

# PROTEIN RECOMMENDATIONS FOR ATHLETES

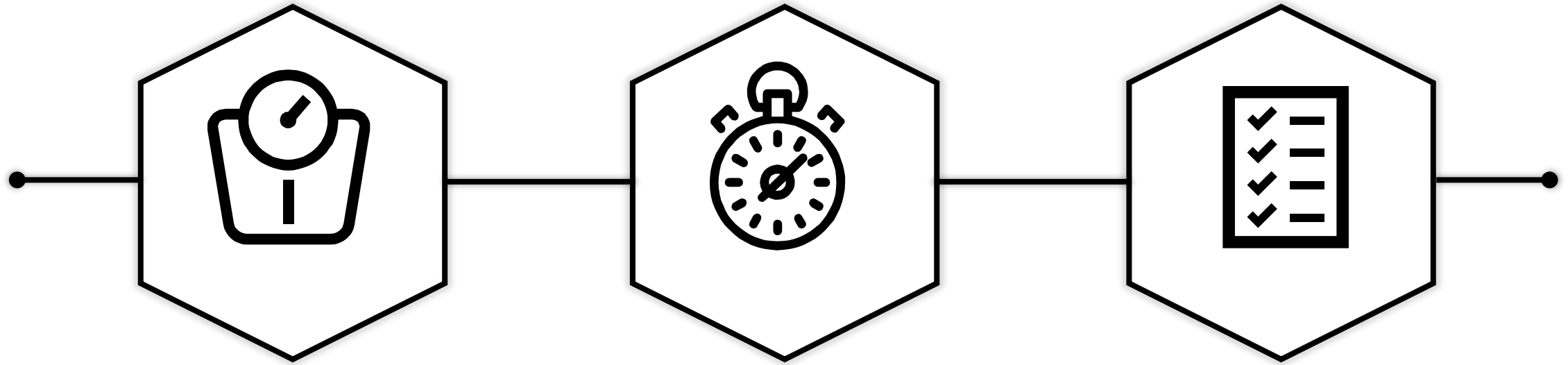


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# OVERVIEW

- Protein recommendations for both endurance and resistance athletes
- Effect of protein quality on endurance and resistance exercise
- Balancing protein intake
- Benefits of protein for structural tissues



Amount

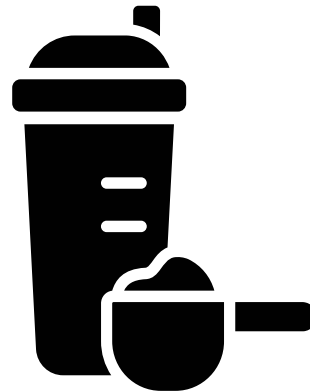
Timing

Type

How does protein amount and quality affect...



Resistance Training  
Weightlifting



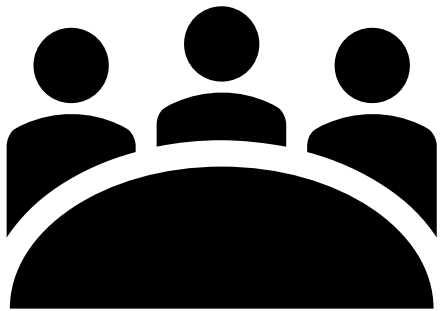
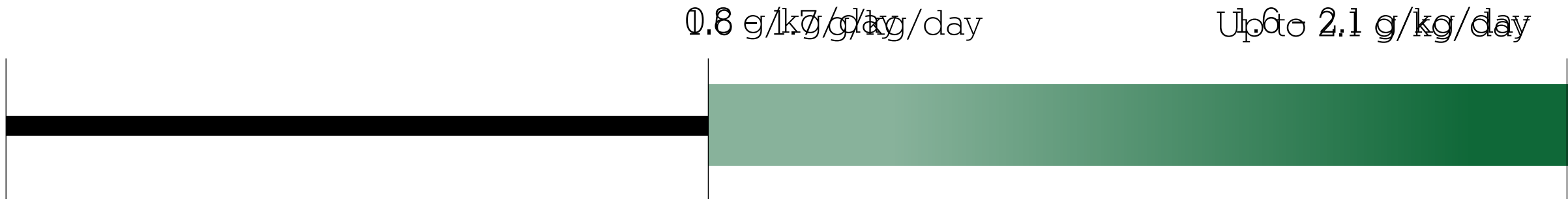
VS



Aerobic Training  
Endurance exercise



# DAILY PROTEIN RECOMMENDATIONS



RDA for healthy adults



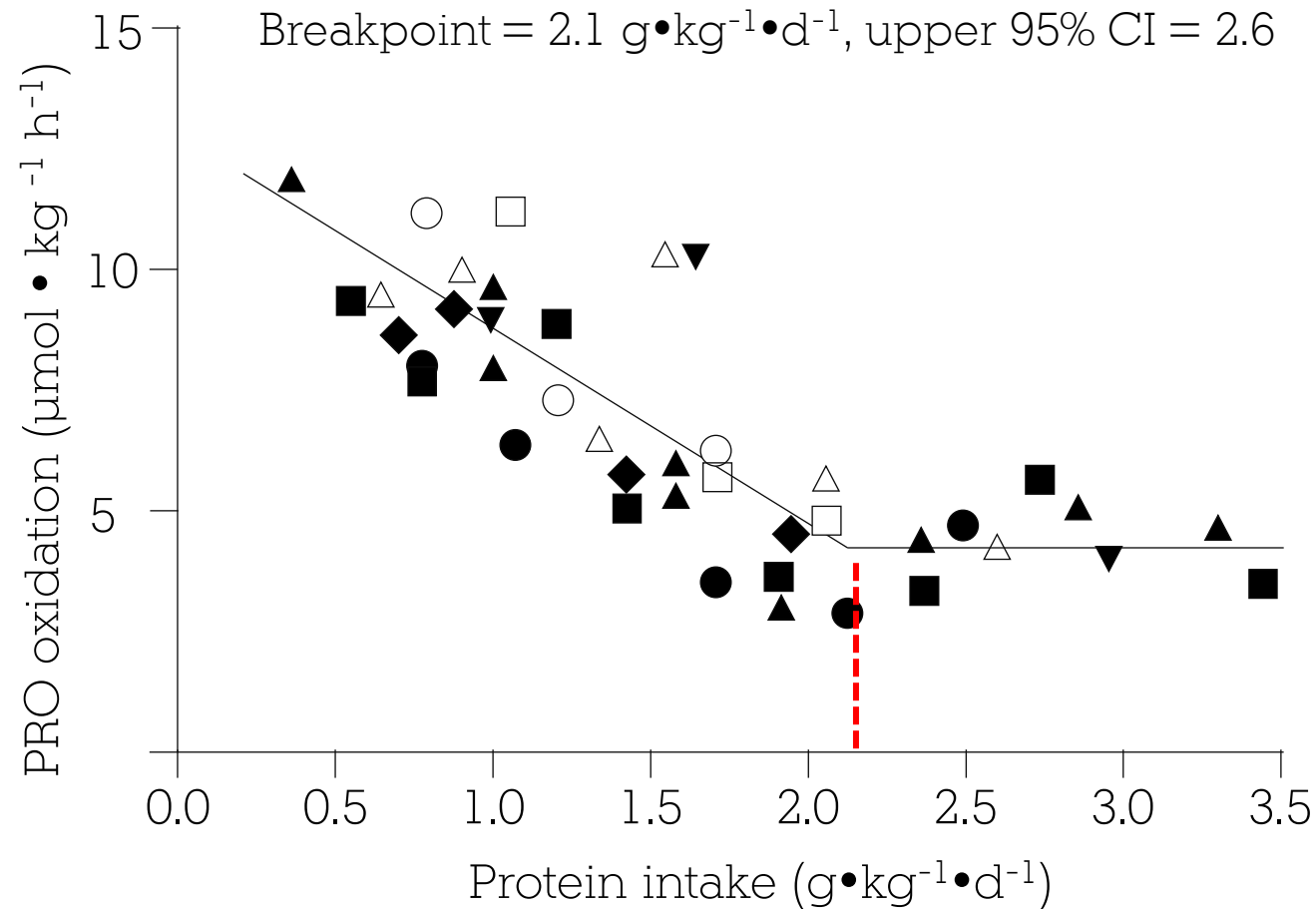
Strength training



Endurance training

# DAILY PROTEIN RECOMMENDATIONS

## Why the High Amount for Endurance Athletes?



Endurance trained men  
Habitual training = 6 d/week  
 $\text{VO}_2 = 64.1 \pm 3.7 \text{ ml/kg/min}$

Require:  
 $\sim 2.1 \text{ g/kg/day protein}$



# HABITUAL PROTEIN INTAKE

	Triathletes (n = 25)	Marathoners (n = 19)	Weightlifters (n = 19)
PRO (g/kg)	<b>2.0 ± 0.5</b>	<b>2.0 ± 0.4</b>	<b>1.9 ± 0.6</b>

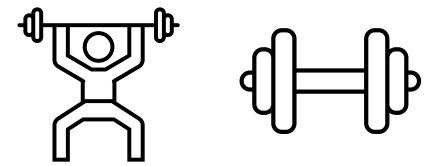
Analysis of dietary intake of elite Australian athletes highlighted that total protein intake is similar amongst endurance athletes and resistance trained athletes.

~2.0 g/kg/day

**But if we simply look at protein in grams/kg what might we be missing?**

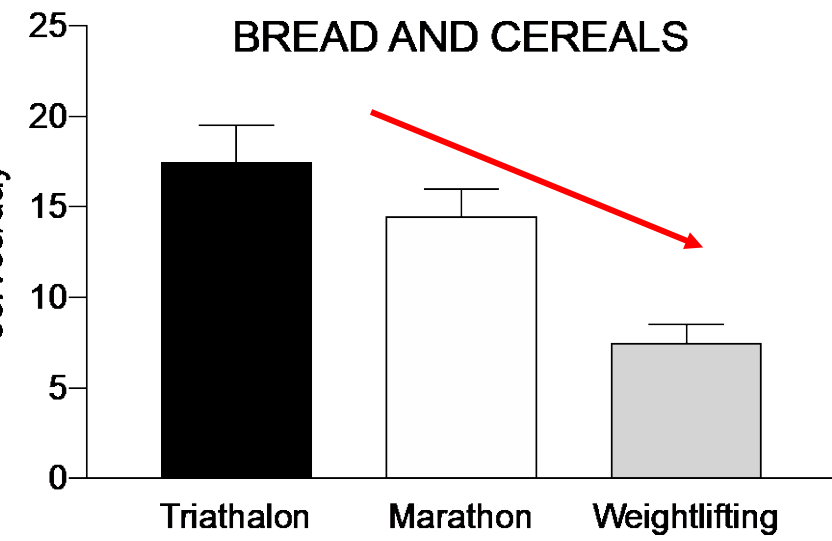
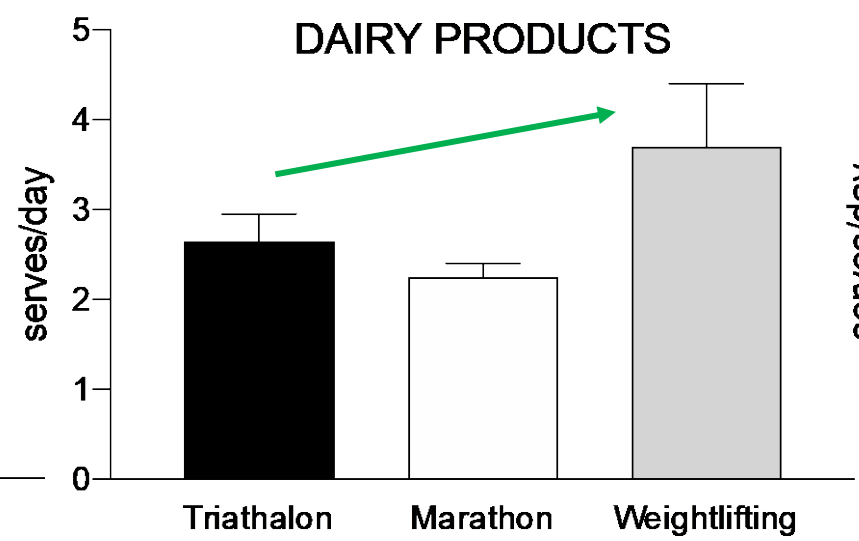
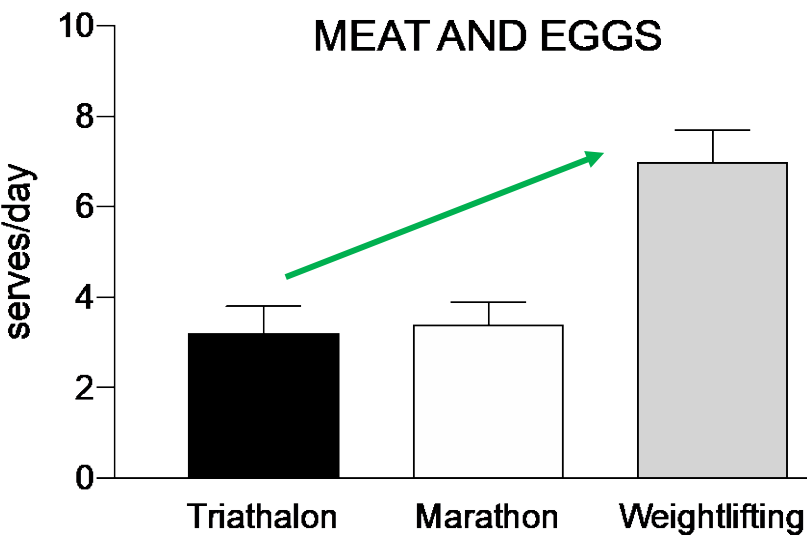


# HABITUAL PROTEIN INTAKE



Endurance athletes get more of their total protein from bread and cereals (plant-based protein sources).

Resistance trained athletes get more of their total protein from dairy, meat, and eggs (animal-based protein sources).





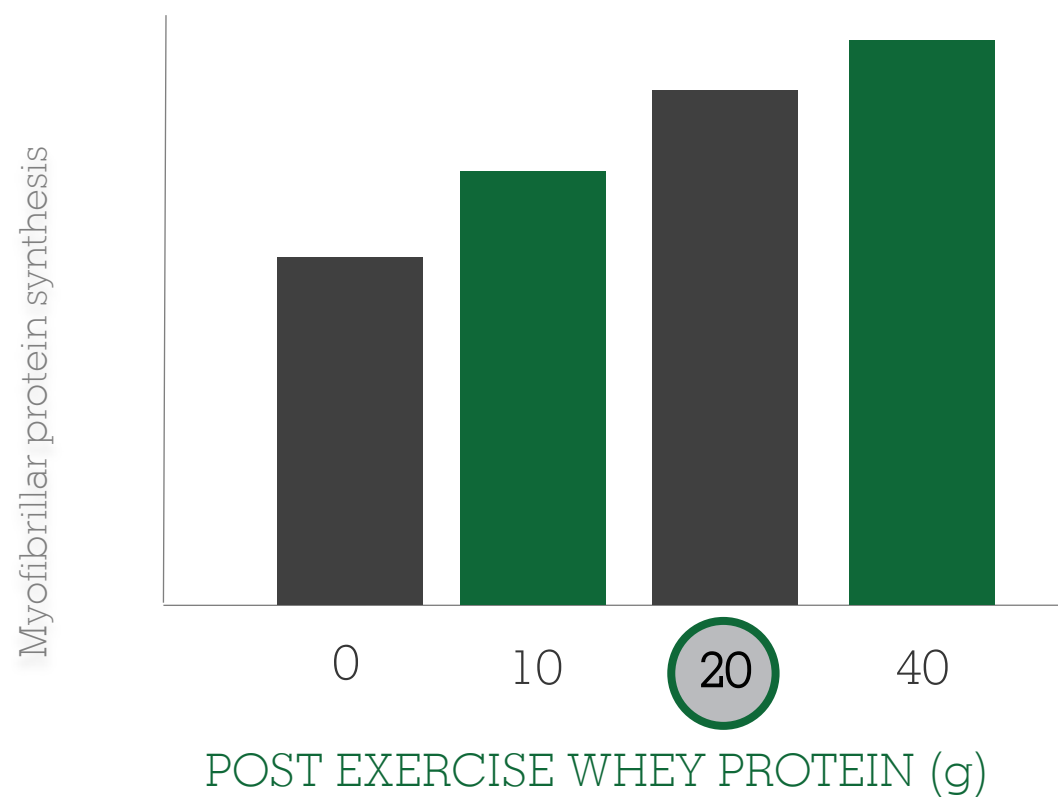
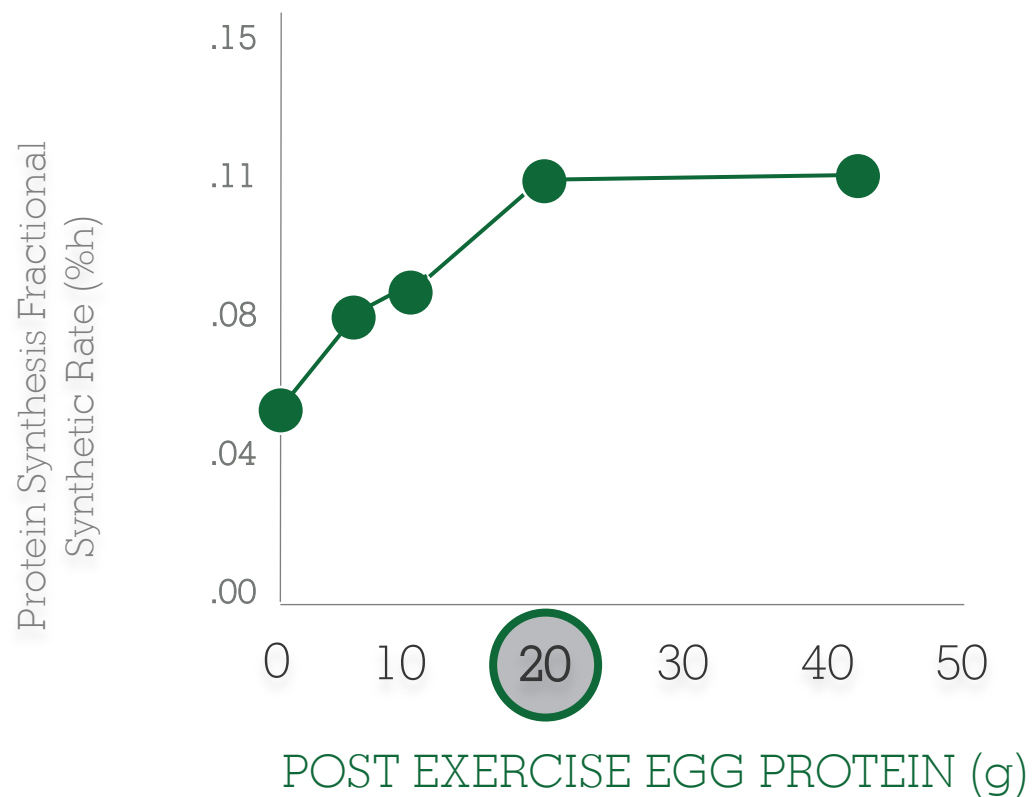


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## POST EXERCISE PROTEIN INTAKE

# POST EXERCISE PROTEIN INTAKE

## Dose-Response: Resistance Exercise

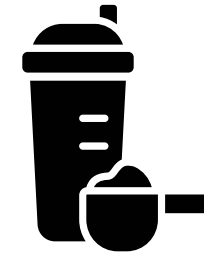
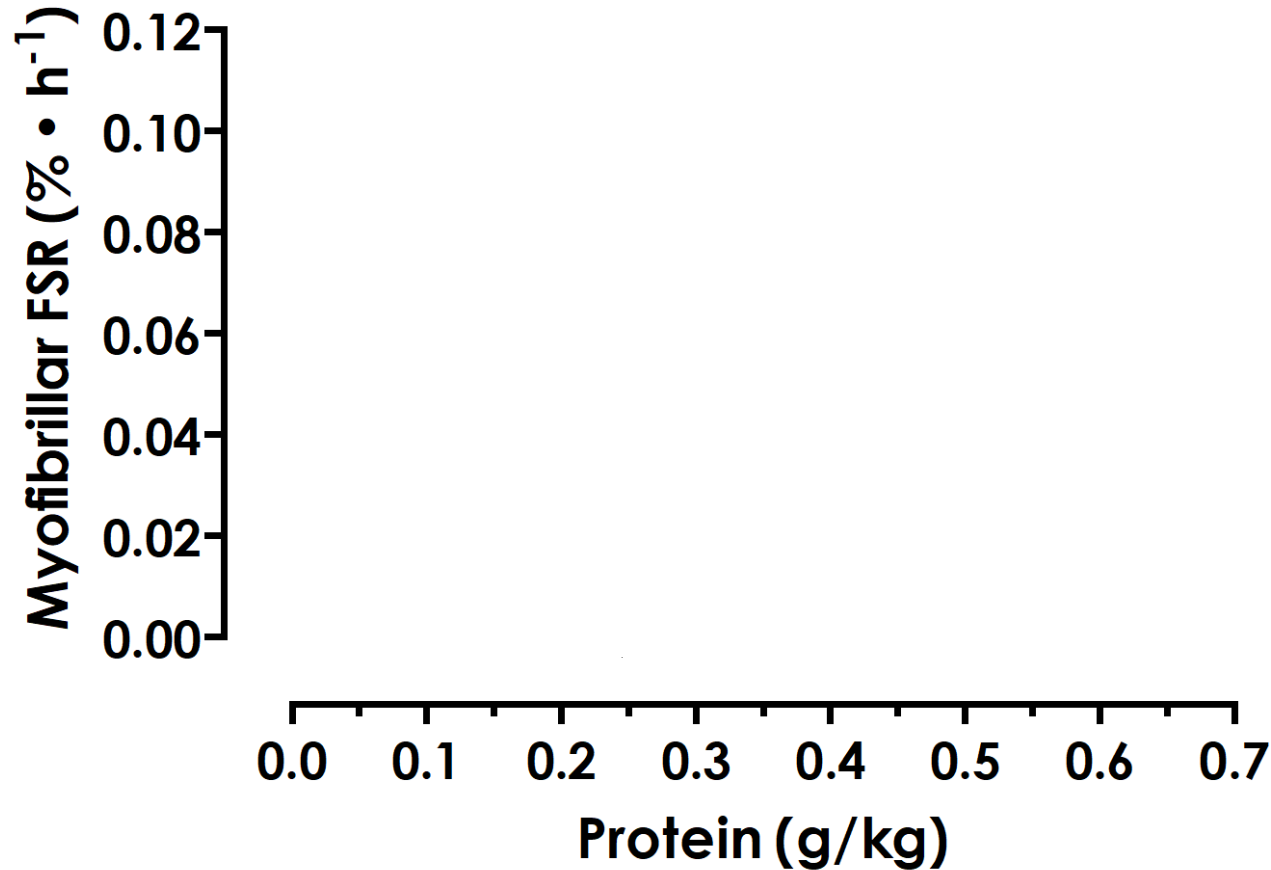


SSE#172



# RELATIVE PROTEIN RECOMMENDATIONS

One size does not fit all



Whey or egg protein



n = 65

Breakpoint = point where no further  
in MPS with greater protein intake



= 0.24 g/kg/dose

**Current recommendations:  
0.24 – 0.31 g/kg/dose**

# RELATIVE PROTEIN RECOMMENDATIONS

This allows for better protein personalization



0.25-0.30  
g/kg



288 LBS  
X 0.30 (g/kg)  

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39 g PROTEIN

135 LBS  
X 0.30 (g/kg)  

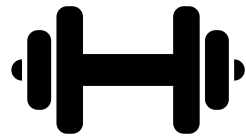
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18 g PROTEIN

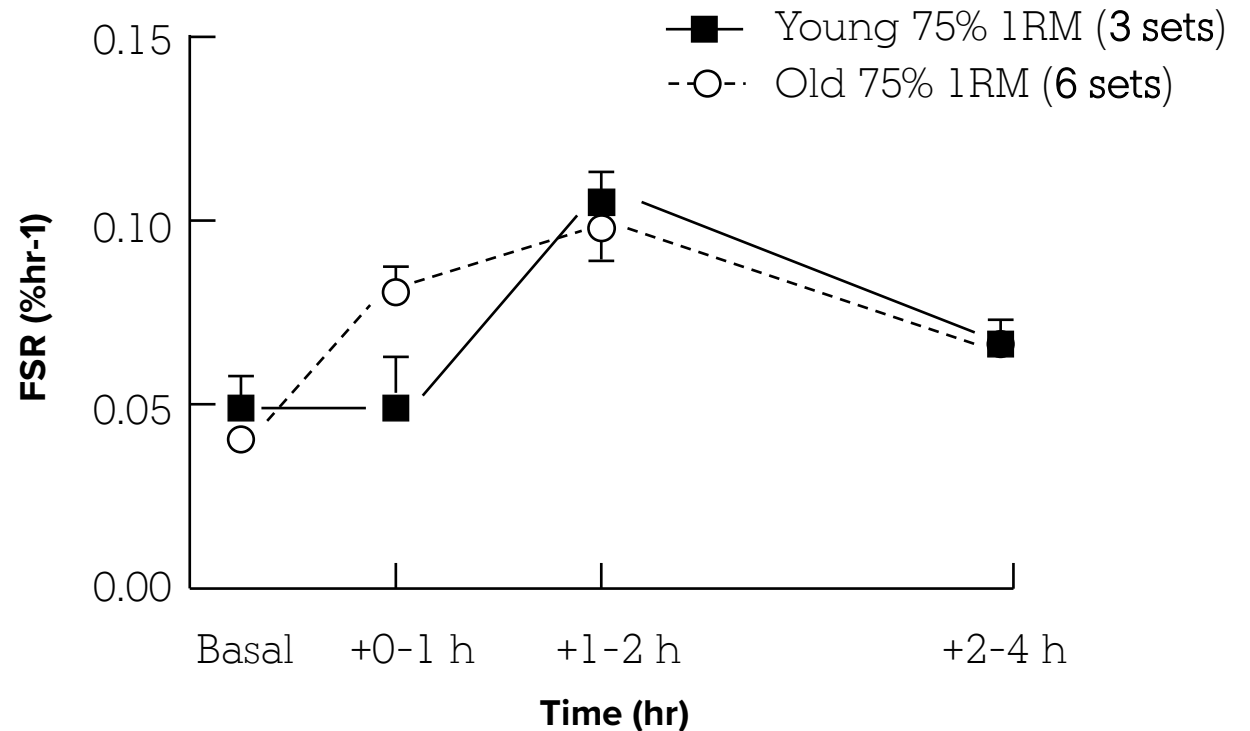
# CONSIDERATIONS FOR AGING ATHLETES

Older adults exhibit a dampened MPS response to both exercise and protein ingestion

**Older adults (> 60 years) require:**

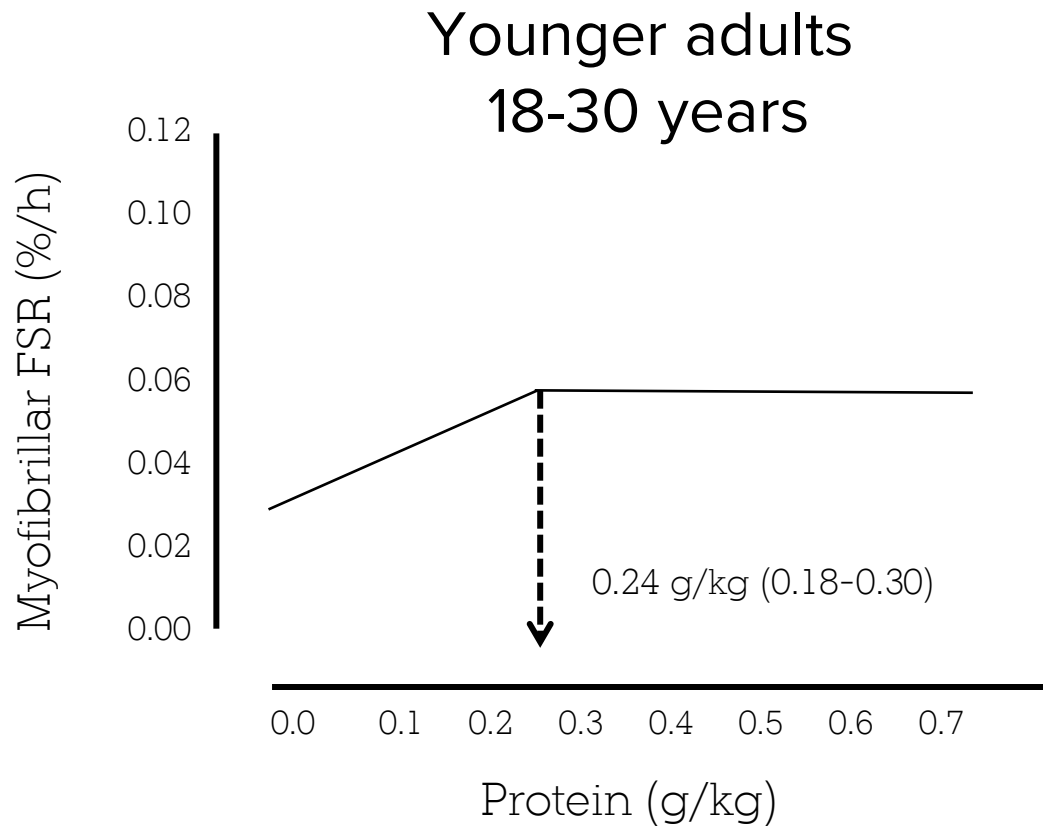


**100% > volume to achieve the same MPS as young adults**



Given the synergistic effects of protein and resistance exercise to increase MPS how should protein dose be modulated?

# CONSIDERATIONS FOR AGING ATHLETES



= ~63% greater protein requirement per dose



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# THE IMPACT OF PROTEIN SOURCE ON RESISTANCE TRAINING ADAPTATIONS

COSMED  
Pulmonary Function Equipment

T20



# RECOVERY PROTEIN CHOICE CRITERIA

**1** Complete protein

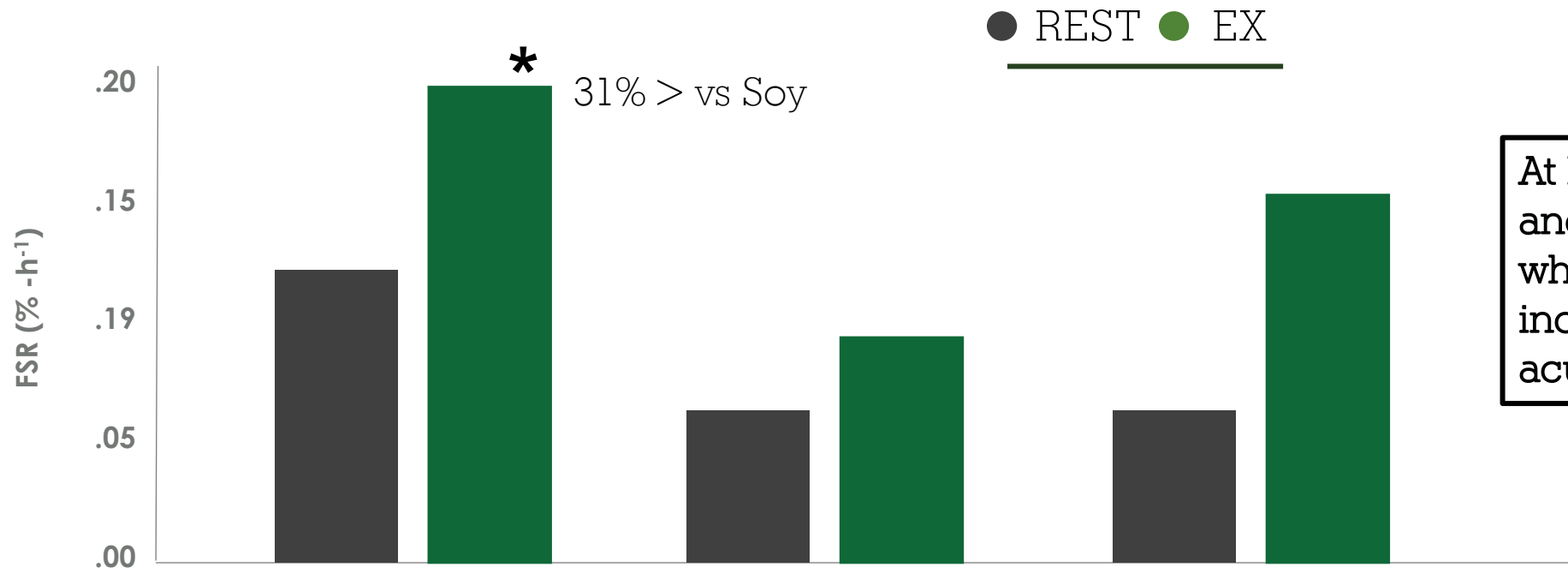
**2** Rapidly digested/absorbed

**3** Leucine rich





# PROTEIN SOURCE



At both REST and EX, whey > soy for increases in acute MPS

- ✓ Complete protein
- ✓ Rapidly digestible
- ✓ High leucine

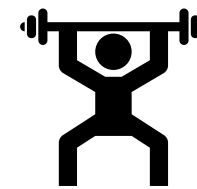
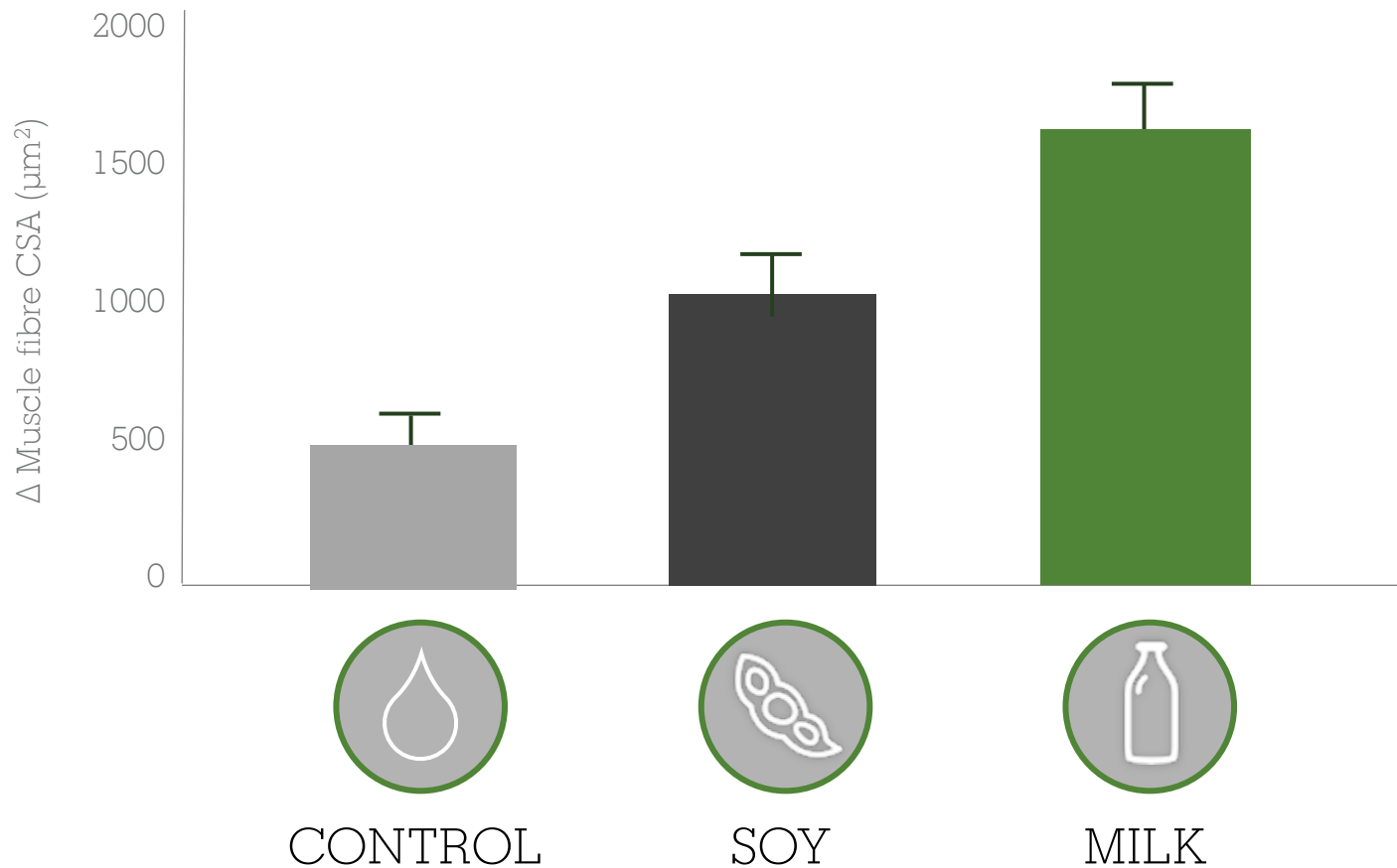
✓  
✓  
✓  
WHEY

✓  
✓  
CASEIN

✓  
✓  
✓  
SOY

# PROTEIN SOURCE

Prolonged consumption of milk protein augments training-induced muscle gains.



12 weeks, 5d/week

500 ml Soy Milk

500 ml Cow's Milk

Isoenergetic CHO control

Milk consumption after exercise =  $\uparrow$  muscle fiber CSA compared to soy

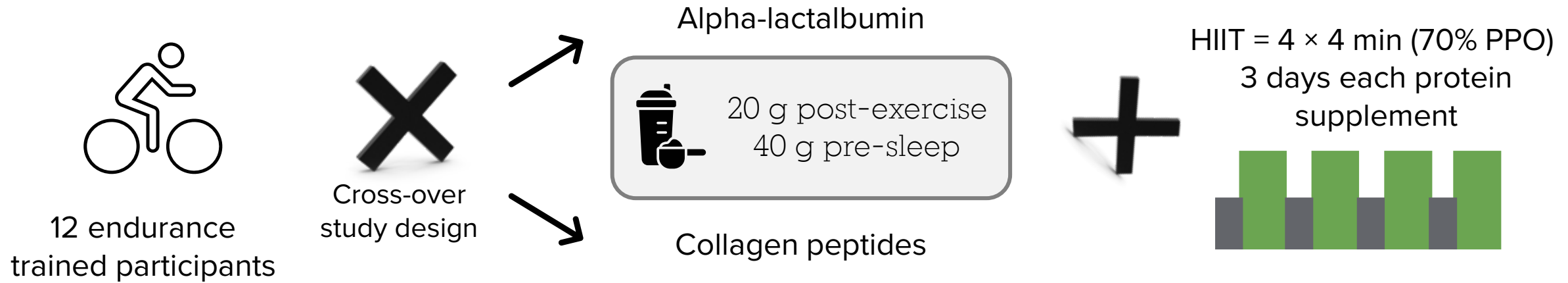


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# THE IMPACT OF PROTEIN SOURCE ON ENDURANCE TRAINING ADAPTATIONS

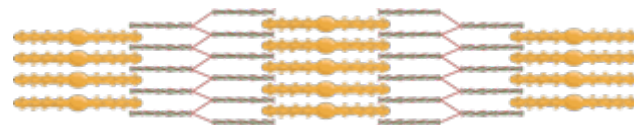
# PROTEIN FOR ENDURANCE EXERCISE

How does protein source affect the response to endurance exercise?



Measured:

Muscle Protein Synthesis (MPS)

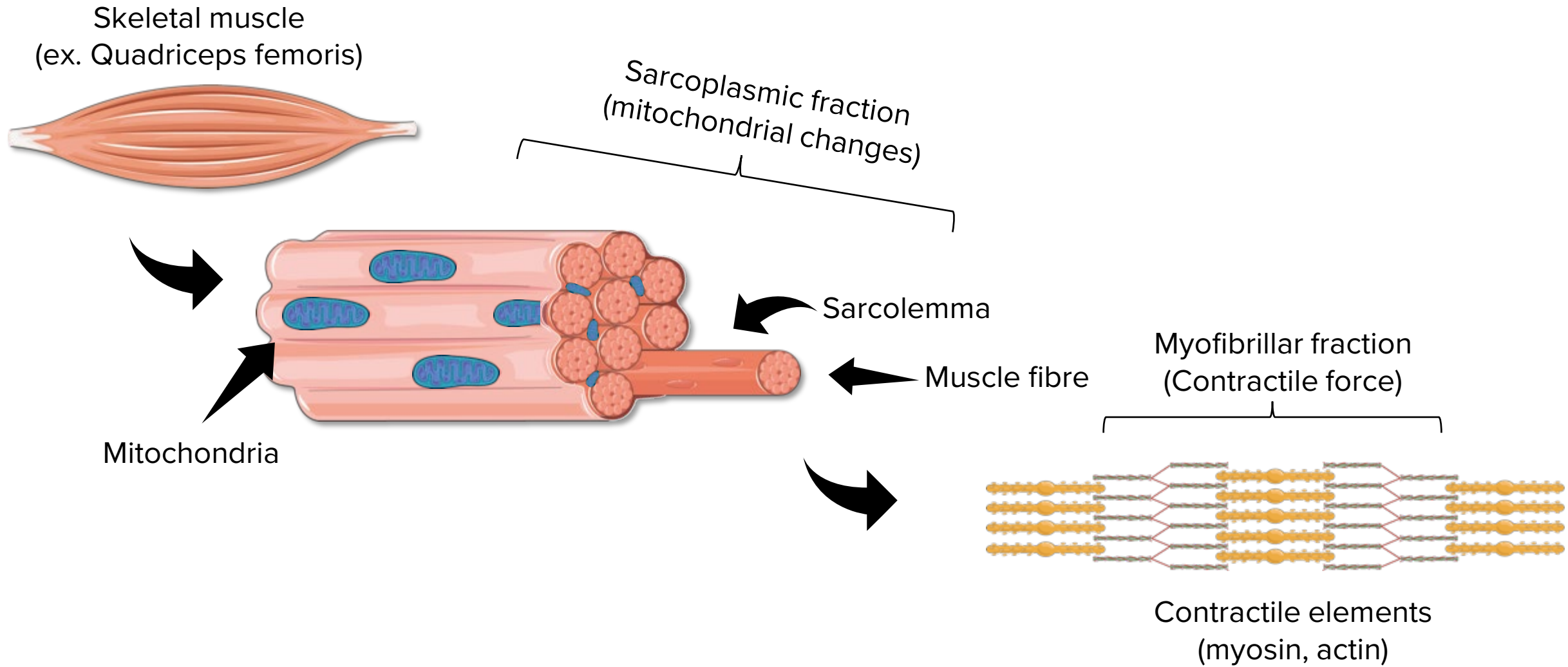


Myofibrillar MPS  
(MyoPS)



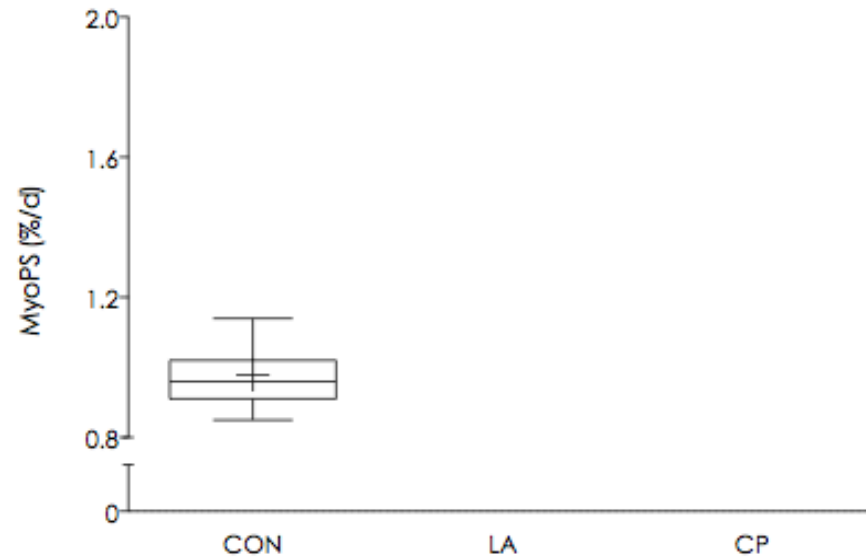
Sarcoplasmic MPS  
(SarcPS)

# REVIEW: SKELETAL MUSCLE STRUCTURE

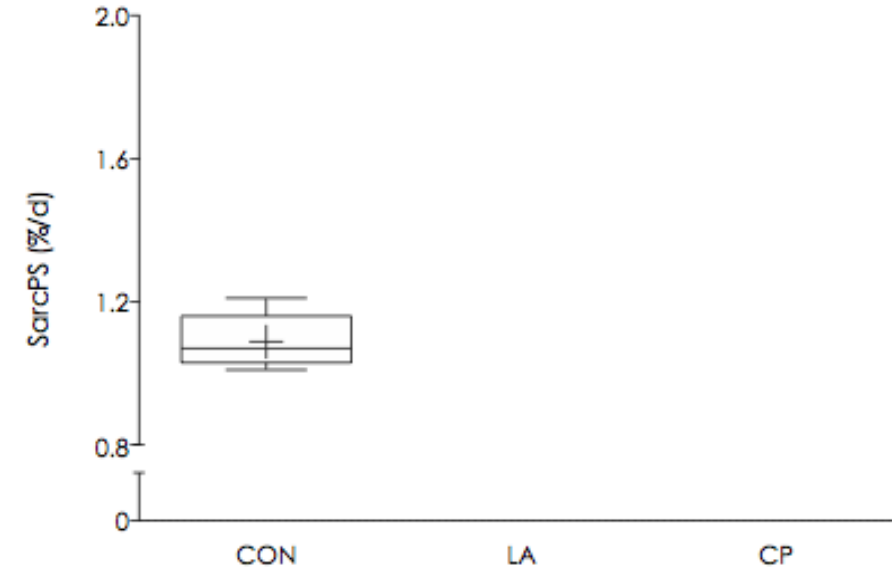


# PROTEIN FOR ENDURANCE EXERCISE

How does protein source affect the response to endurance exercise?



Contractile elements



Mitochondrial elements

High quality protein => increases in both Myo and Sarc MPS

PDCAAS: LA = 1.0 CP = 0 (void of Tryp)

Protein quality still matters for endurance athletes!



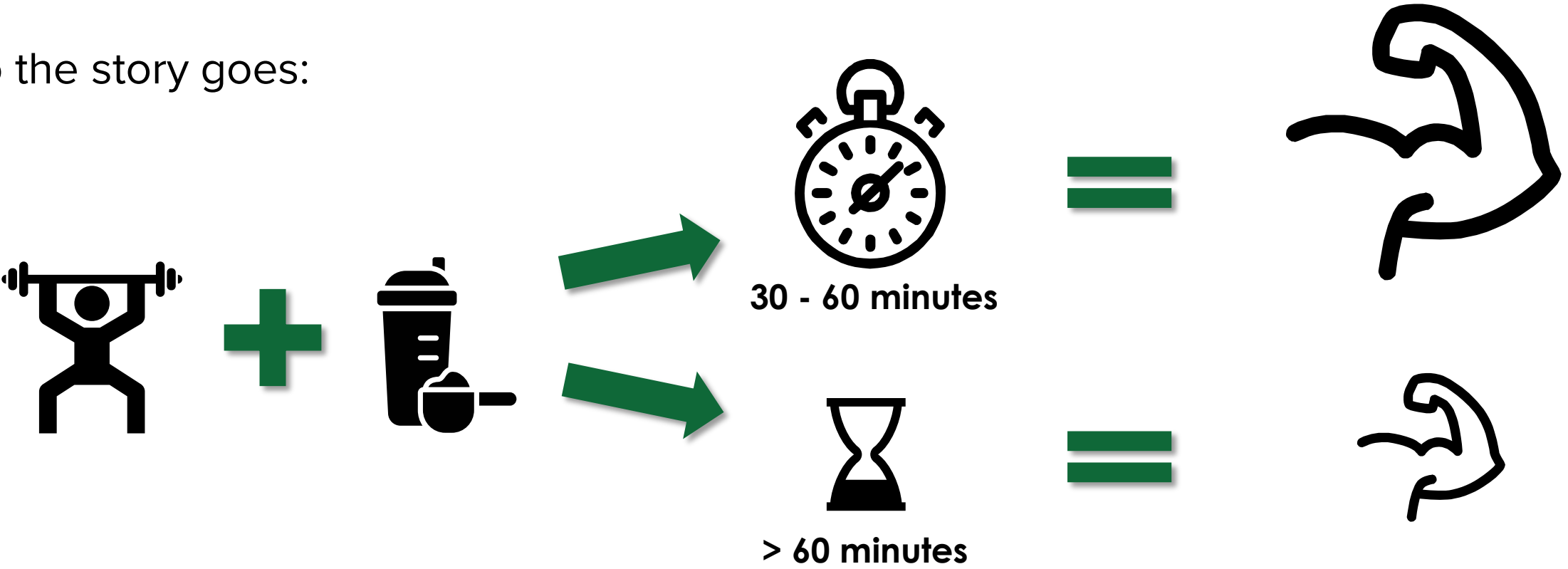
**PROTEIN SPACING:  
MAXIMIZING  
ANABOLIC  
RESPONSE**



# PROTEIN TIMING

THEORY: Protein Timing & the “Anabolic Window”

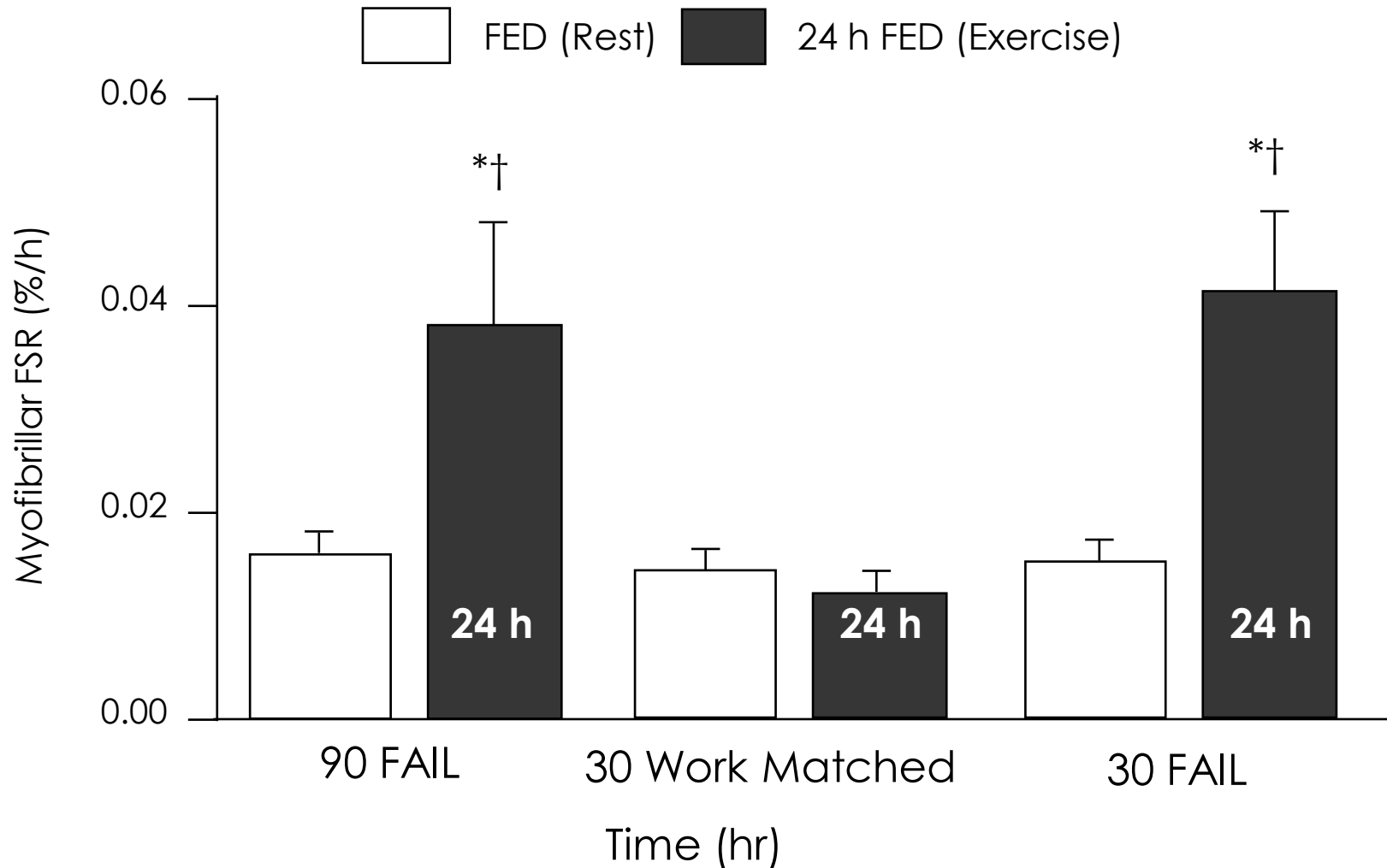
So the story goes:





# PROTEIN TIMING

The window for young adults may be as large as 24 hours



24 hours following the exercise bout, MPS was still elevated in the fasted state in both groups that exercised to failure

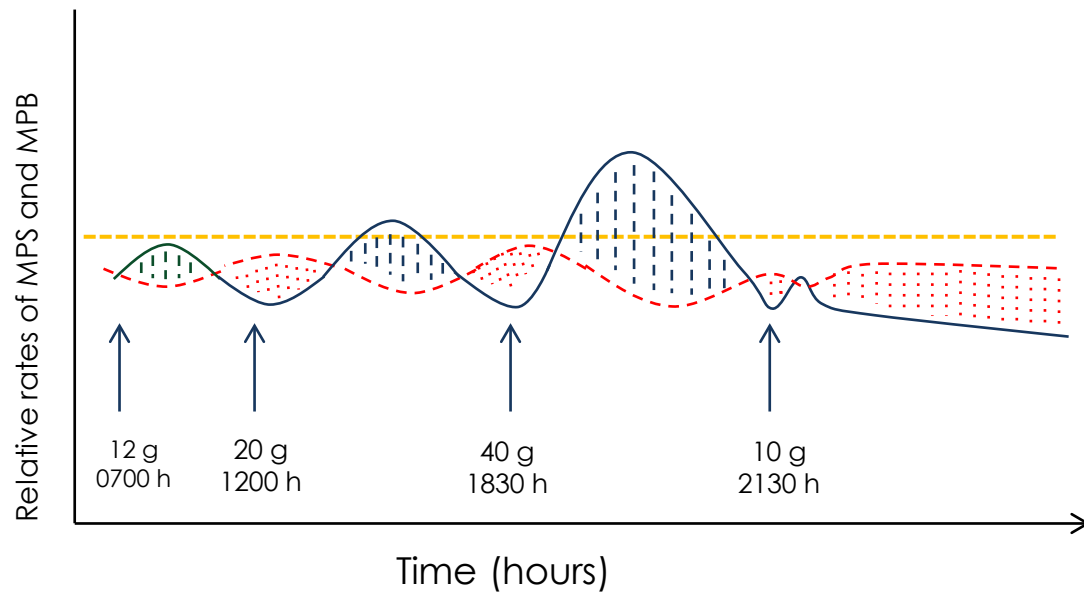


# PROTEIN TIMING

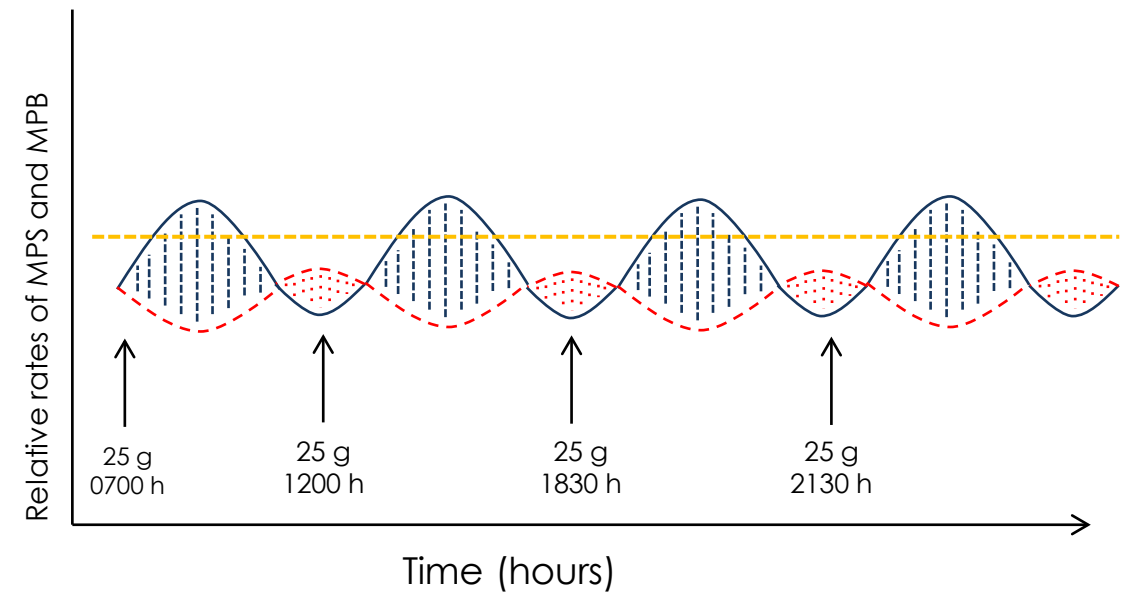
Importance of spacing

Hypothetical Examples

SKEWED Protein Intake



BALANCED Protein Intake



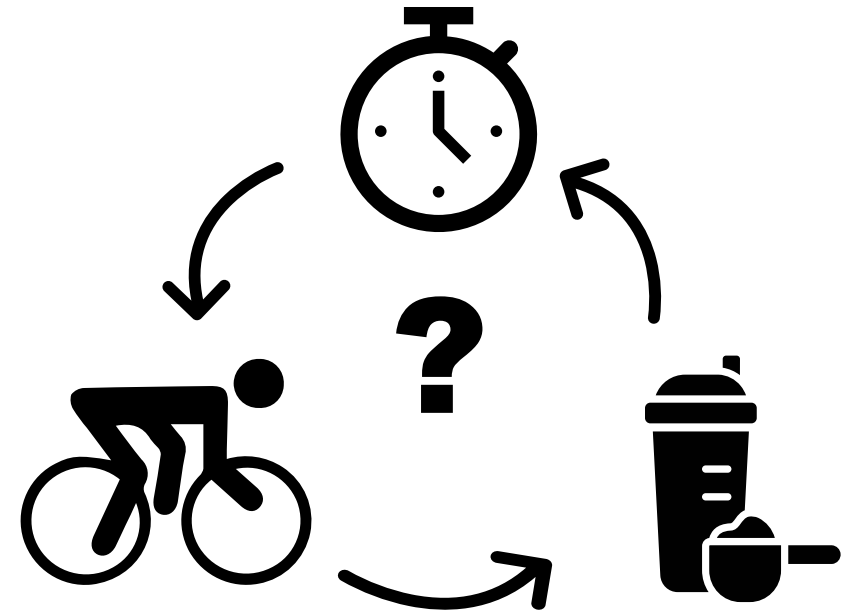
Should I consume protein during exercise to maximize MPS?

Protein consumed prior to or during exercise may promote MPS before exercise cessation.

Possible implications for attenuating negative net balance!

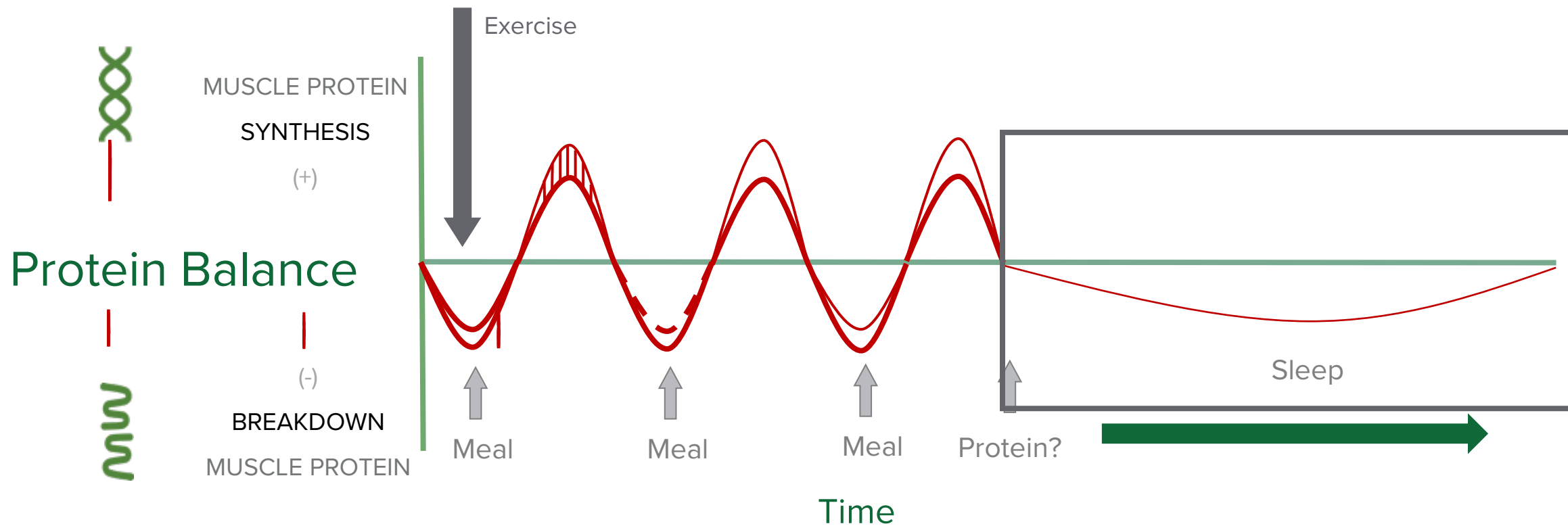
Protein consumed during exercise has conflicting evidence:

- Does not acutely improve performance.
- May improve training efficiency.



# PROTEIN TIMING

Pre-sleep protein: an often-missed window



SSE#117



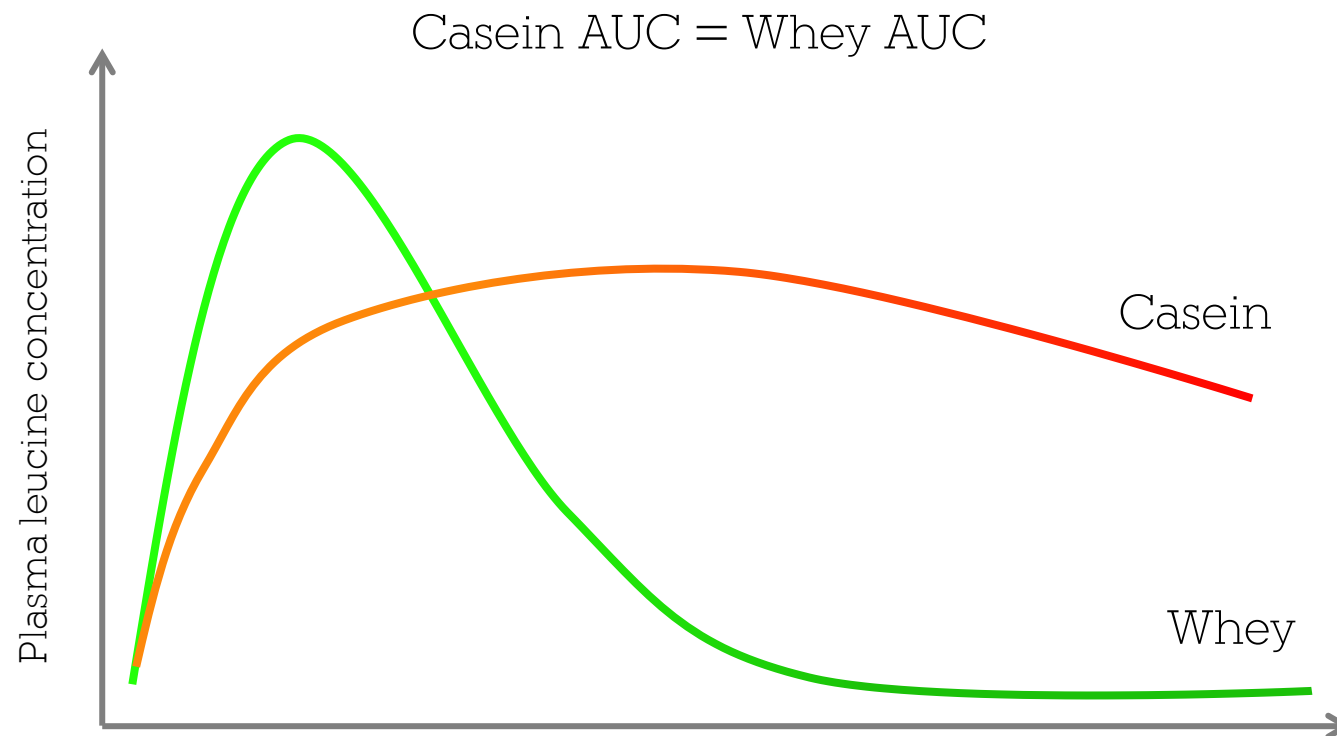
# PROTEIN TIMING

Pre-sleep protein: an often-missed window

CONSUME



OF PROTEIN





# PROTEIN FOR CONNECTIVE TISSUES

# STRUCTURAL TISSUES

- Connective tissue is made up of collagen protein
- Collagen helps to transmit force from muscles and is therefore essential for optimal performance
- However, cells within tendons and ligaments do not respond to exercise the same way as muscles
- AA's hydroxylysine, hydroxyproline, proline, and lysine **in combination with** Vitamin C can improve collagen synthesis



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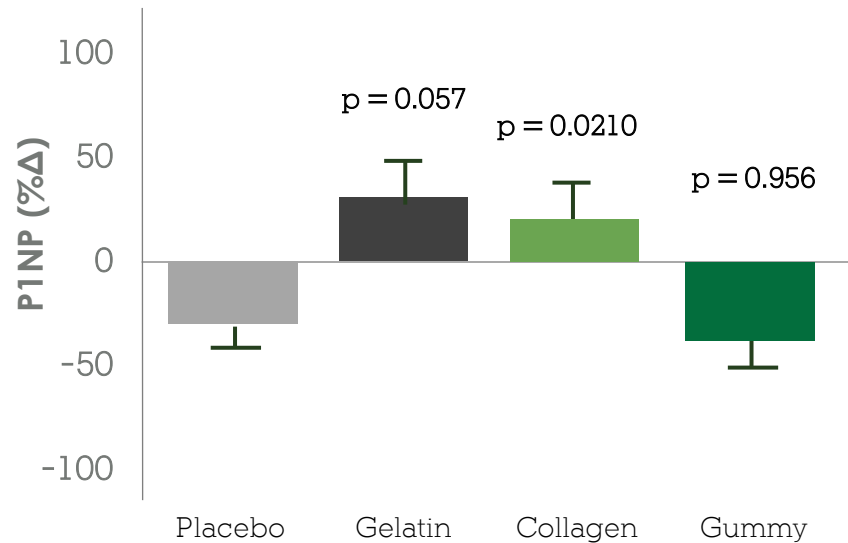
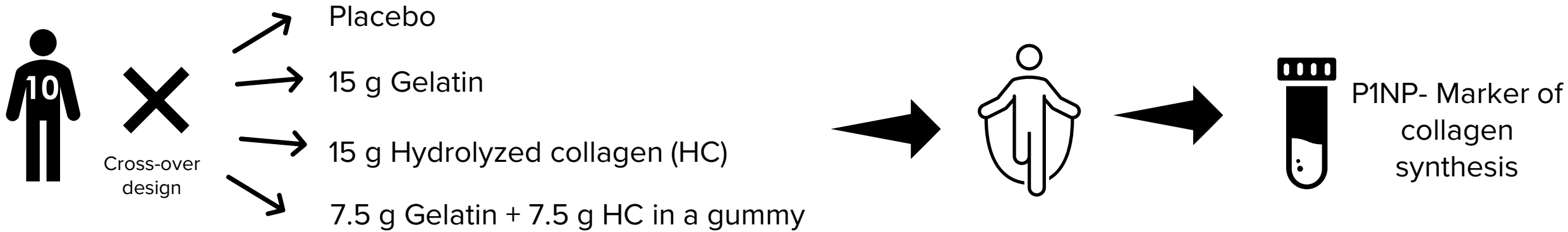


SSE#166



# COLLAGEN SUPPLEMENTS

Do collagen supplements enhance ligament collagen synthesis?



Gelatin = 20% increase in P1NP

\*\* Vitamin C is essential for collagen formation and therefore collagen supplements should be enriched or consumed with adequate Vitamin C



# KEY TAKEAWAYS

- ✓ Protein should be consumed in a relative manner to maximize benefits (g/kg).
- ✓ Protein ingestion benefits both resistance and endurance athletes.
- ✓ If possible, choose a complete protein that is rapidly digested and absorbed and rich in leucine.
- ✓ Aim to consume protein evenly throughout the day.
- ✓ Don't forget about sleep.



# SUMMARY VIDEO



[LINK TO VIDEO](https://www.youtube.com/watch?v=2rpUVggG0U)



[www.GSSIweb.org](http://www.GSSIweb.org)