

In-Season Strength Programming

MATT JOHNSON

HEAD STRENGTH AND CONDITIONING COACH

CHICAGO BULLS



Quick Bio

- ▶ From Madison, WI
- ▶ B.S. Exercise and Sport Science
 - ▶ University of Wisconsin-La Crosse
- ▶ M.S. Human Performance
 - ▶ University of Wisconsin-La Crosse
- ▶ 7th season as a strength and conditioning coach in the NBA
 - ▶ Al Vermeil and Erik Helland tree



A Few Thank You's - Family



A Few Thank You's

- ▶ I work with the best staff in the world
 - ▶ A Boss/Director of Sports Performance that empowers and leads.
 - ▶ Open communication with the training room and physical therapist.
 - ▶ Assistant strength coach that is a wizard with force plates and sport science.
 - ▶ An athletic trainer that can squat 400 lbs. The Unicorn.



Needs Analysis: Elite Basketball

- ▶ In order to program correctly in-season we must know the demands of the sport.

- ▶ Metabolic Demands? Kinetic Demands? Kinematic Demands?



In-Season Schedule Characteristics

- ▶ On average 3.2 games per week.
- ▶ On average 2-3 practices per week varying from 60-160 minutes.
- ▶ 5-7 days per week of specific basketball exposure.
 - ▶ Stimulus to lateral change of direction, jumping, acceleration.
- ▶ Travel, poor sleep habits, outside commitments.
- ▶ ****7-8 uninterrupted months of training with your athletes****



Physiological Effects of NBA Season

- ▶ Degradation of strength
 - ▶ Hoffman, J. R.
- ▶ Loss of lean mass (especially during road trips)
- ▶ Potentially “Enhance lower-body power, repetitive jump ability, and reaction during a competitive season, which appear to be enhanced with the stimulus of playing time.”
 - ▶ Gonzalez, A. M., Hoffman, J. R., Rogowski, J. P., Burgos, W., Manalo, E., Weise, K., . . . Stout, J. R. (2013).



Better Lateral Movement Stimulus Defense or Band Resisted Slides?

- ▶ We cannot mimic the high intensity stimuli NBA Athletes compete at nightly.
- ▶ Everything we do is GENERAL.
- ▶ Are we adding stress to stress?
- ▶ Equip athletes with the physical qualities necessary to excel in all movement patterns.



In-Season Training in the NBA

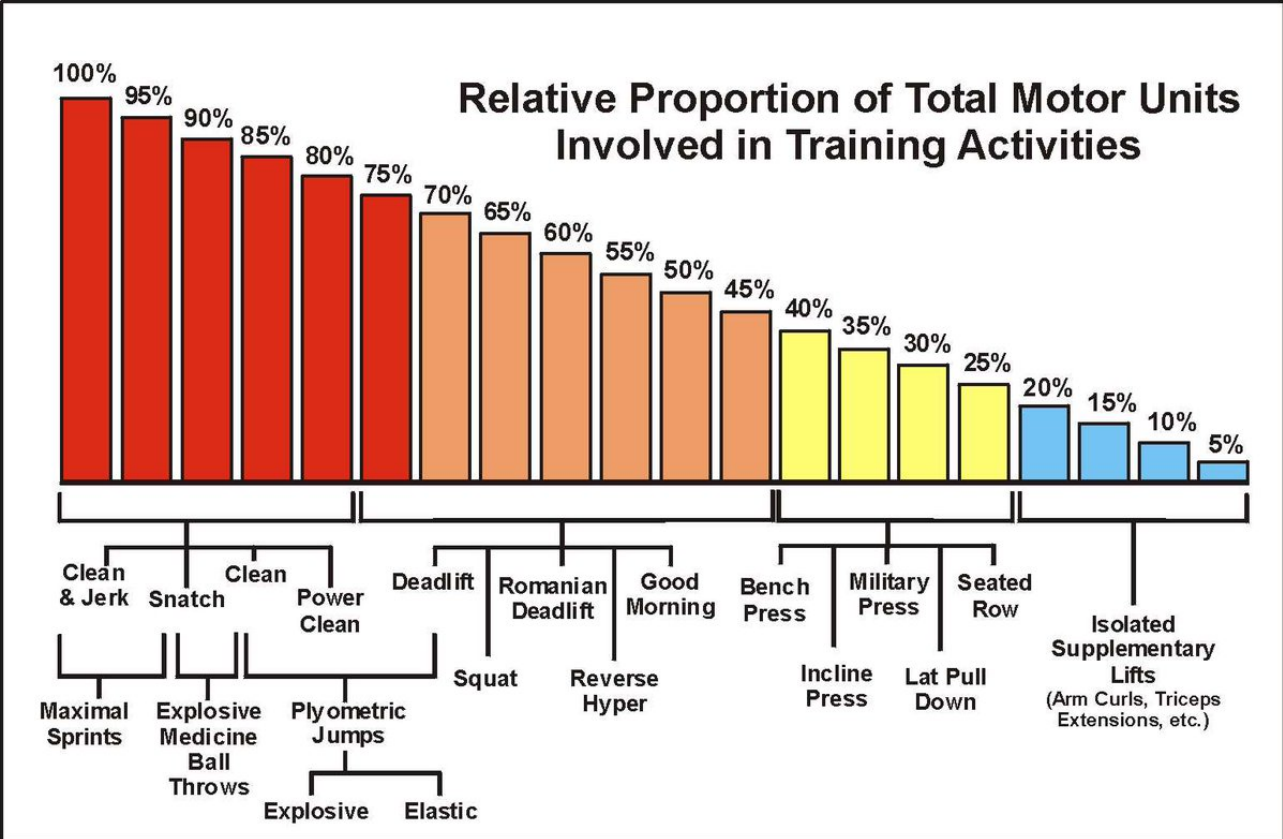
MAINTENANCE



In-Season Training in the NBA - Objectives

- ▶ Improve STRENGTH, power, and speed
- ▶ Maintain range of motion and loaded movement quality
- ▶ Improve body composition and lean mass gains
- ▶ Build robustness and durability (load management)
- ▶ **Maximal adaptation with the least amount of stimulus (holy grail)**
 - ▶ Any coach can destroy an athlete
 - ▶ Warm Ups/Activation will not provide a stimulus outside of their intent
 - ▶ The goblet squat is not a strength exercise





Build Robustness and Durability

- ▶ “Direct effect of strength training in prevention of acute hamstring injuries”
- ▶ “64% ACL injury reduction...focusing on improved stability and pelvis control”
- ▶ “Primary overuse anterior knee pain reduction of 75%”
- ▶ “10% increase in strength training volume reduced the risk of injury by more than four percentage points”

Review

Strength training as superior, dose-dependent and safe prevention of acute and overuse sports injuries: a systematic review, qualitative analysis and meta-analysis

Jeppé Bo Lauersen,^{1,2} Thor Einar Andersen,³ Lars Bo Andersen^{1,4}

ABSTRACT **Objective** This review aims to analyse strength training-based sports injury prevention randomised controlled trials (RCT) and present best evidence recommendations for athletes and future research. A priori PROSPERO registration: CRD42015006970. **Design** Systematic review, qualitative analysis and meta-analysis. Sorting of studies and quality assessments were performed by two independent authors. Qualitative analyses, relative risk (RR) estimate with robustness and strength of evidence tests, formal tests of publication bias and post-hoc meta-regression were performed. **Data sources** PubMed, Embase, Web of Science and SPORTDiscus were searched to July 2017. **Eligibility criteria for selecting studies** RCTs on strength training exercises as primary prevention of sports injuries. **Results** Six studies analysed five different interventions with four distinct outcomes. 7738 participants aged 12–40 years were included and sustained 177 acute or training has proved to be accessible, effective and cost-effective for populations.¹¹ However, research has yet to establish fundamental strength training prevention mechanisms and parameters for optimization. In 2013, Lauersen *et al.* quantitatively compared the preventive effects of different types of exercise programmes: strength training, proprioception, stretching and multicomponent interventions. The obvious next step would be a further description and qualitative analysis of these four intervention types. However, several reviews have satisfactorily analysed both proprioception and stretching studies,^{12–15} while multicomponent programmes have proved problematic to analyse qualitatively due to their complex nature.^{16–17} Therefore strength training, which proved the most effective, represented the logical progression and, to our knowledge, existing strength training research has primarily focused on biomolecular aspects, full prevention in the elderly.

Br J Sports Med: first published as 10.1136/bjsports-2016-099078 on 21 August 2018. Doi: 10.1136/bjsports-2016-099078

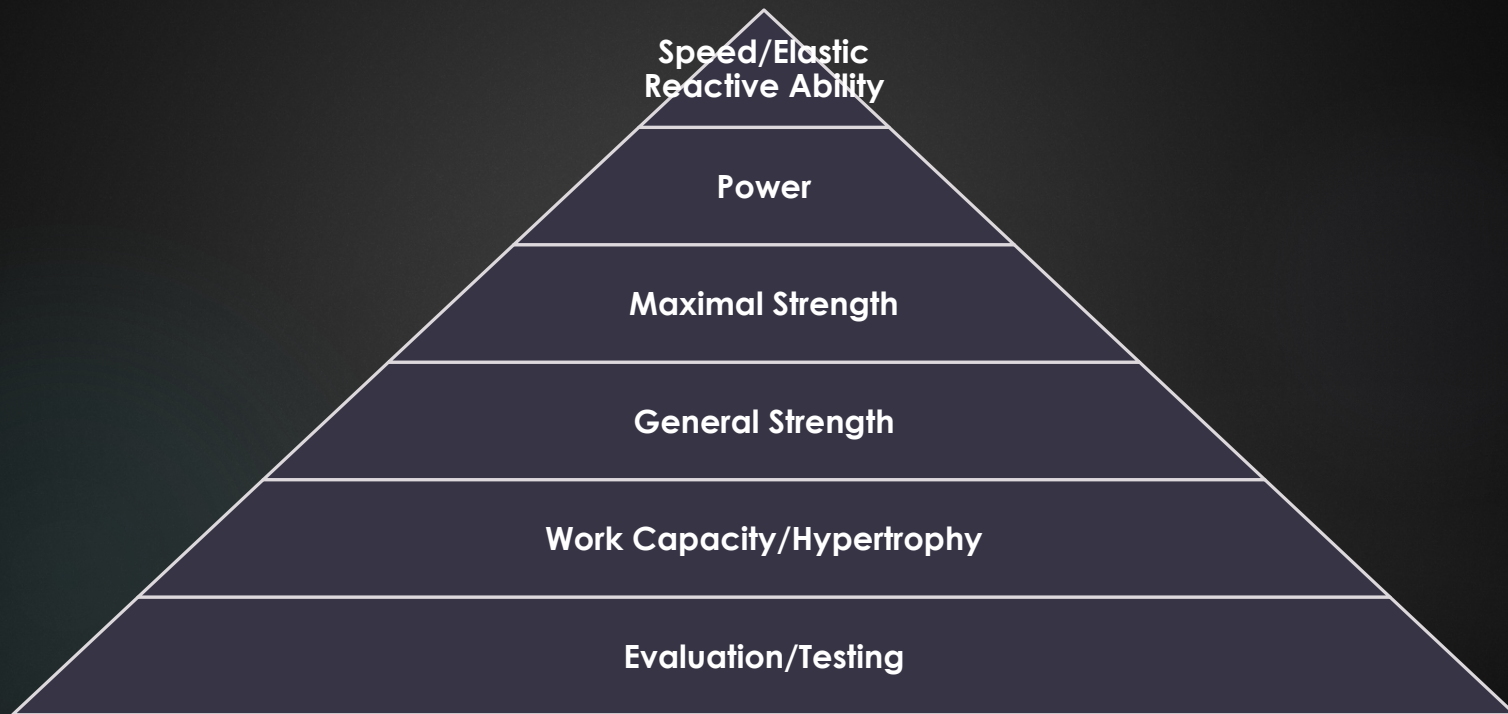


Build Robustness and Durability

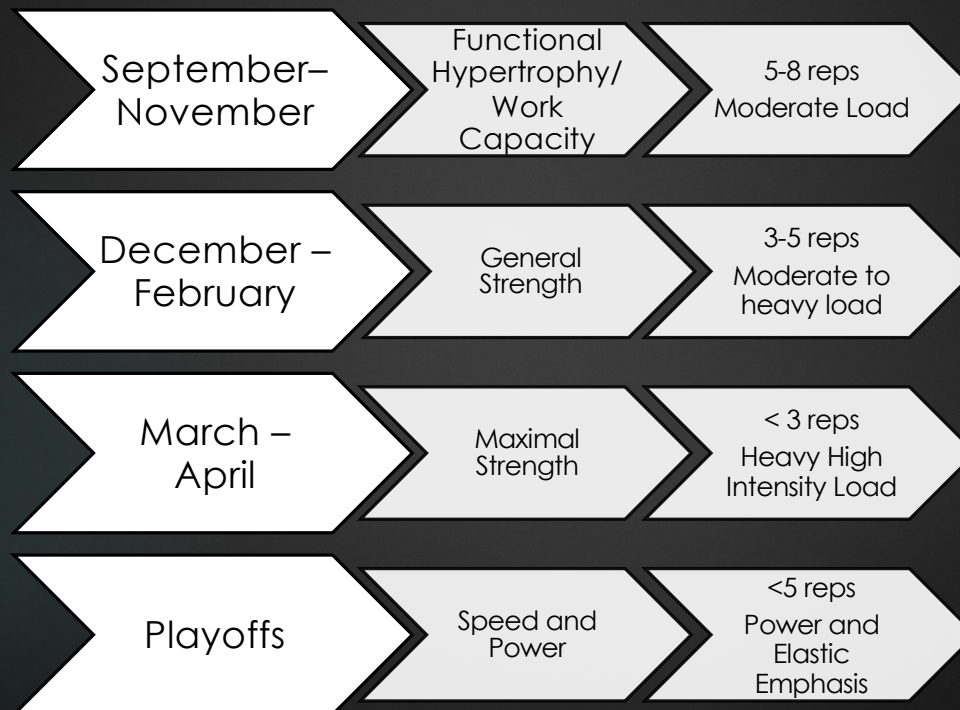
- ▶ “Tissues fail when they cannot tolerate the forces they encounter”
 - ▶ -Nick Papendieck, yesterday



Hierarchy of Athletic Development:



How Can This Hierarchy Fit into an NBA Season?



In-Season Microcycle Model

Day A	Day B	Day C
LB Push	LB Pull	LB P-chain (less stress)
UB Horizontal Push	UB Vertical Push	UB Combo Push
Anti-Flexion Core	Anti-Extension Core	Anti-Rotation Core
Knee Dominant Hamstring	Supported SL LB Push	SL Unsupported LB Push or Lateral LB movement
UB Horizontal Pull	UB Vertical Pull	UB Combo Pull
Anti-Lateral Flexion	Anti-Rotation	MB Core



In-Season Microcycle Model

- ▶ Progression and periodization of exercise selection.
- ▶ Each category progresses from simple to complex movement tasks.
- ▶ Challenge kinetic and kinematic demands as season progresses.
 - ▶ Shorten the time to create force.
 - ▶ Make movements more challenging.

Day A	Day B	Day C
LB Push	LB Pull	LB P-chain (less stress)
UB Horizontal Push	UB Vertical Push	UB Combo Push
Anti-Flexion Core	Anti-Extension Core	Anti-Rotation Core
Knee Dominant Hamstring	Supported SL LB Push	SL Unsupported LB Push or Lateral LB movement
UB Horizontal Pull	UB Vertical Pull	UB Combo Pull
Anti-Lateral Flexion	Anti-Rotation	MB Core



Physiological Adaptations to Heavy Strength Training

Neurological Adaptations	Structural Adaptations
Motor unit recruitment	Cross sectional area
Motor unit synchronization	Pennation angle
Motor unit firing rates	Fiber type transitions



December-February (General Strength) Lower Body Push 90kg x 4



December-February (General Strength)
Lower Body Push –SL Supported 90 kg
x5/e



December-February (General Strength) Knee Dominant Hamstring



March-April Maximal Strength Lower Body Pull



March-April Maximal Strength Lower Body Pull



April-Playoffs (Speed and Power) Split Snatch



April-Playoffs (Speed and Elastic Reactive Ability)



Olympic Lifting In-Season

- ▶ Pre-game is an optimal time to teach and maximize these lifts.
- ▶ 3-5 sets = 15 mins of your time.
- ▶ **MUST COACH!!!**
- ▶ Outstanding mobility benefits pre-game.
- ▶ Fine tune motor firing patterns and synchronization.
- ▶ Maximal recruitment and RFD.
- ▶ Postural emphasis.
- ▶ Limits neural fatigue and won't negatively impact basketball performance.
- ▶ Don't be afraid of derivatives.



Olympic Lifting – BAK Clean Pull



Olympic Lifting – Hang Snatch



Autoregulation of the High Minute Athlete

- ▶ HRV
 - ▶ Wellness Questionnaires
 - ▶ Force Plates
 - ▶ Hallway test
-
- ▶ Reduction of volume by 15-20%. Intensity **MUST** remain high.
 - ▶ If movement is poor/stiff cut the workout.
 - ▶ **MOVEMENT QUALITY DRIVES LOADING STRATEGY.**



Intensity

- ▶ How do we determine intensity without 1RMs?
- ▶ What is the right intensity on any given day?
- ▶ What is the right intensity when an athlete is only at 80% of their max to begin with?



Intensity: Repetitions in Reserve

Table 1
Resistance training specific rating of perceived exertion (48)

Rating	Description of perceived exertion
10	Maximum effort
9	1 repetition remaining
8	2 repetitions remaining
7	3 repetitions remaining
5-6	4-6 repetitions remaining
3-4	Light effort
1-2	Little to no effort

Reprinted from Zourdos et al. 2015 with permission.

Relationship with percentage 1RM, repetitions performed and RIR-based RPE

RPE	Repetitions performed							
	1	2	3	4	5	6	7	8
10	100^a%	95.0%	91.0%	87.0%	85.0%	83.0%	81.0%	79.0%
9.5	97.0%	93.0%	89.0%	86.0%	84.0%	82.0%	80.0%	77.5%
9	95.0%	91.0%	87.0%	85.0%	83.0%	81.0%	79.0%	76.0%
8.5	93.0%	89.0%	86.0%	84.0%	82.0%	80.0%	77.5%	74.5%
8	91^a%	87.0%	85.0%	83.0%	81.0%	79.0%	76.0%	73.0%
7.5	89.0%	86.0%	84.0%	82.0%	80.0%	77.5%	74.5%	71.5%
7	87.0%	85.0%	83.0%	81.0%	79.0%	76.0%	73.0%	70^a%

^aThese bolded values are the mean percentage 1RM values from sets performed in Zourdos et al. (48).



Case Study:

Athlete A	Athlete B
Fully compliant	Average compliance
2-3 quality lifts per week	1-2 quality lifts per week
High minute athlete	High minute athlete
Olympic lifting derivatives	No Olympic lifting
Maximal strength work	Minimal heavy loading



Case Study:

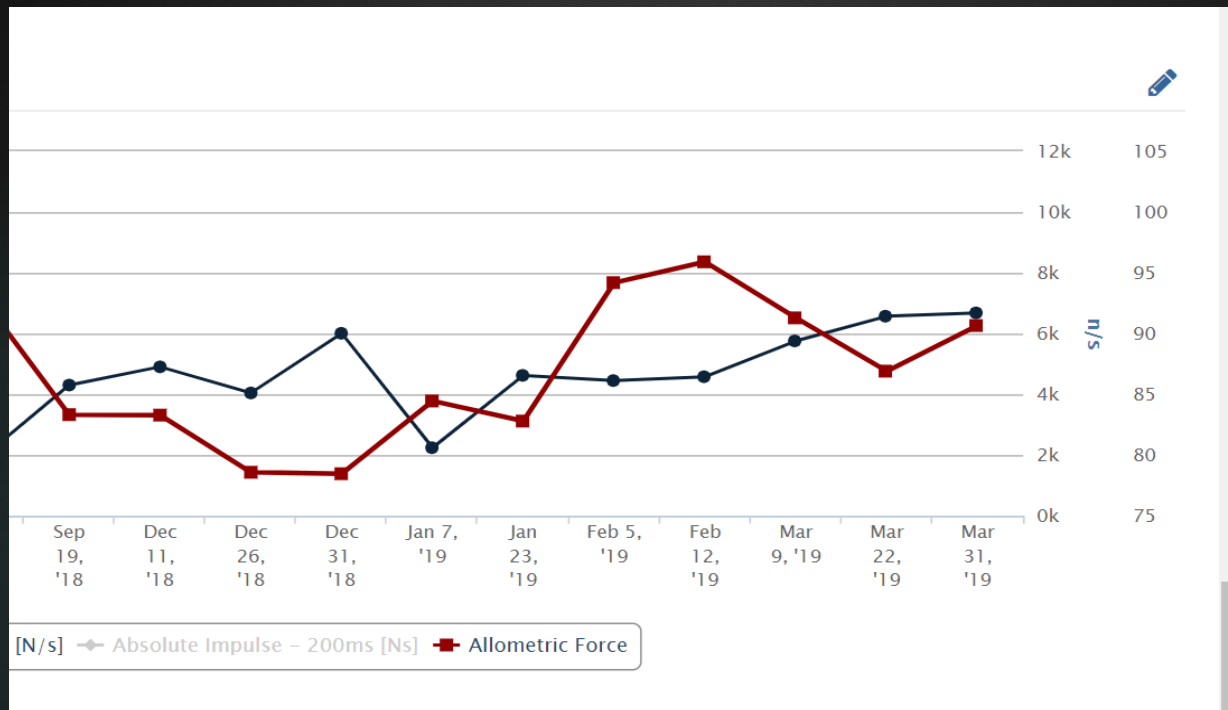
- ▶ IMTP tested regularly throughout the NBA season (2-3x per month).

- ▶ Key Metrics:

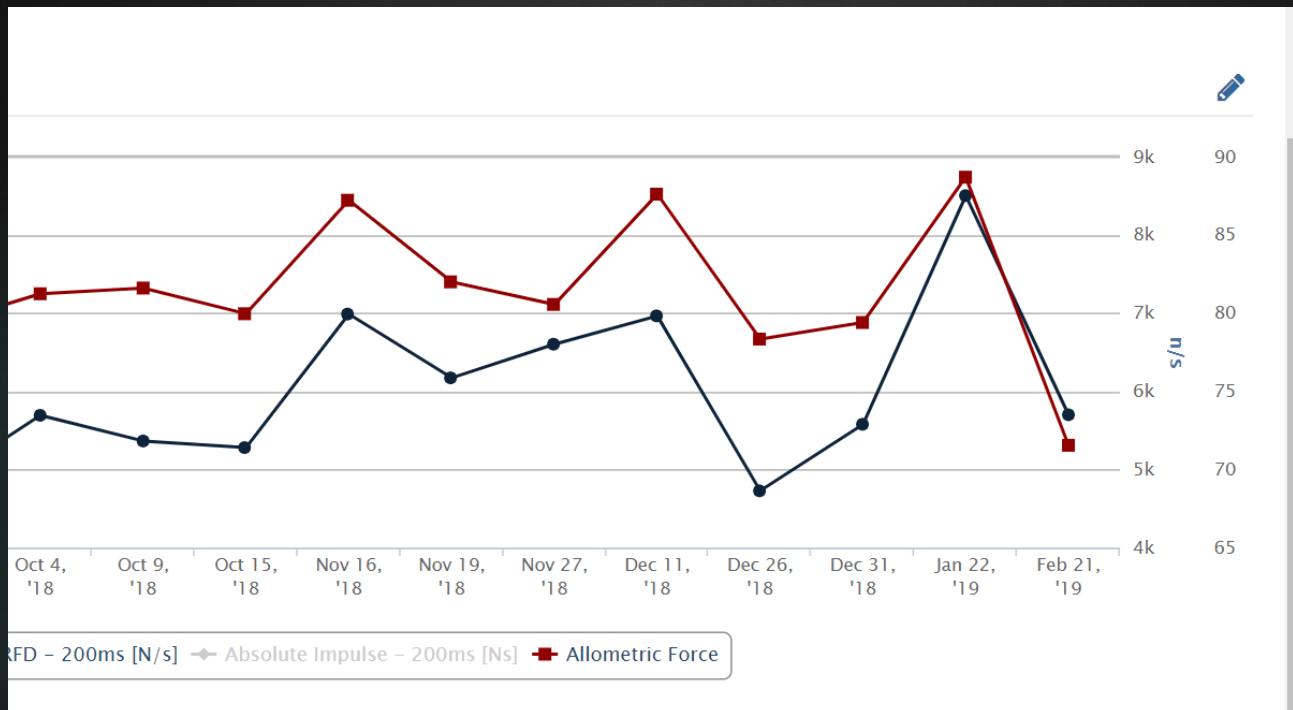
- ▶ Allometric Peak Force
- ▶ RFD (200ms)



Case Study: Athlete A



Case Study: Athlete B



References

- ▶ Hoffman, J. R., Fry, A. C., Howard, R., Maresh, C. M., & Kraemer, W. J. (1991). Strength, Speed and Endurance Changes During the Course of a Division I Basketball Season. *The Journal of Strength and Conditioning Research*, 5(3), 144. doi:10.1519/1533-4287(1991)0052.3.co;2
- ▶ Gonzalez, A. M., Hoffman, J. R., Rogowski, J. P., Burgos, W., Manalo, E., Weise, K., . . . Stout, J. R. (2013). Performance Changes in NBA Basketball Players Vary in Starters vs Nonstarters Over A Competitive Season. *Journal of Strength and Conditioning Research*, 27(3), 611-615.
- ▶ Zourdos MC, Klemp A, Dolan C, Quiles JM, Schau KA, Jo E, Helms E, Esgro B, Duncan S, Merino SG, Blanco R. Novel resistance training-specific RPE scale measuring repetitions in reserve. *J Strength Cond Res* 30: 267–275, 2016.



Any Questions?

