



SAN FRANCISCO  
STATE UNIVERSITY

# Skeletal Muscle Phenotype and Performance of an Elite Mixed Martial Artist



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## ABSTRACT

## PARTICIPANT

## METHODS

### Elite Male Mixed Martial Artist



Age: 33 y  
Height 1.89 m  
Mass: 102.1 kg  
Competes at: 93.0 kg

MMA RECORD  
8 wins; 2 losses

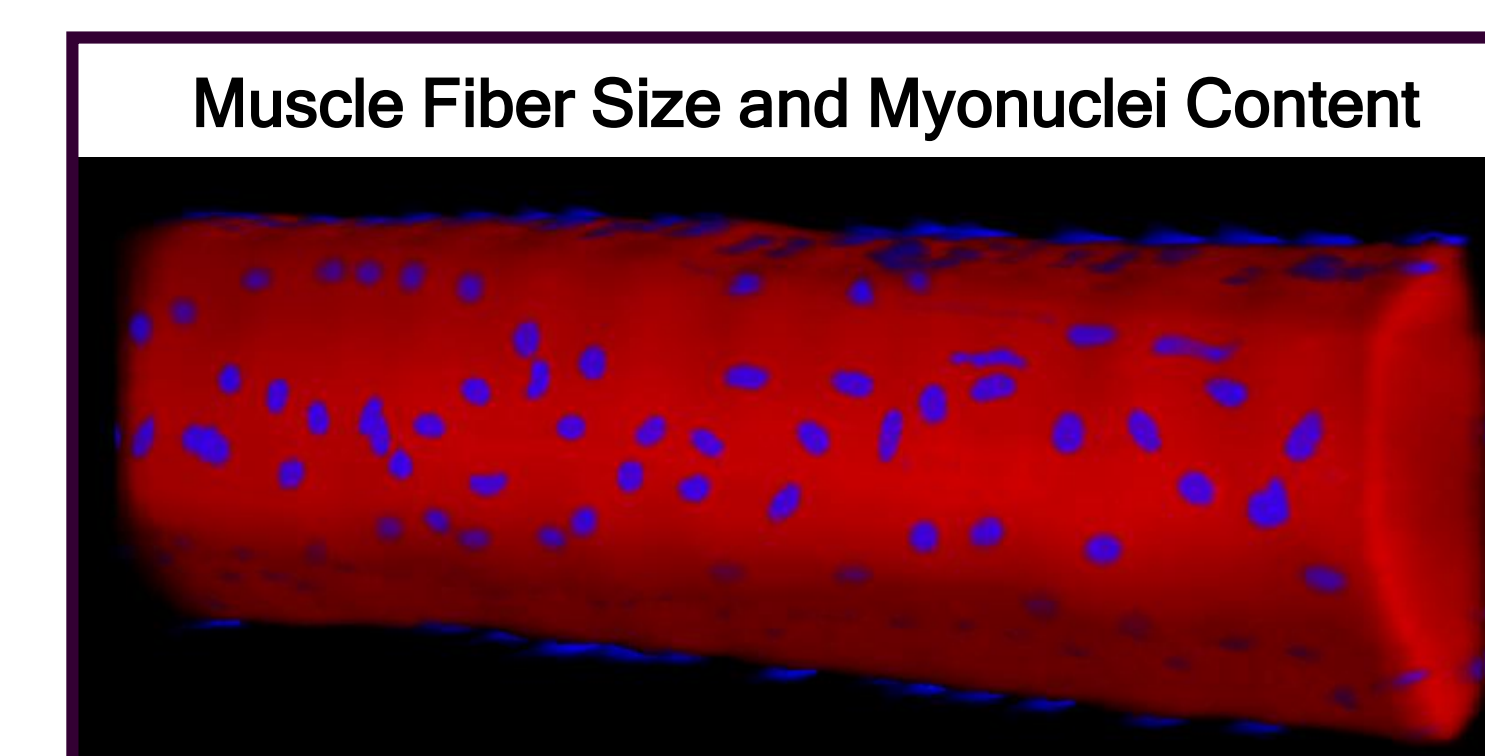
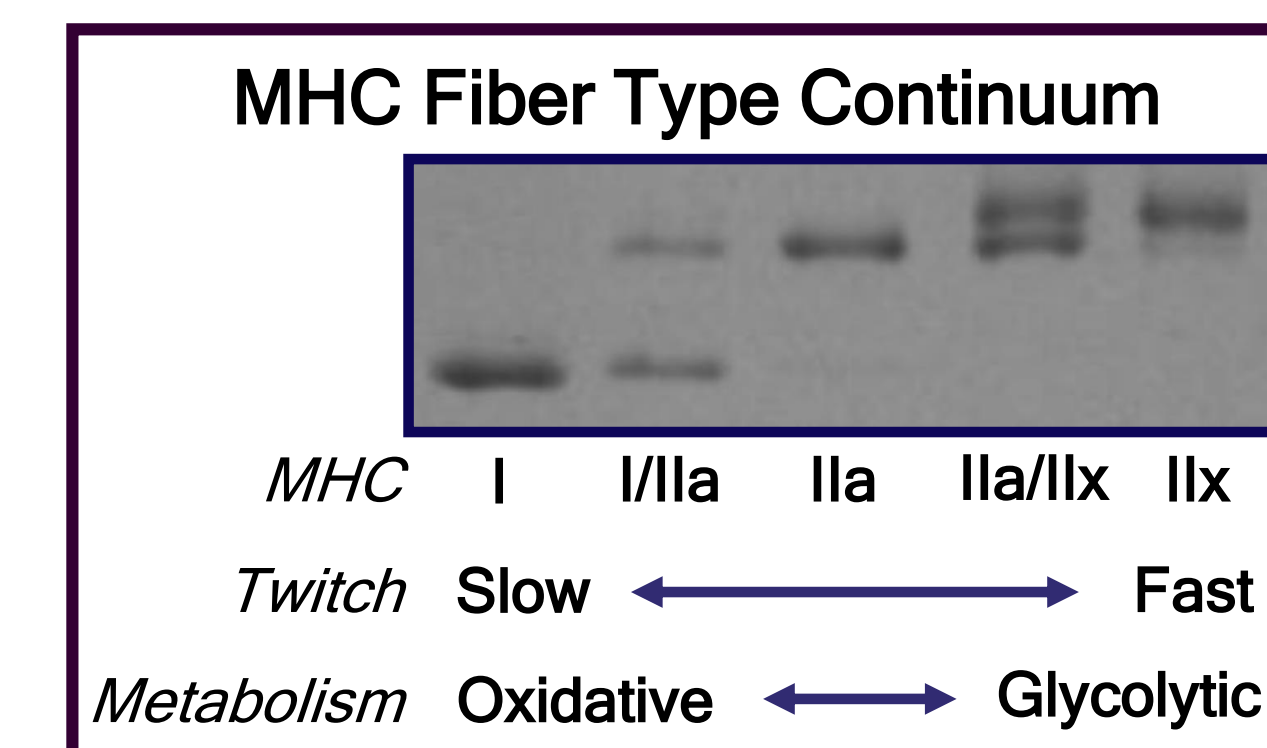
UFC RANKING  
Top 10 in the Light  
Heavyweight Division

### Myocellular Structural Characteristics



Single Fiber Myosin Heavy Chain (MHC)  
Determination via SDS-PAGE

Fluorescence Labeling  
• Actin: Alexa Fluor 568 Phalloidin  
• Myonuclei: DAPI



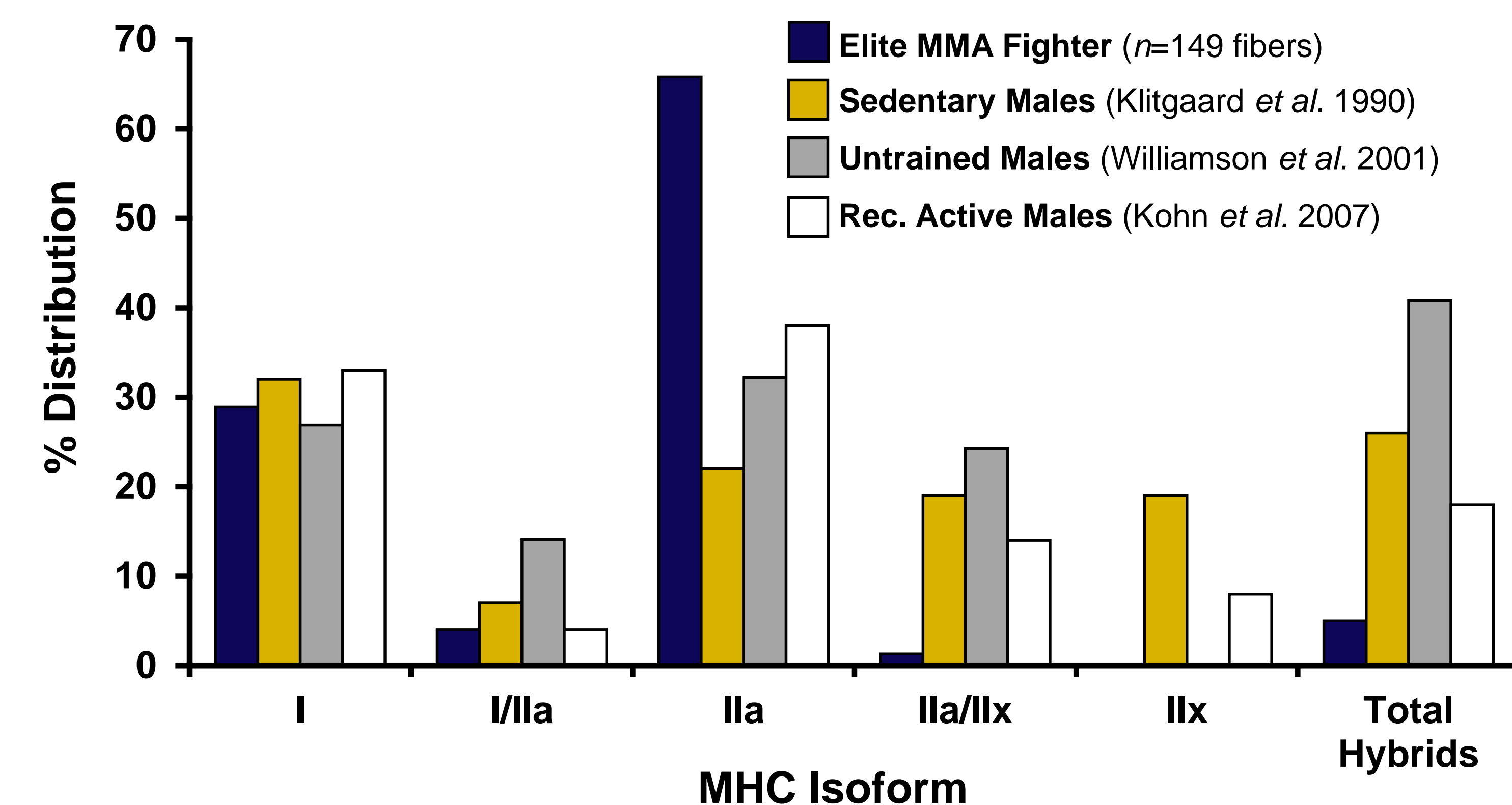
### Whole Muscle Functional Performance

Hand Grip Dynamometry → Peak Isometric Mid-thigh Pulls → Vertical Jump Height → Wingate Anaerobic Power Test

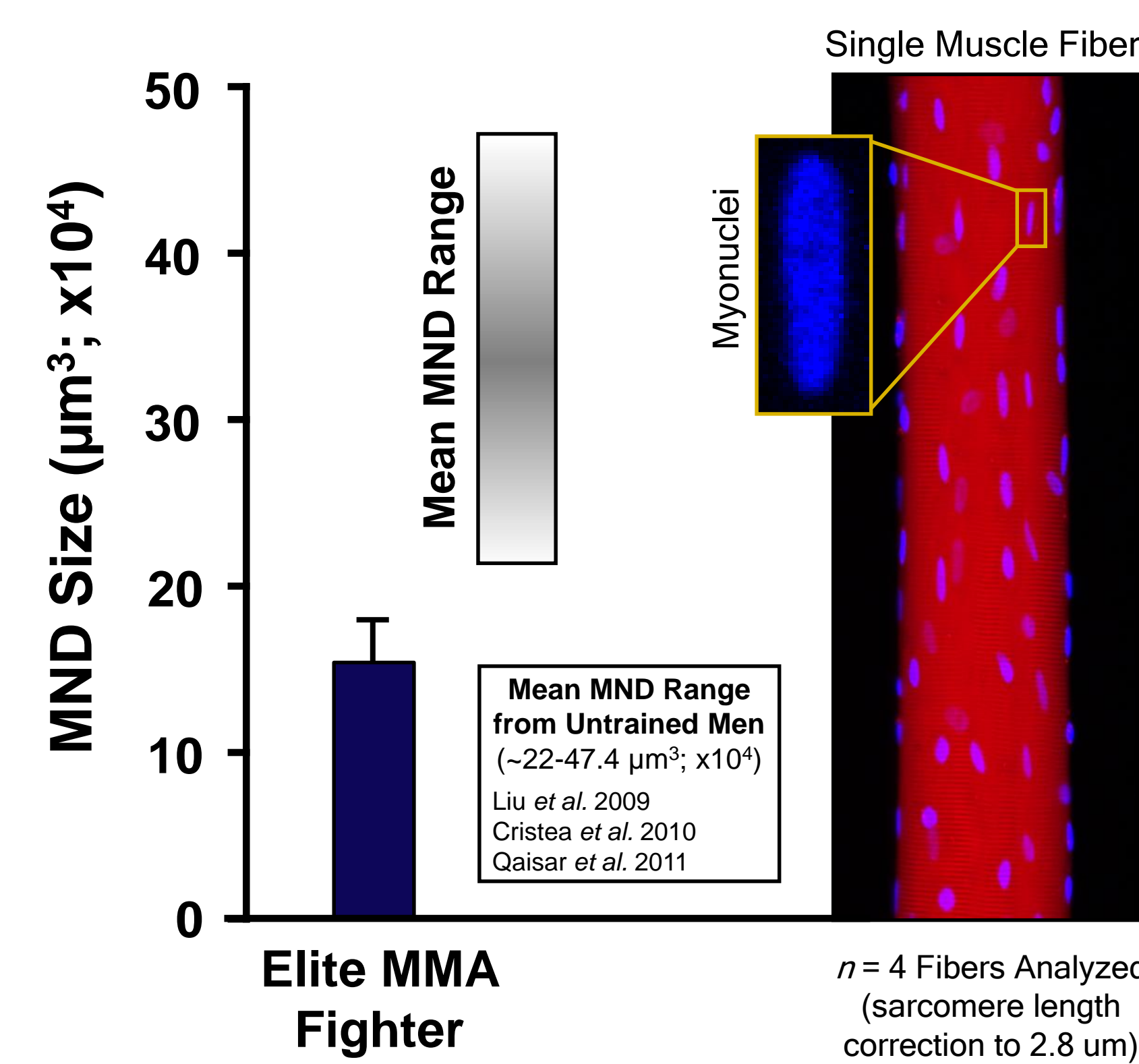
## RESULTS

## CONCLUSION

### Myosin Heavy Chain (MHC) Fiber Type



### Myonuclear Domain (MND) Size



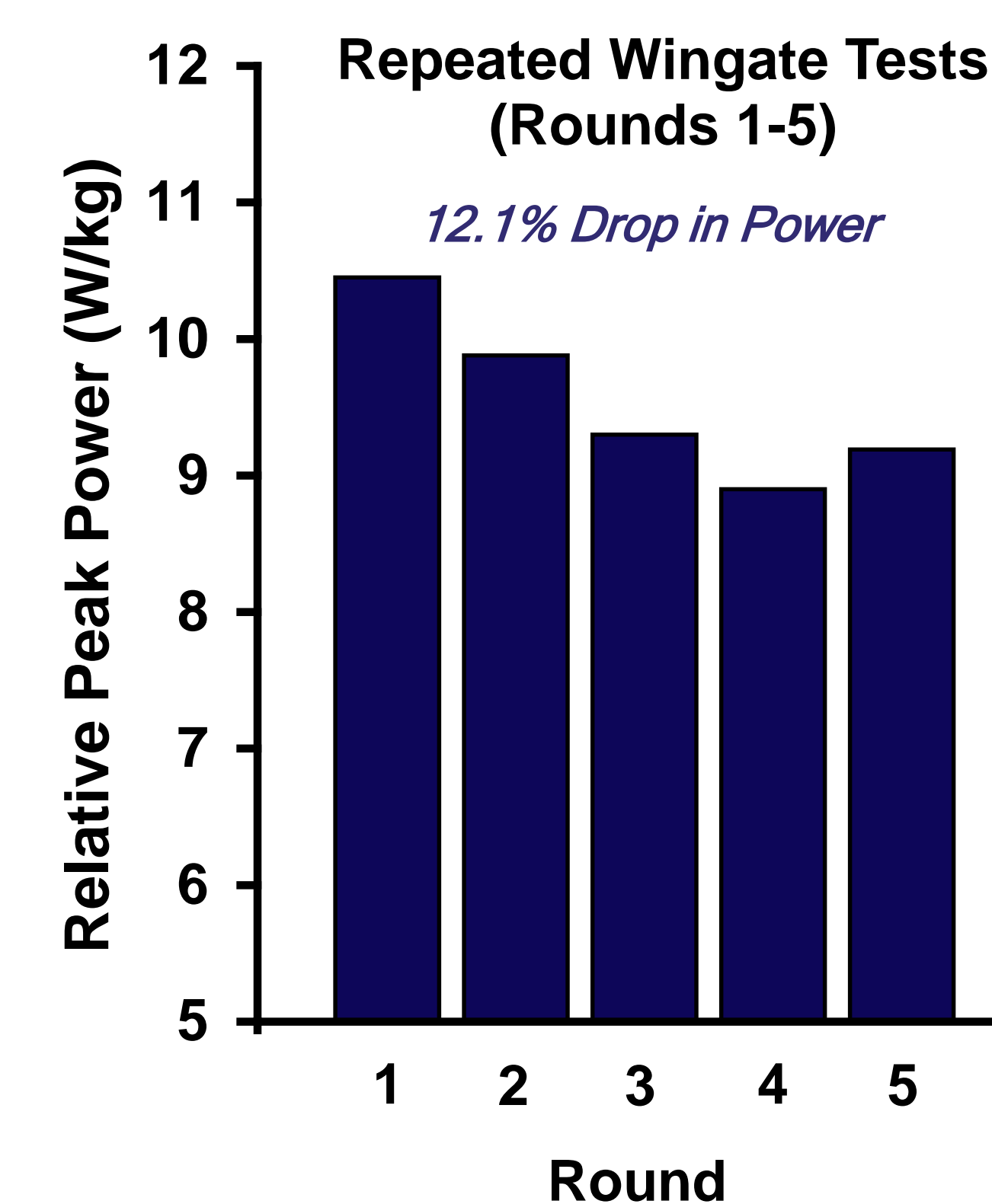
### Whole Muscle Performance

#### WINGATE ANAEROBIC CYCLING TEST

Peak Power  
1,075.89 W

Relative Peak Power  
10.45 W $\cdot$ kg<sup>-1</sup>

Fatigue Index  
43.39 %



This MMA fighter's muscle exhibited:

- A homogenous muscle fiber type (66% MHC IIa and 5% total hybrids)
- A small MND size, which may be related to myocellular transport and repair efficiency
- High whole muscle peak power and only a 20% drop in power over five rounds of Wingate Tests

His elevated whole muscle function may be partially explained by his unique myocellular phenotype. Future research should continue to investigate the muscle cell structure/function relationship among these unique athletes to further our knowledge regarding elite human muscle physiology.

## CONTACT

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http://hhd.fullerton.edu/knes/ResearchLabs/bmep/index.htm