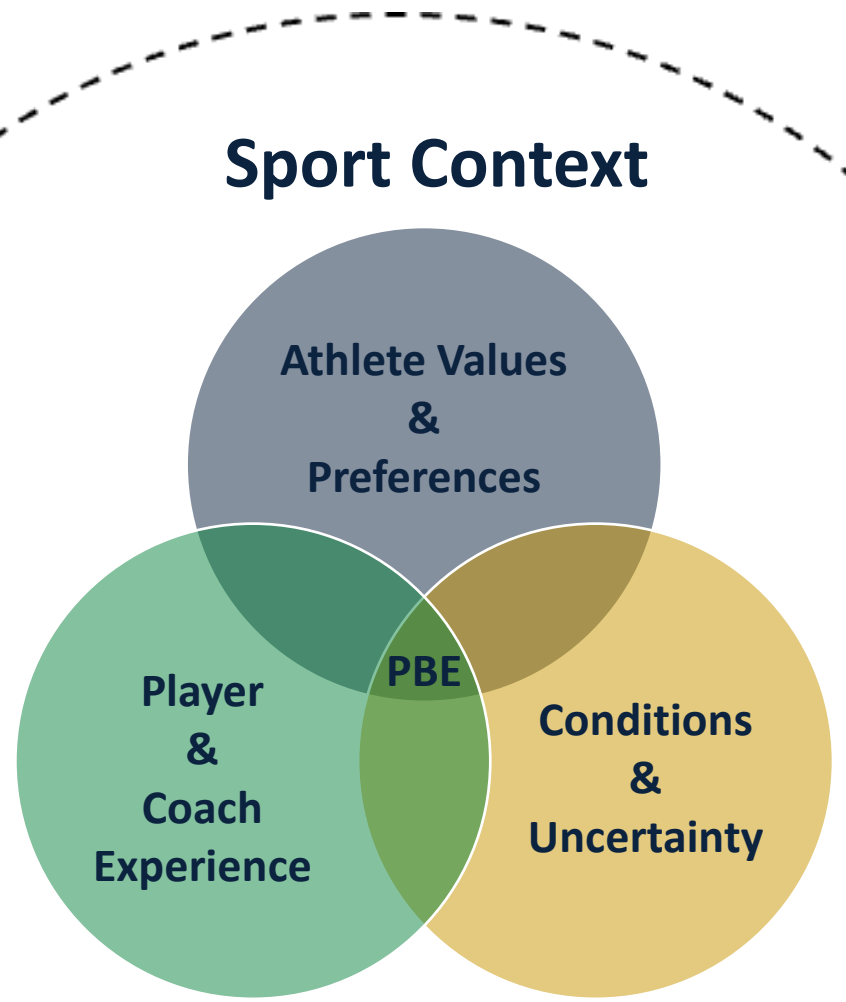


Marit Bjørgen



Scientific Context

GOLD STANDARD



Sport Context

Training Zone	Primary Currency	Primary Fiber Type
Zone 1	FAT	Type I
Zone 2	FAT-CHO	Type I
Zone 3	FAT-CHO	Type I-IIa
Zone 4	CHO	Type IIa
Zone 5	CHO	Type IIa-b
Zone 6	CHO-ATP/PC	Type IIb

San-Millán, I., Stefanoni, D., Martínez, J. L., Hansen, K. C., D'Alessandro, A., & Nemkov, T. (2020). Metabolomics of endurance capacity in world tour professional cyclists. *Frontiers in Physiology*, 11, 578.

San Millan, I. ND. Zone 2 Training for Endurance Athletes: Build Your Aerobic Capacity

Willingham, T. B., Ajayi, P., & Glancy, B. SUBCELLULAR SPECIALIZATION OF MITOCHONDRIAL FORM AND FUNCTION IN SKELETAL MUSCLE CELLS. *Frontiers in Cell and Developmental Biology*, 2907.



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Training Zone	Primary Currency	Primary Fiber Type
Zone 1	FAT	Type I
Zone 2	FAT-CHO	Type I

Moderate-low Intensity (~6/10 RPE)

Stable physiology (HR, [La], < VT1)

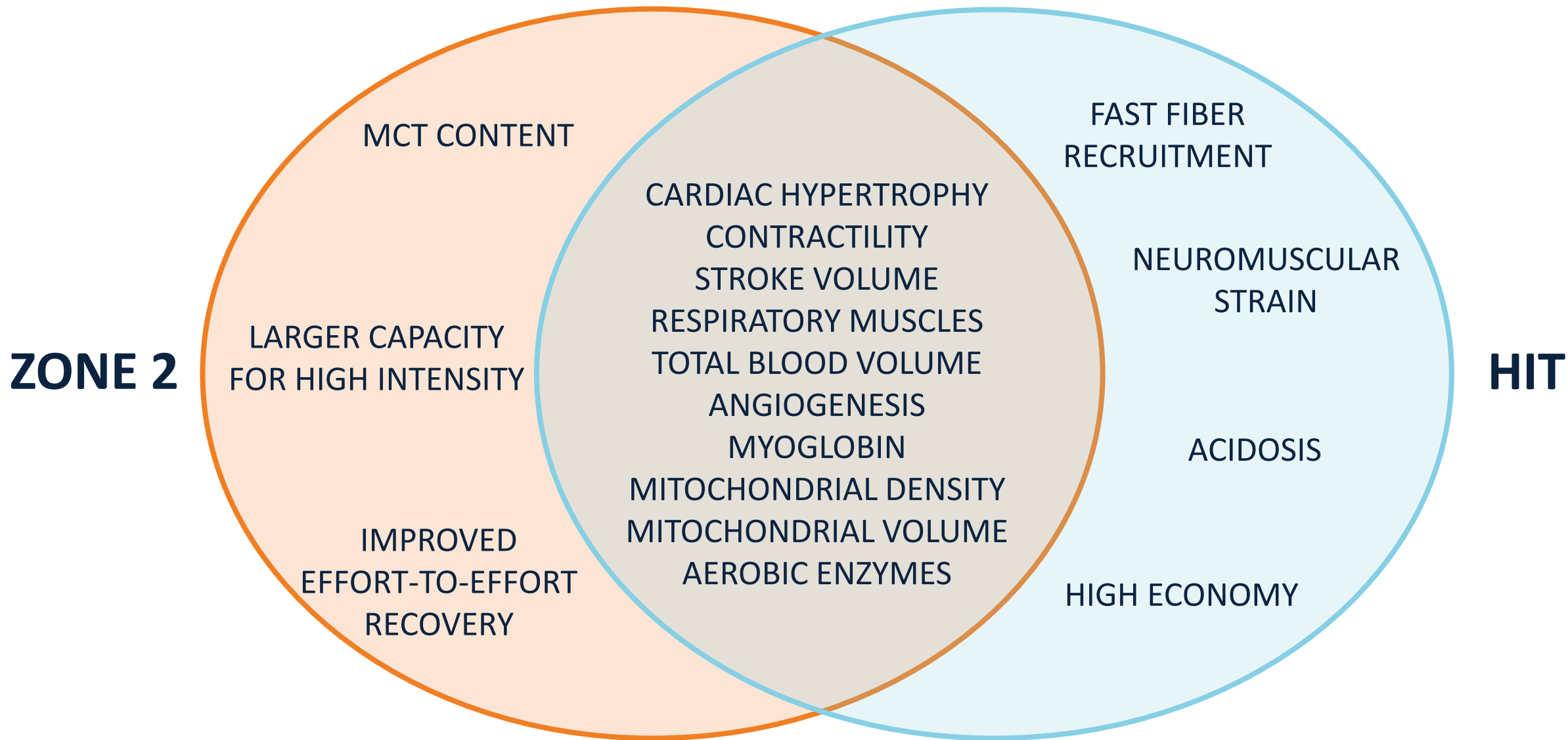
HR, ventilation rate, perception all valuable in tuning intensity

“The highest intensity at which you can still hold a conversation”

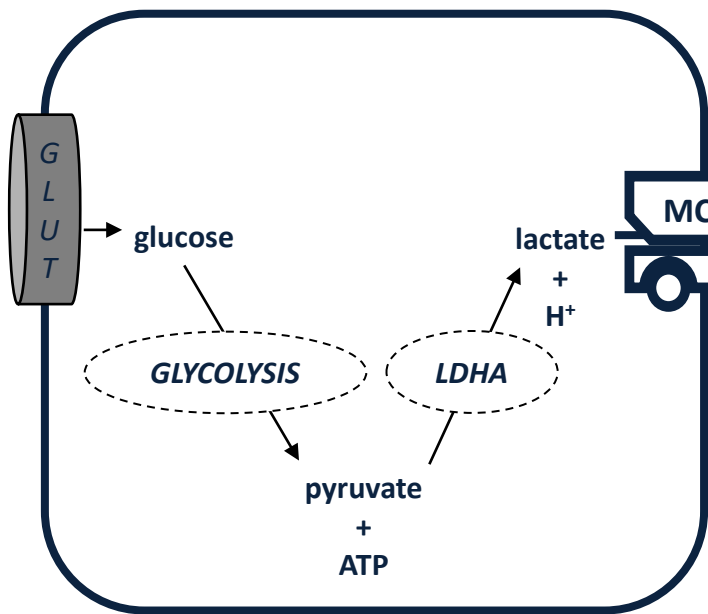
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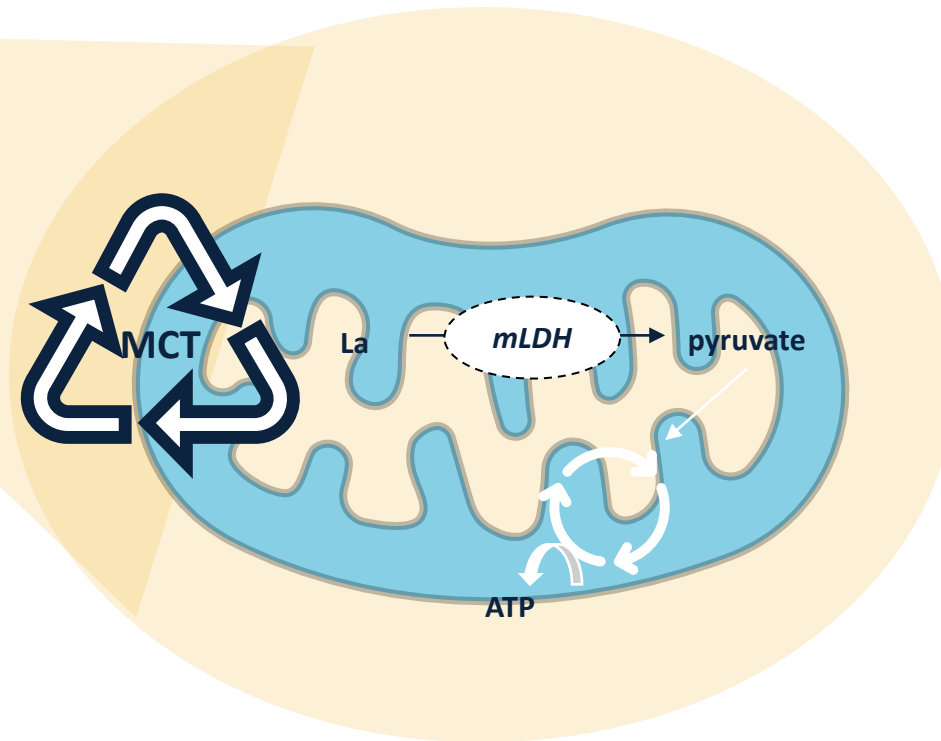
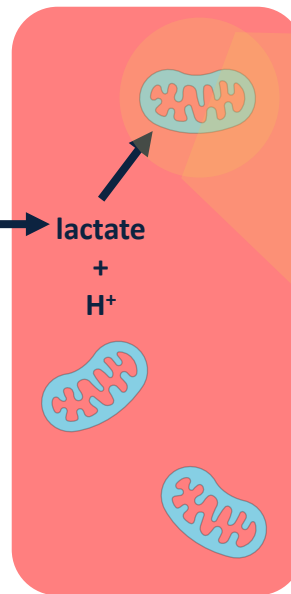
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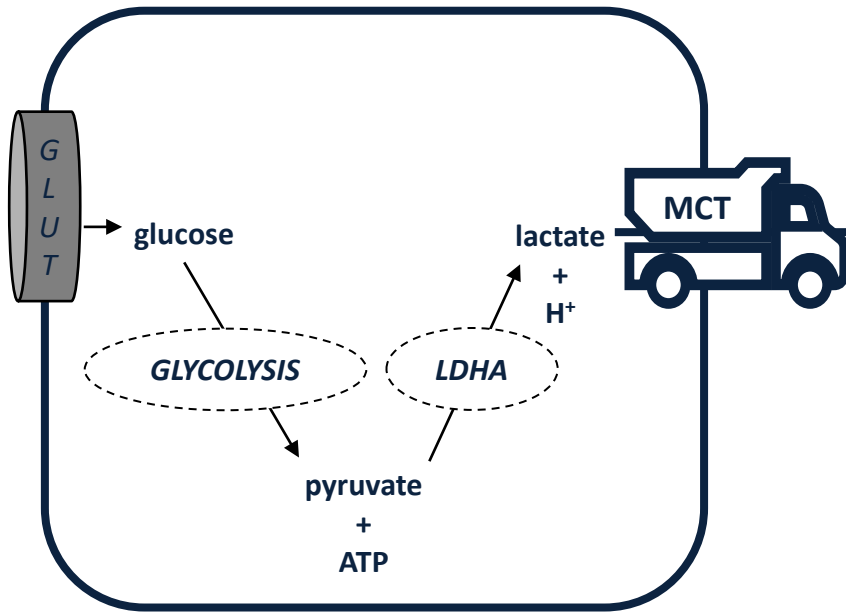
CANCER CELL



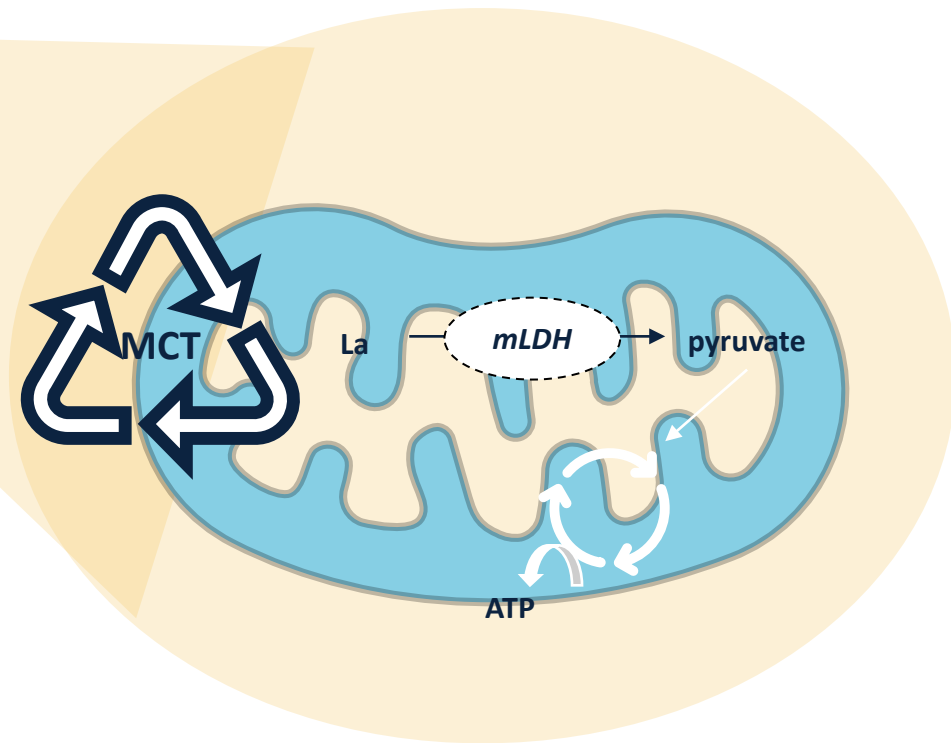
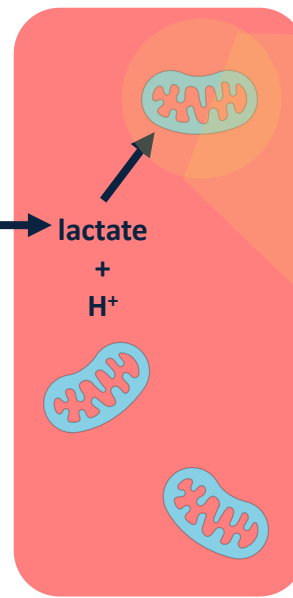
T LYMPHOCYTE



FAST FIBER



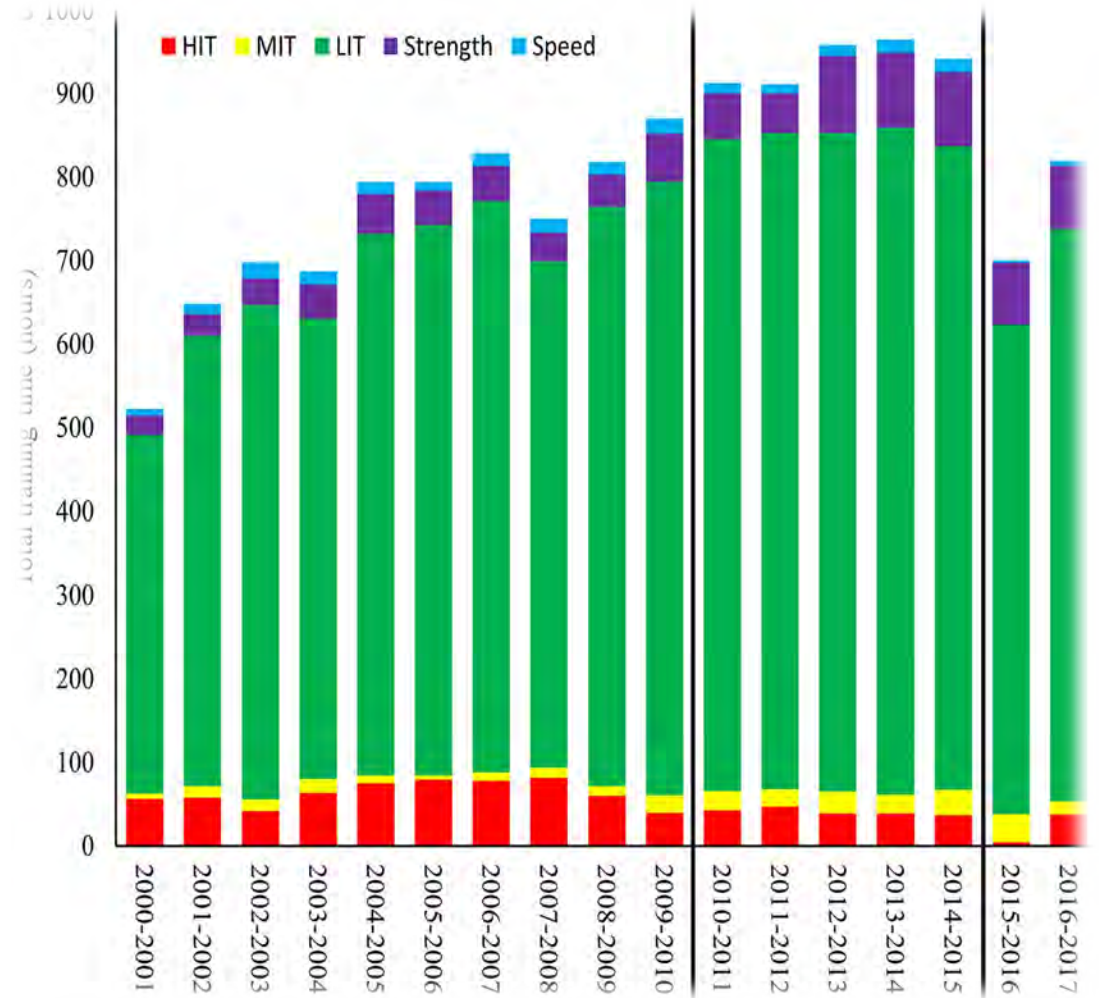
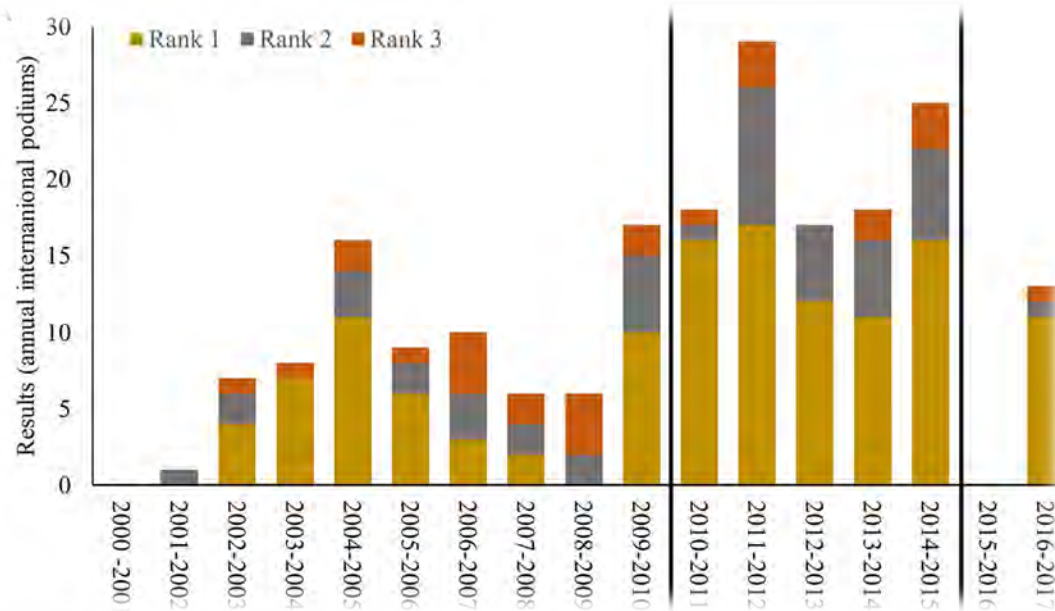
SLOW FIBER



The Training Characteristics of the World's Most Successful Female Cross-Country Skier

Guro S. Solli¹, Espen Tønnessen² and Øyvind Sandbakk^{3*}

¹ Department of Sports Science and Physical Education, Nord University, Bodo, Norway, ² The Norwegian Olympic Federation, Oslo, Norway, ³ Department of Neuromedicine and Movement Science, Centre for Elite Sports Research, Norwegian University of Science and Technology, Trondheim, Norway



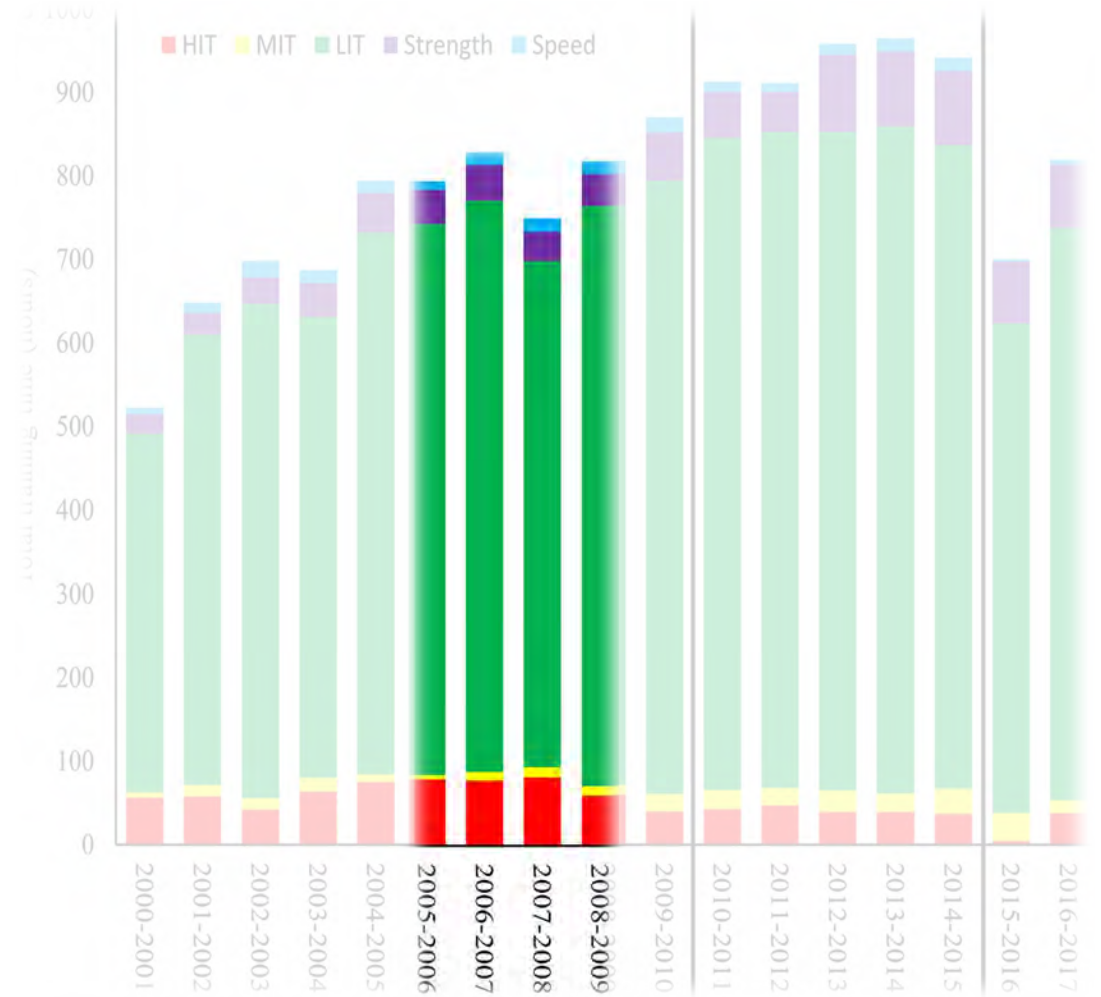
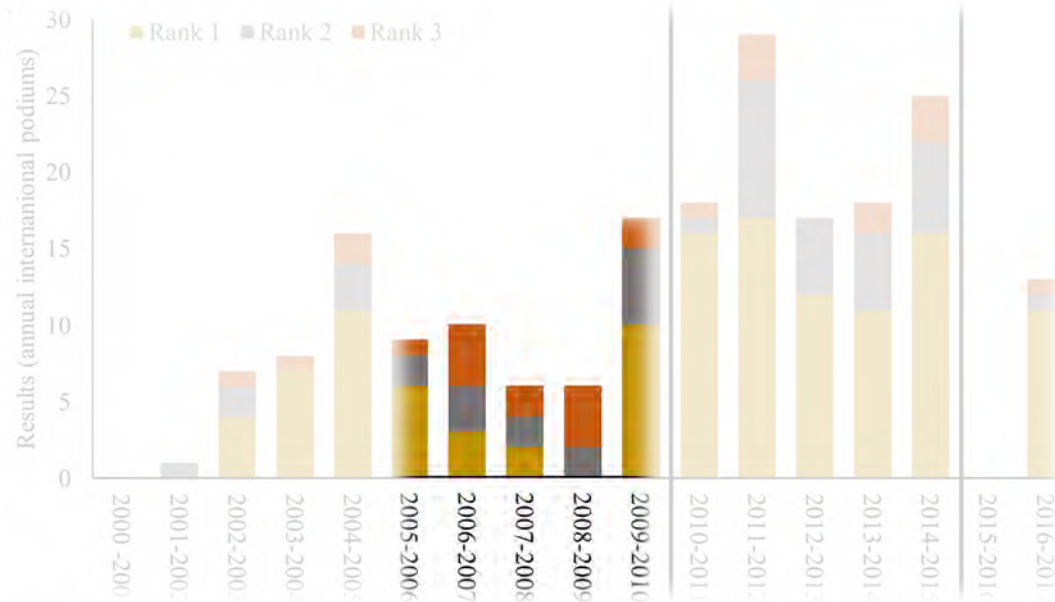
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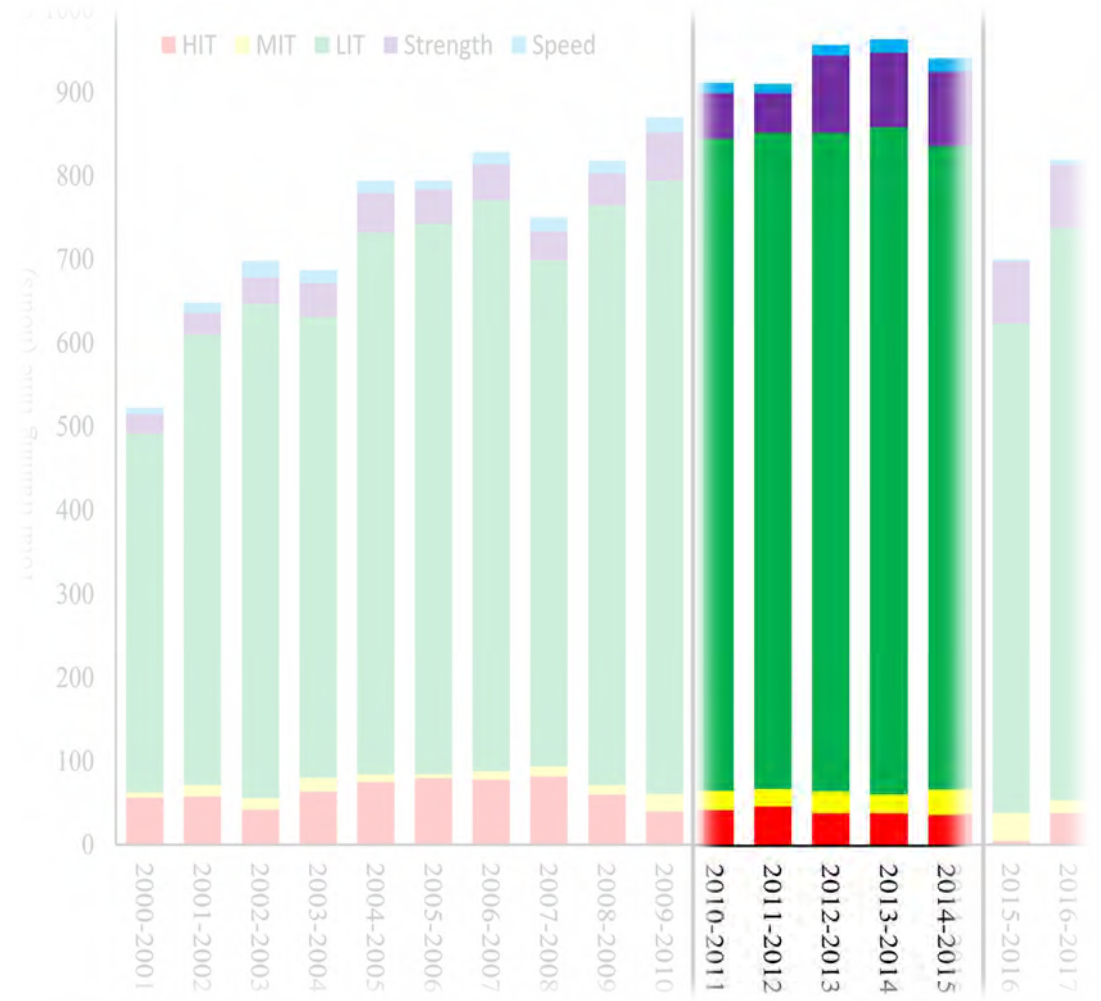
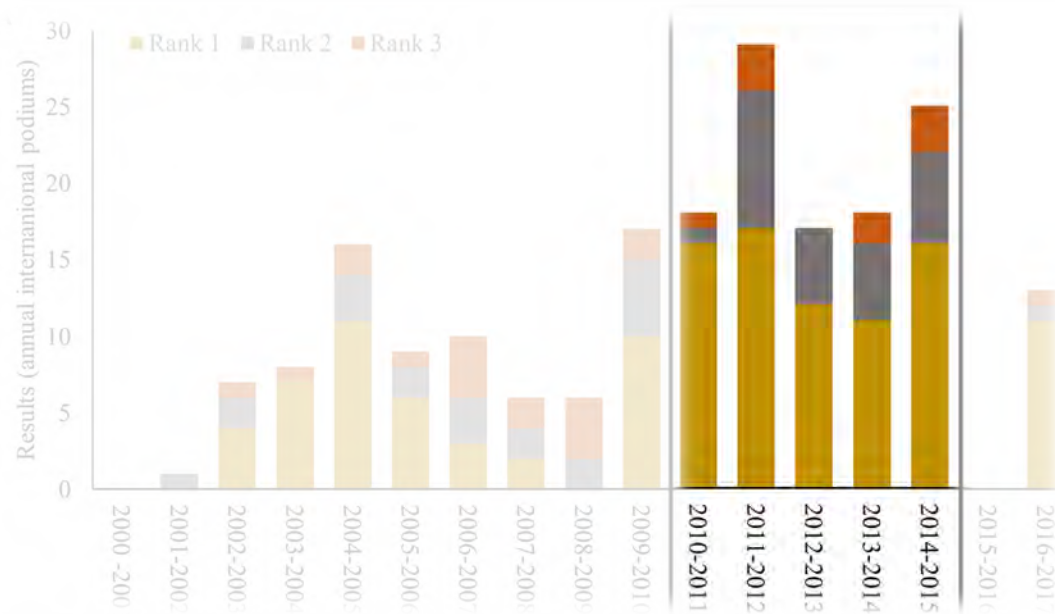
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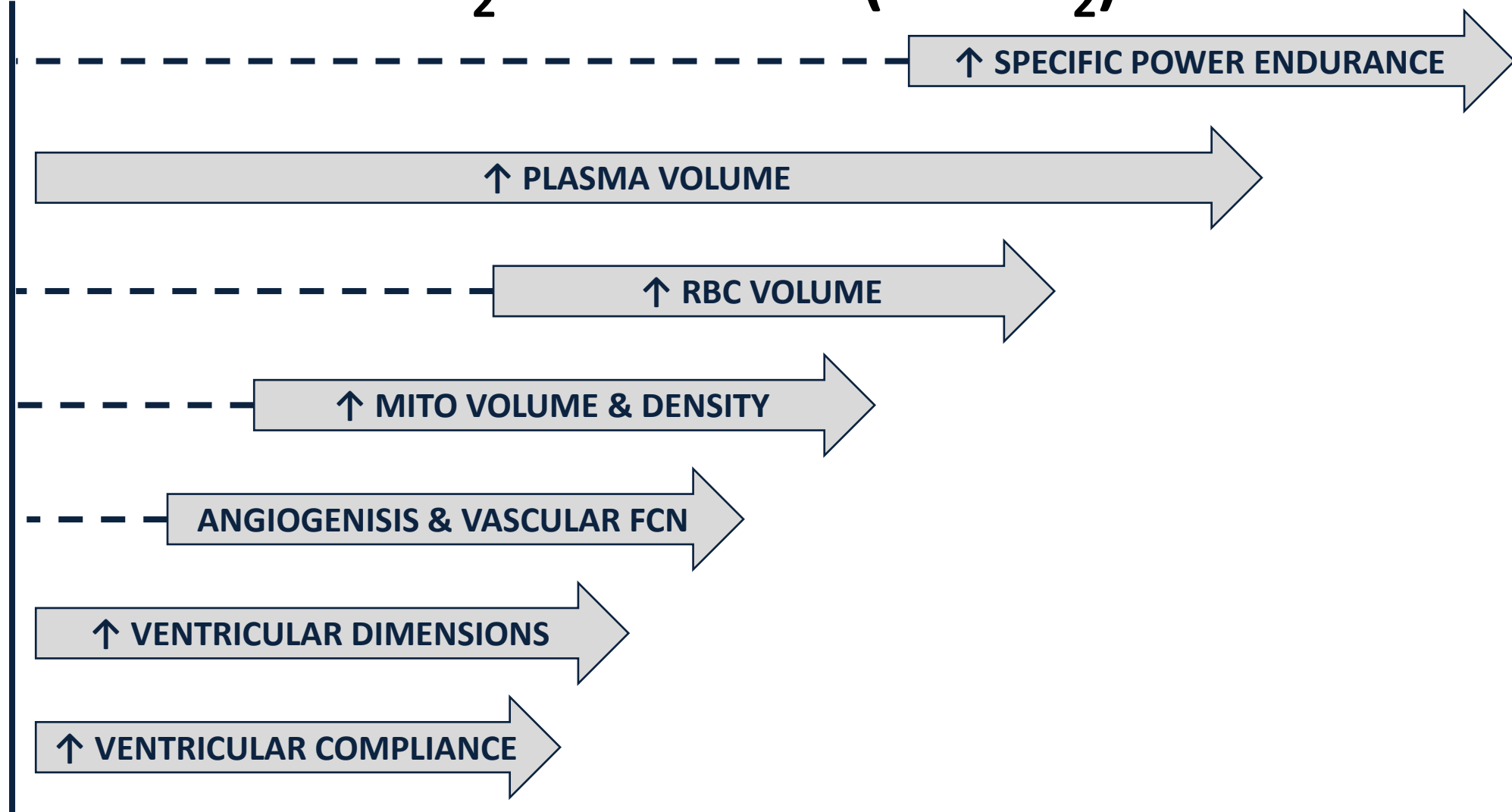
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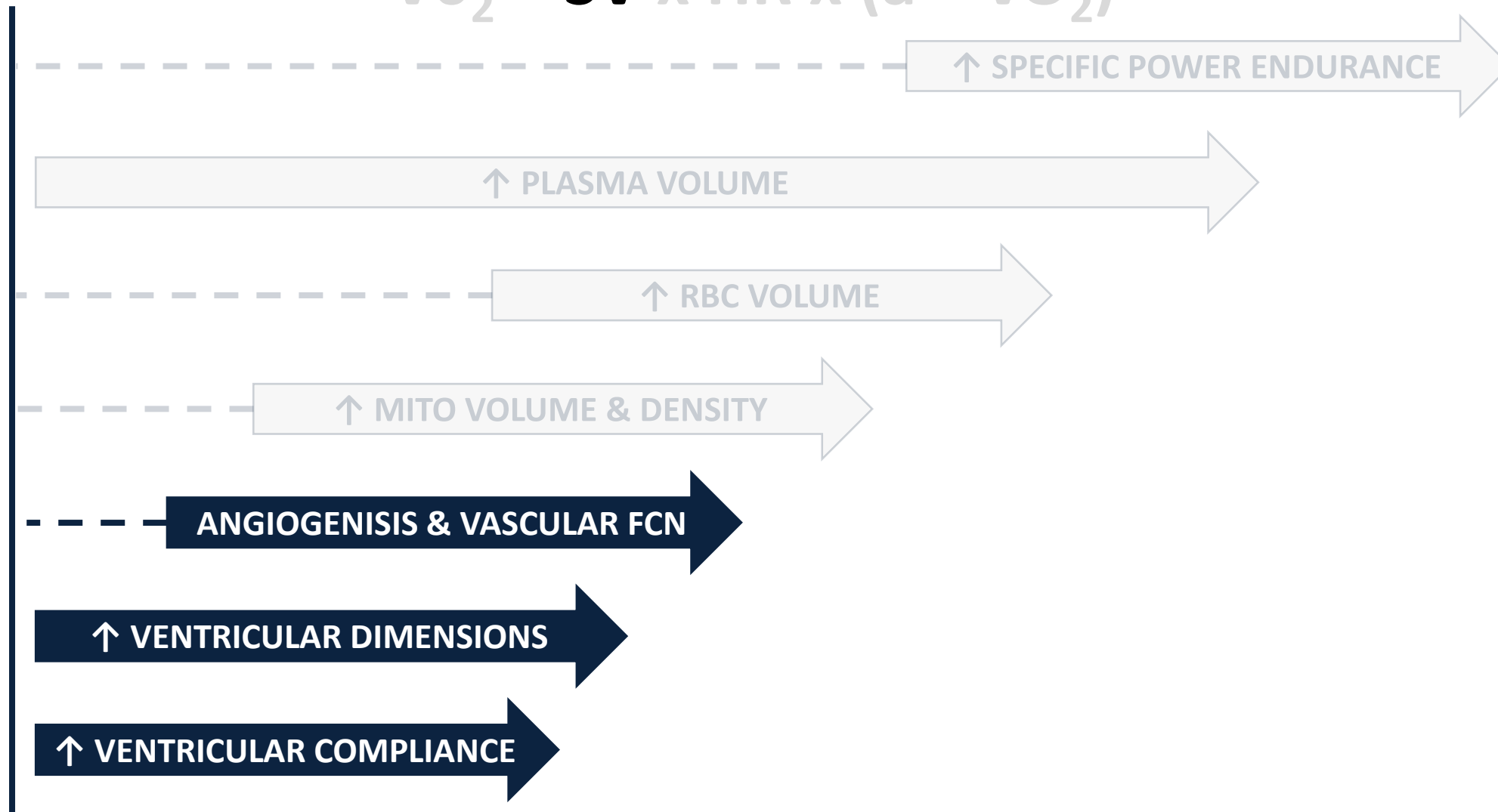
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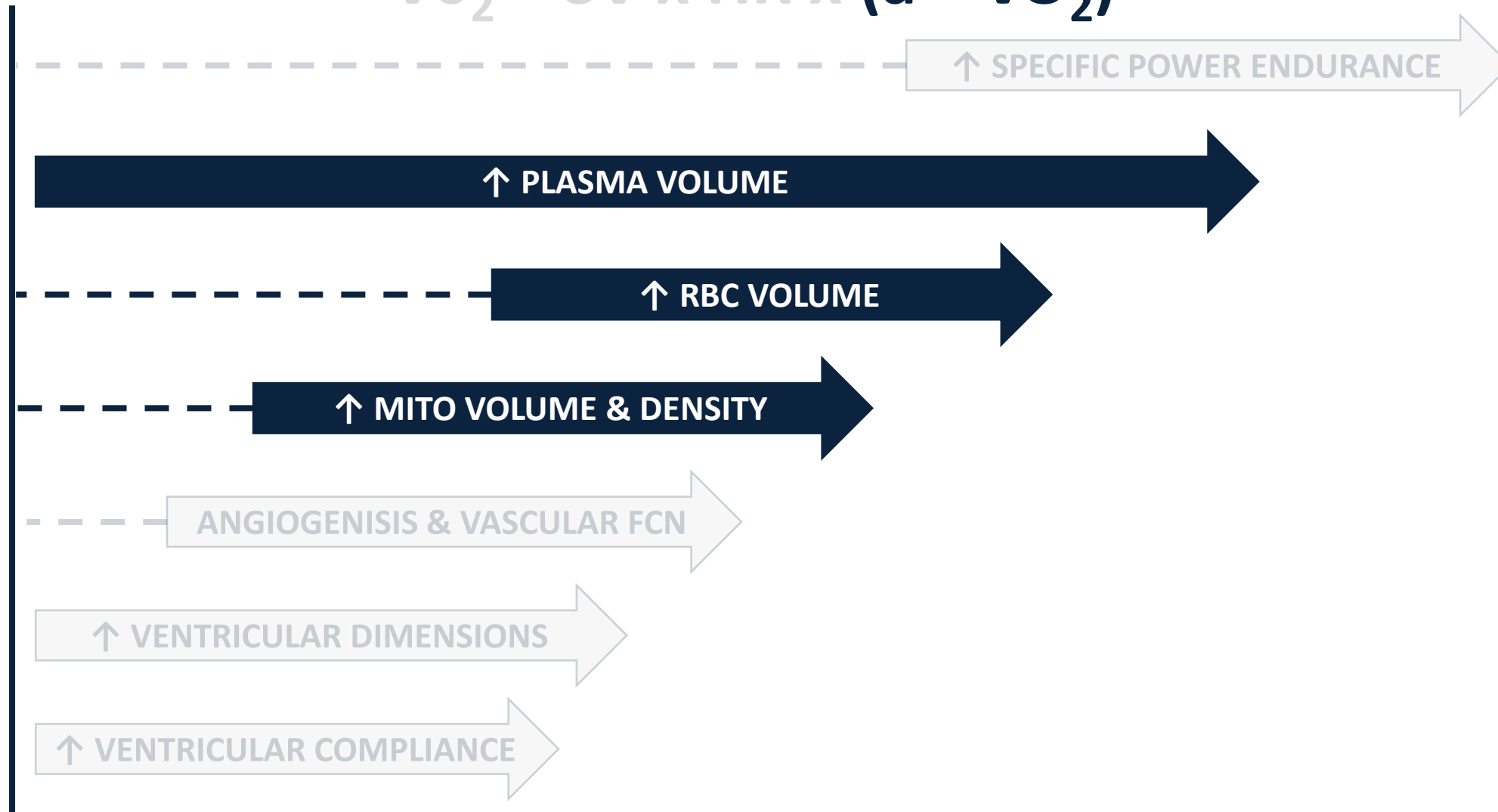
$$VO_2 = SV \times HR \times (a - vO_2)$$



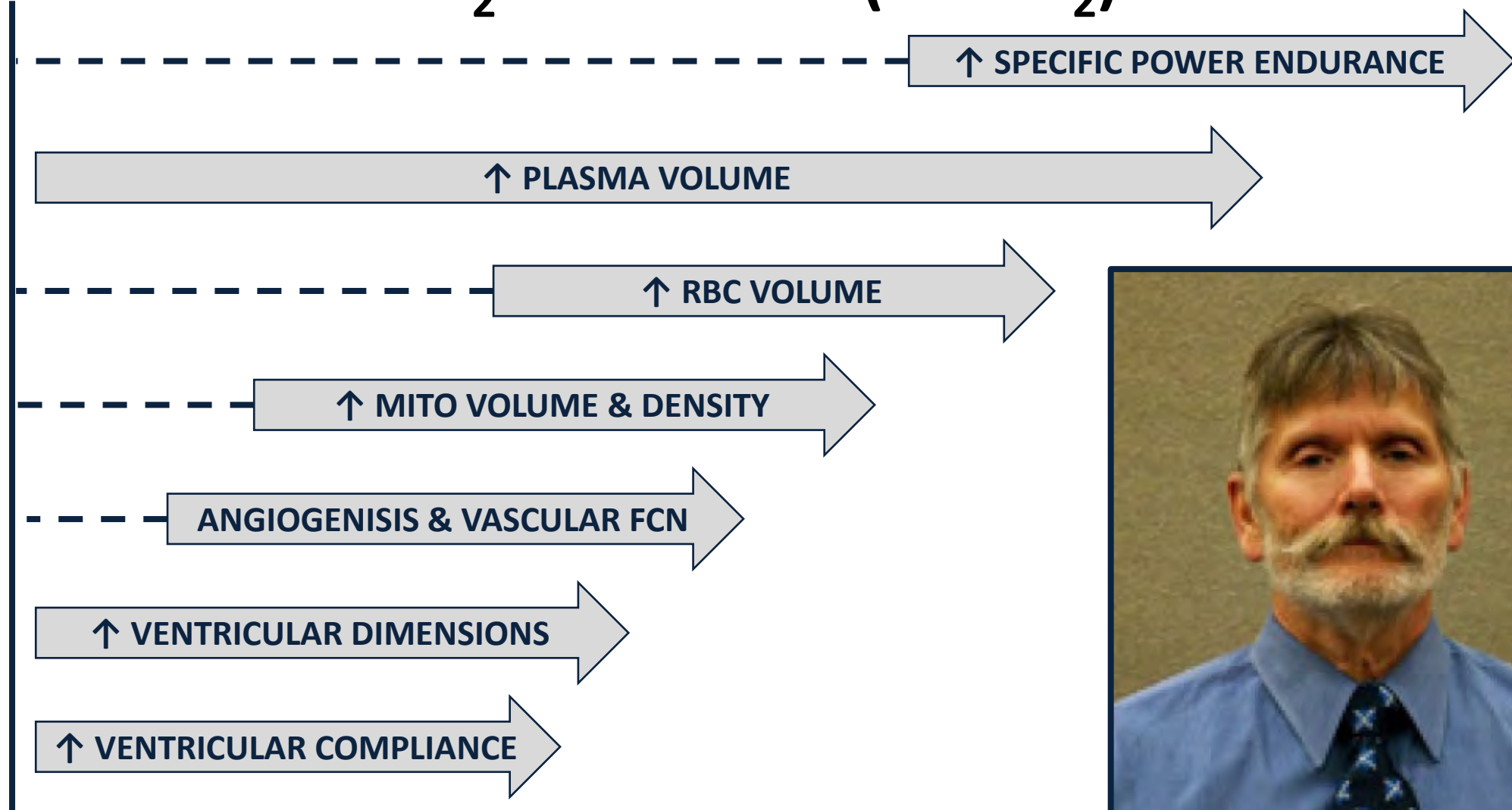
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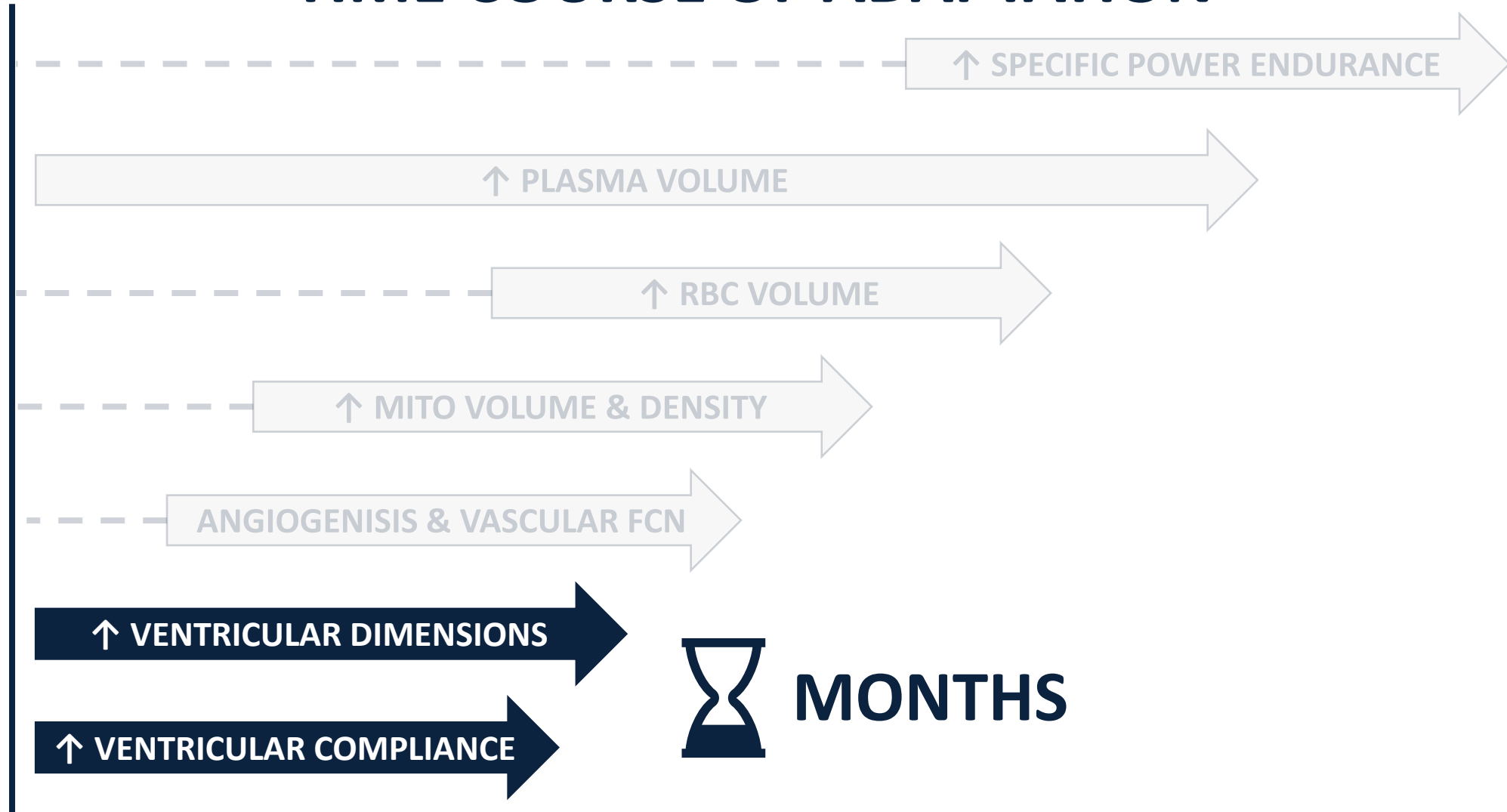
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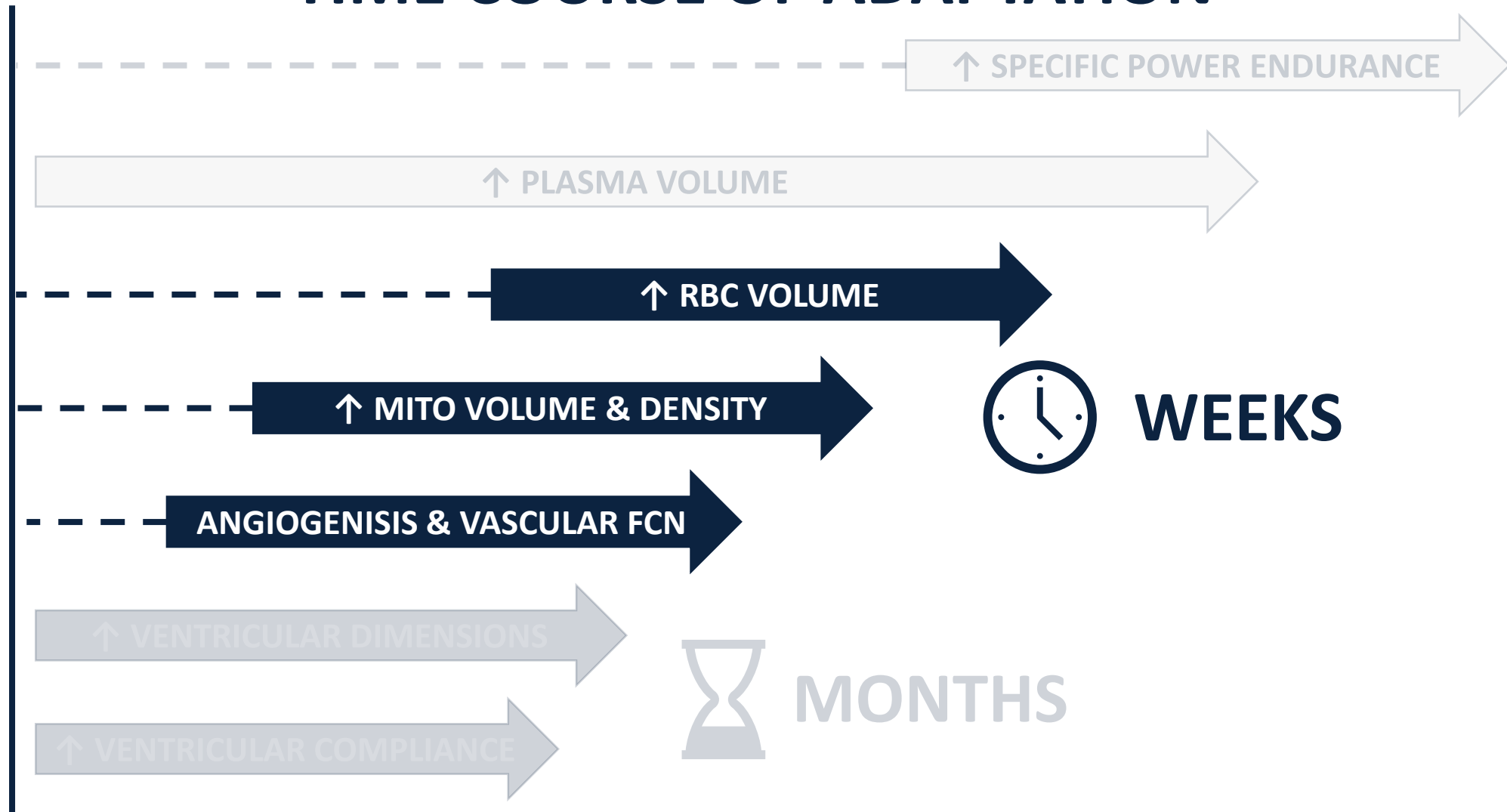
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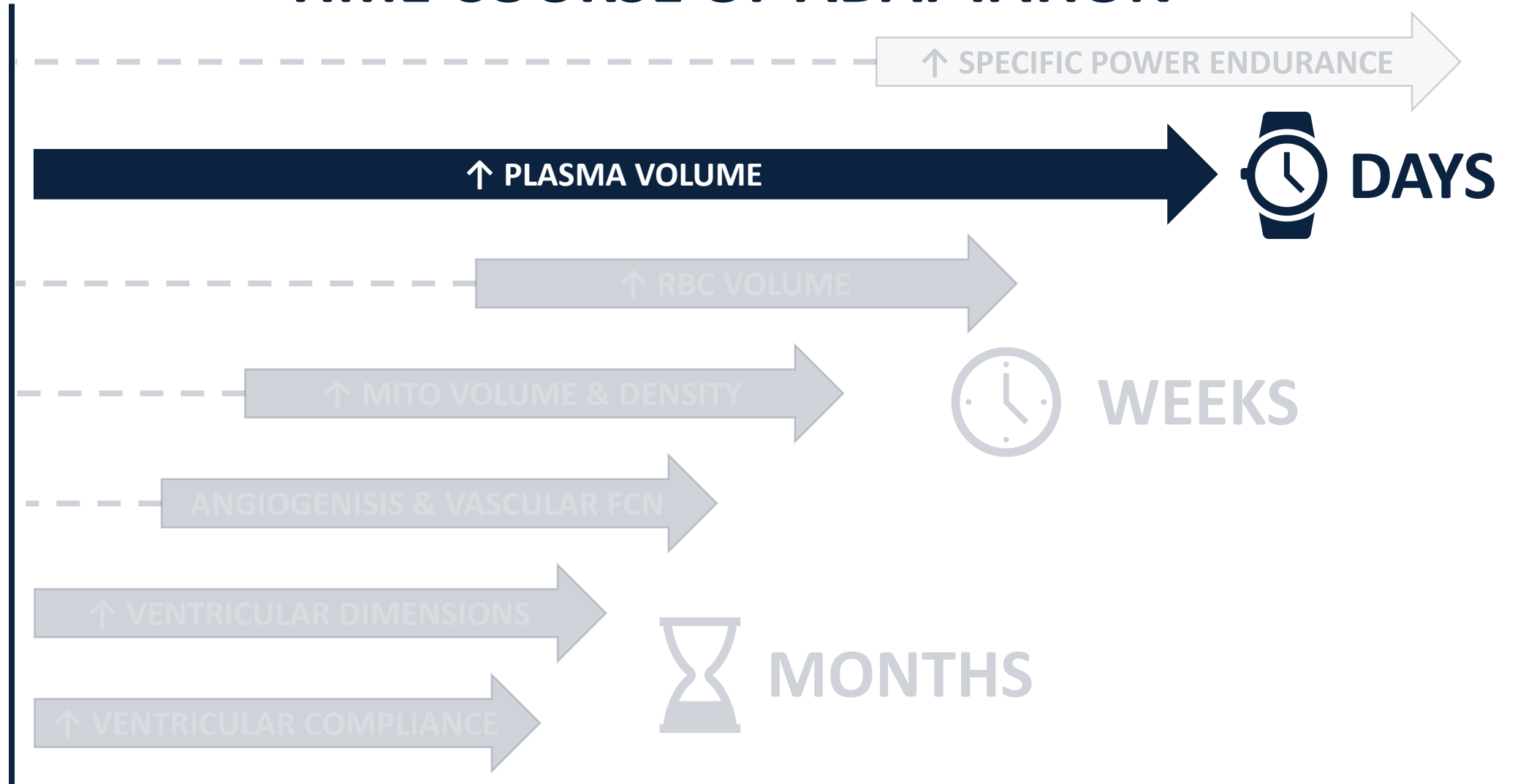
TIME COURSE OF ADAPTATION



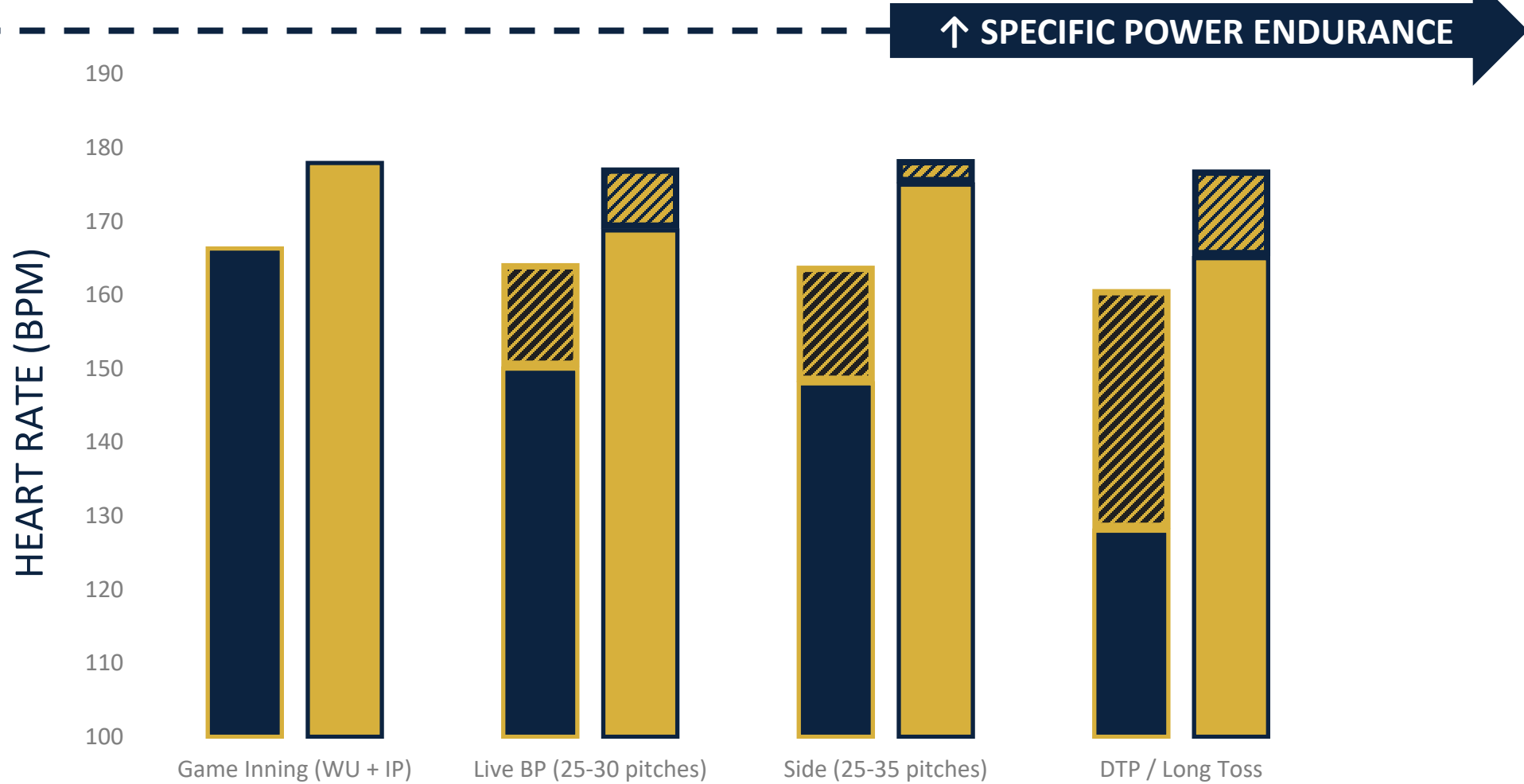
TIME COURSE OF ADAPTATION



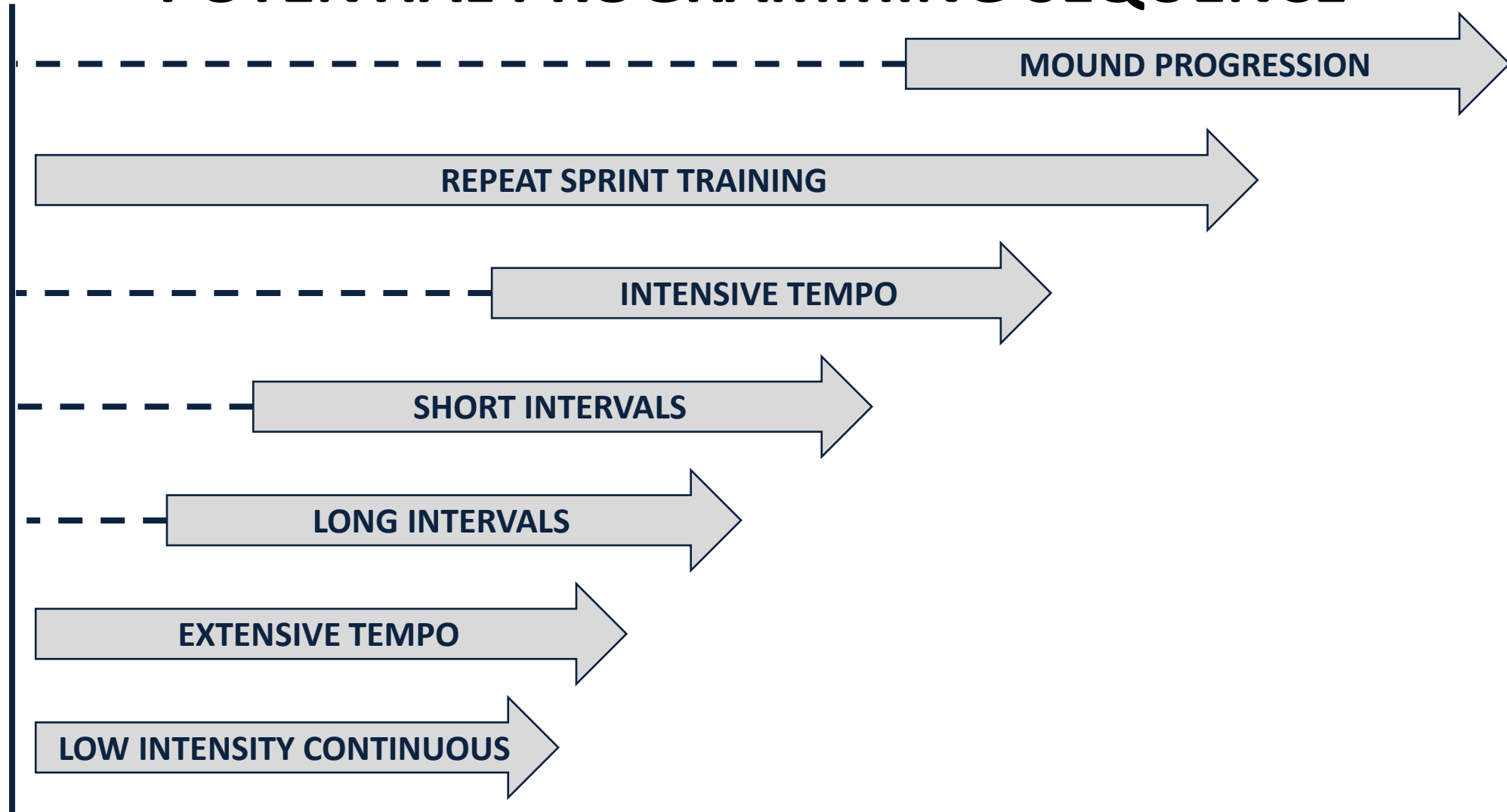
TIME COURSE OF ADAPTATION



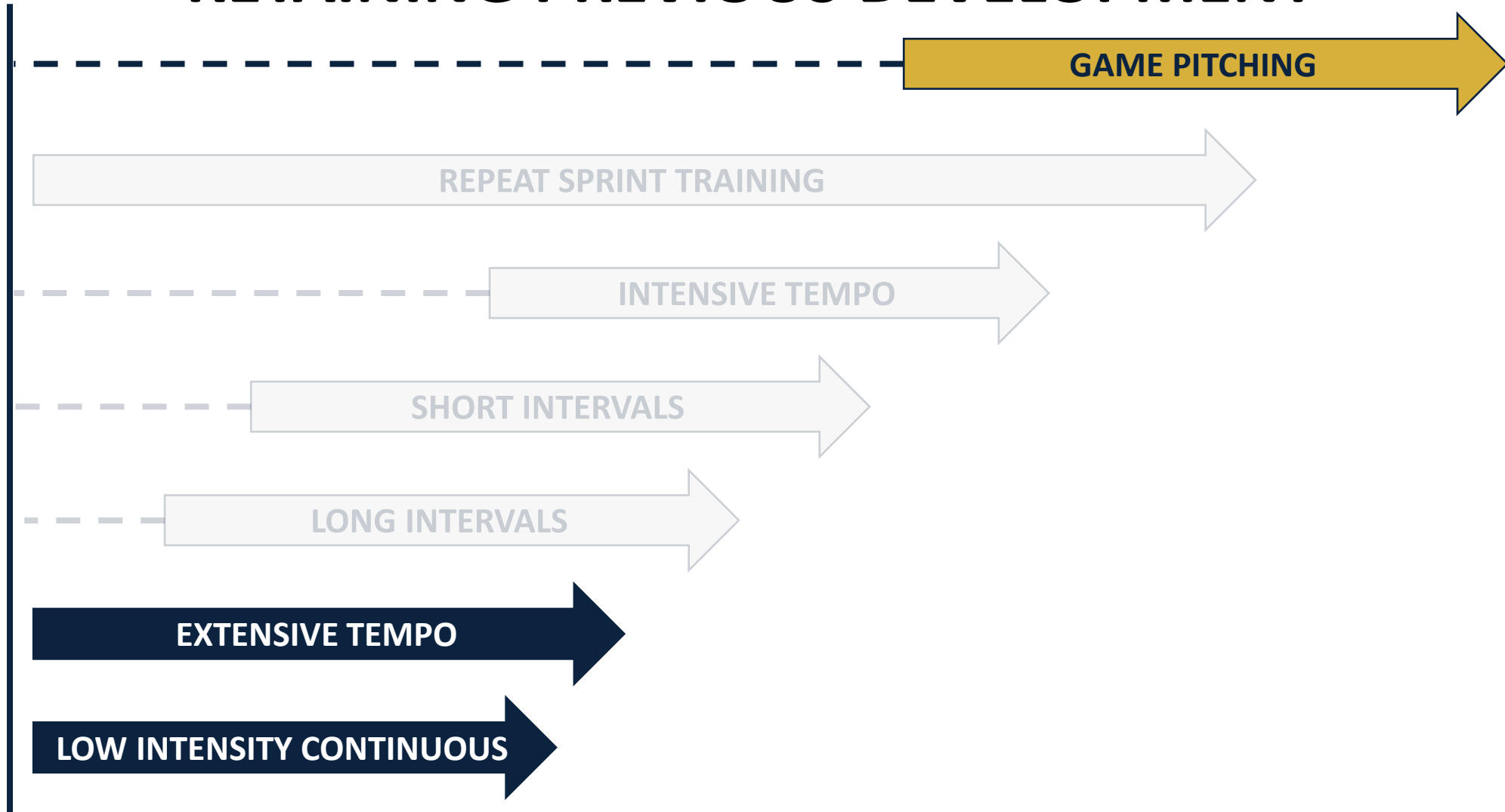
YOU CAN'T RUN THE BALL TO THE PLATE

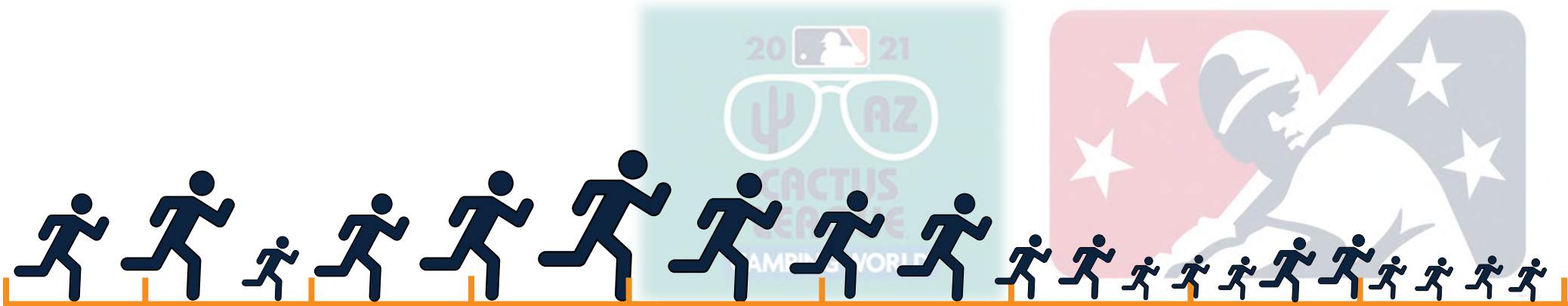


POTENTIAL PROGRAMMING SEQUENCE



RETAINING PREVIOUS DEVELOPMENT





NOVEMBER

JULY

~30% of physical training contents were conditioning
Minimal to no mound work for 2/3 of offseason window



NOVEMBER

JULY

~15% of physical training contents were conditioning
Overall training volume decreased (meaning allocation even less in absolute terms)
Mound work twice every 5-6 days



16.7

17.1



NOVEMBER

JULY



John P. Wagle, PhD, MBA
Cardiovascular Demands of Baseball Pitching



THANK YOU

AUSTIN DRIGGERS

JARRET ABELL

ERIKA WINCHESKI

JUSTIN HAHN

RYAN MAID

MELISSA LAMBERT

DANIEL MACK

J.J. PICOLLO

MICHAEL H. STONE

ERIC McMAHON



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