



2022 NSCA PERSONAL TRAINERS VIRTUAL CONFERENCE

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Hypertrophy Training: *Clearing Up Myths and Misconceptions*



Brad Schoenfeld, PhD, CSCS,*D, CSPS,*D, NSCA-CPT,*D, FNSCA
Hypertrophy Training: Clearing up Myths and Misconceptions

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CONFLICT OF INTEREST STATEMENT

I currently have, or I have had in the past 2 years an affiliation or financial interest with Tonal Corporation around this presentation, including:

- Consulting
- Stockholder or stock options
- Research funding



Lift Smart!

Definition by Urban Dictionary

TOP DEFINITION



Broscience

Broscience is the predominant brand of reasoning in bodybuilding circles where the anecdotal reports of jacked dudes are considered more credible than scientific research.

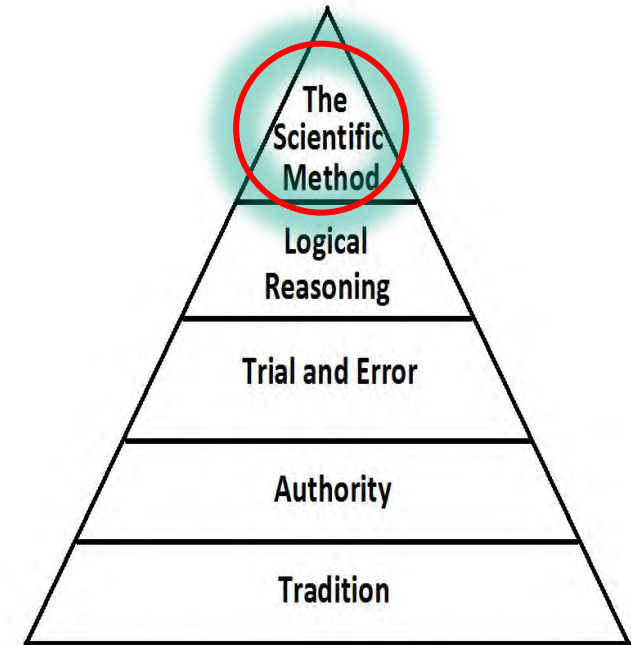
Broscience in action:

"Bro, you gotta slam 40-60 grams of waxy maize plus 20 grams of BCAA within 7 seconds of finishing your last set of squat rack curls. Otherwise, you'll go straight catabolic."

#broscience #bro science #bodybuilding #fitness #nutrition

by **Alan Aragon** August 02, 2008

Sources of Knowledge



The Hierarchy of Knowledge

An Evidence-Based Approach

Synthesizes the body of current research in concert with personal experience and the needs and abilities of the individual



Adapted from: Gross Portney, L., and M. P. Watkins. "Foundations of clinical research: applications to practice." (2000).



Key Point!

Training is both a science and an art

- You cannot disassociate the art from its underlying science!

Myth: There is an optimal
“hypertrophy loading zone”



Intensity of Load Basics



Often expressed as %1RM for a given exercise

- Considerable variance between individual submaximal RMs

Easiest application is “repetition range”

- Heavy loading: 1-5 RM (~87-100% 1RM)
- Moderate loading: 6-12 RM (65-85% 1RM)
- Low loading: 15+ RM (<60% 1RM)

Size Principle of Recruitment



Order of MU recruitment directly related to size of motor neuron


Recruited in same order each time

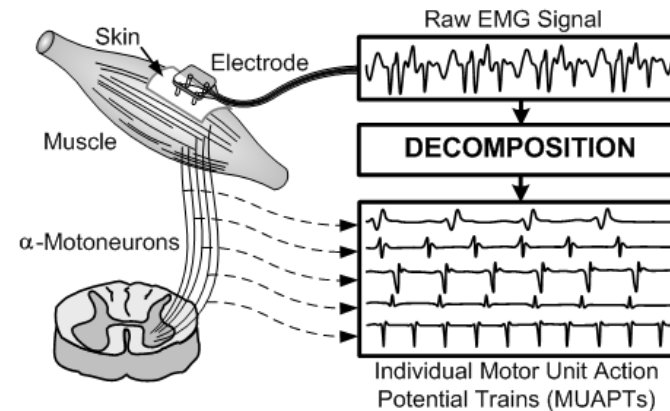


Recruit minimum number of MUs needed

Smallest (type I) motor units recruited first
Midsized (type IIa) motor units recruited next
Largest (type IIx) motor units recruited last

Effects of fatiguing, submaximal high- versus low-torque isometric exercise on motor unit recruitment and firing behavior

Tyler W. D. Muddle, Ryan J. Colquhoun, Mitchel A. Magrini, Micheal J. Luera, Jason M. DeFreitas & Nathaniel D. M. Jenkins 

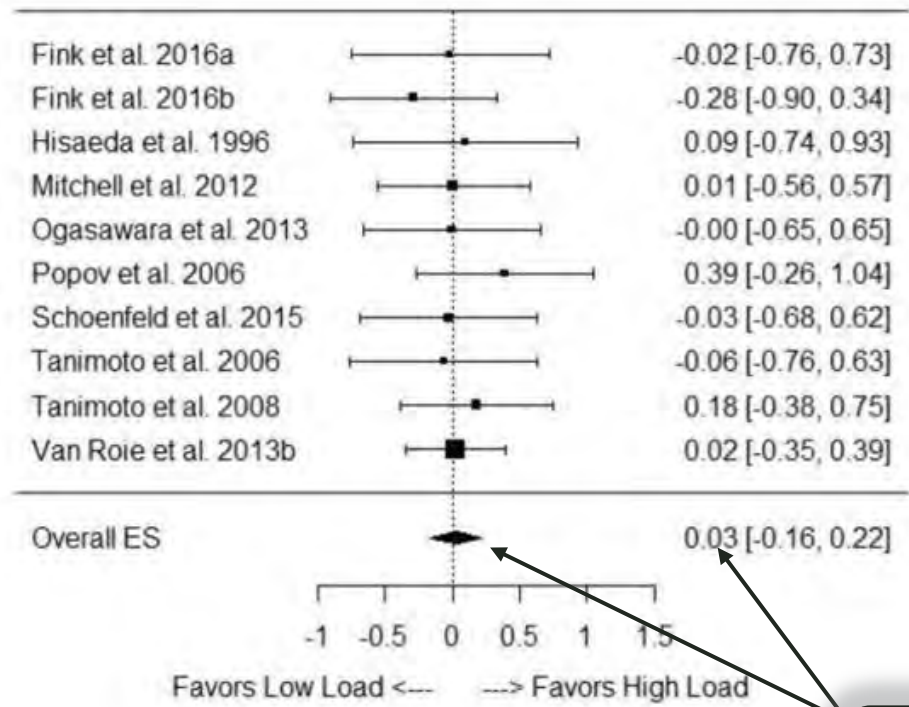


Maximal isometric contractions performed to fatigue at 70% 1RM vs 30% 1RM.

- Although firing rates increased in both high- and low-load contractions, firing rates were > high-load
- Both high and low-load contractions resulted in recruitment of additional, larger MUs; but on average, larger MUs recruited during high-load

STRENGTH AND HYPERTROPHY ADAPTATIONS BETWEEN LOW- vs. HIGH-LOAD RESISTANCE TRAINING: A SYSTEMATIC REVIEW AND META-ANALYSIS

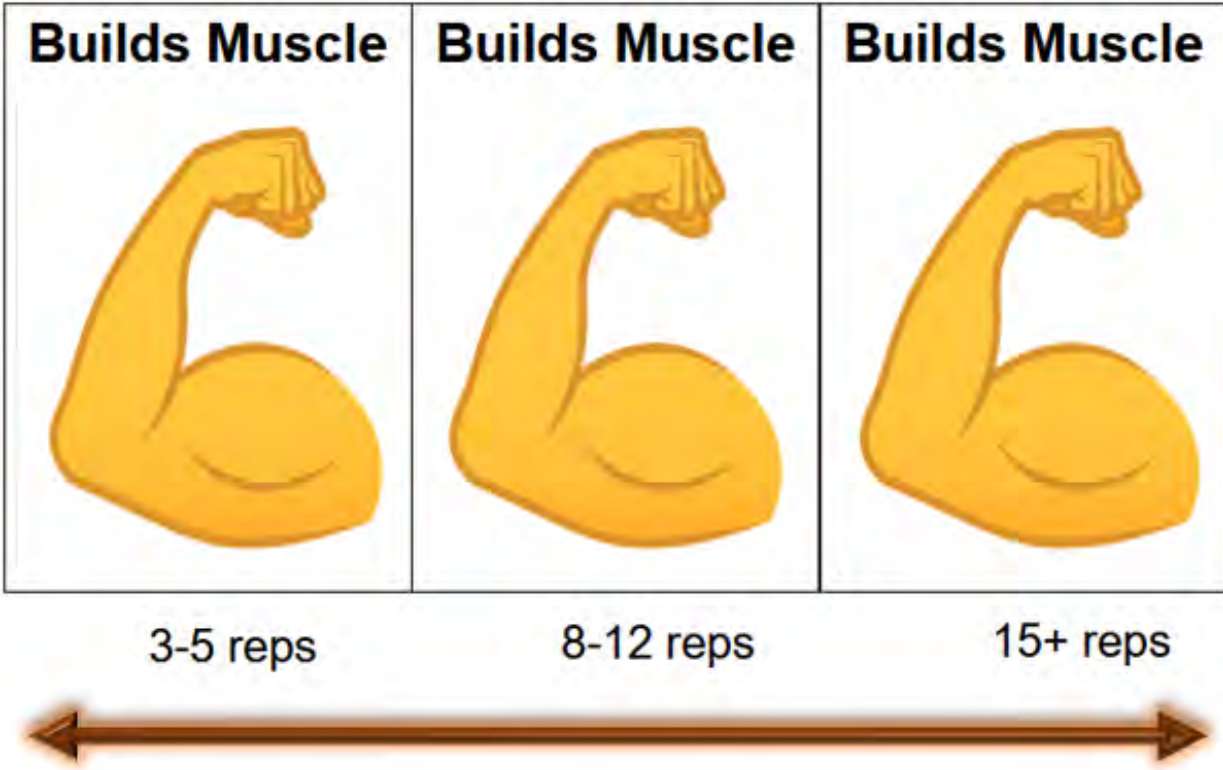
BRAD J. SCHOENFELD,¹ JOZO GRGIC,² DAN OGBORN,³ AND JAMES W. KRIEGER⁴



No Differences!

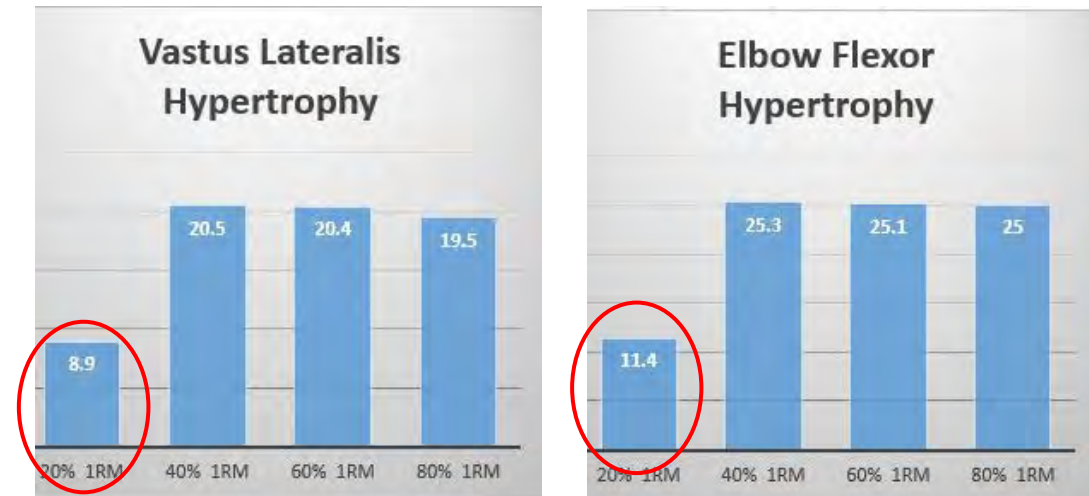


The *New*
Hypertrophy
Continuum



Effects of different intensities of resistance training with equated volume load on muscle strength and hypertrophy

Thiago Lasevicius, Carlos Ugrinowitsch, Brad Jon Schoenfeld, Hamilton Roschel, Lucas Duarte Tavares, Eduardo Oliveira De Souza, Gilberto Laurentino & Valmor Tricoli



Hypertrophy similar at all intensities above 40% 1RM

20% 1RM produced suboptimal results



Are the Hypertrophic Adaptations to High and Low-Load Resistance Training Muscle Fiber Type Specific?

Jozo Grgic^{1*} and Brad J. Schoenfeld²

¹Institute of Sport, Exercise and Active Living, Victoria University, Melbourne, VIC, Australia, ²Department of Health Sciences, Lehman College, Bronx, NY, United States

- Emerging research suggests growth from low-load training may be greater in type I fibers and growth from heavy loading more specific to type II fibers
 - Findings remain equivocal

Myth: You need to “go hard or go home” to build muscle



Set End Point Basics

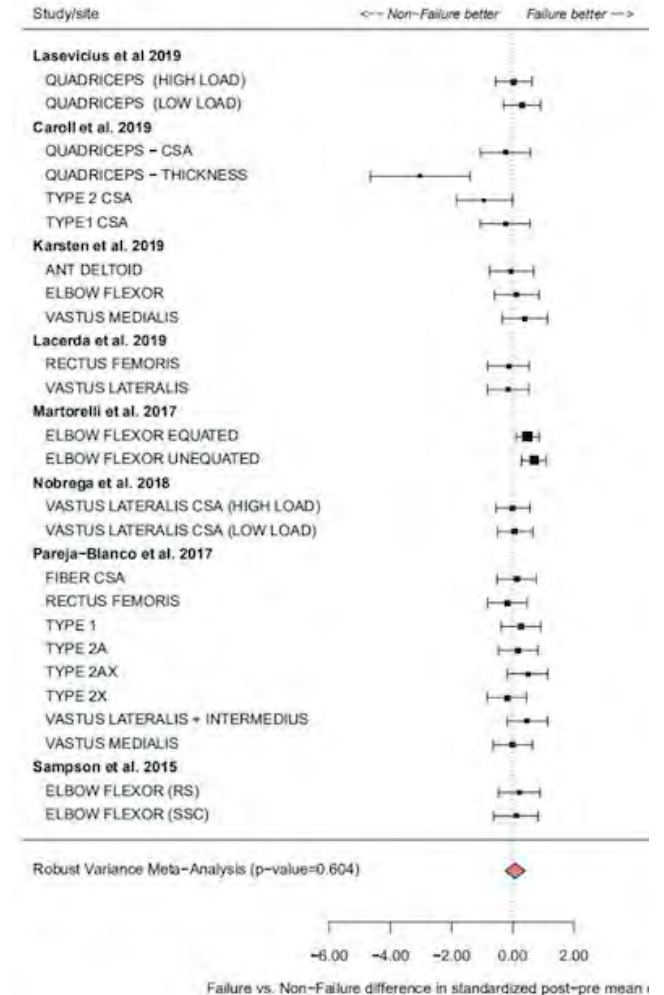
Can be defined as the proximity to momentary failure

- Failure can be defined as when a lifter cannot complete the concentric portion of a rep without deviating from the prescribed form

Should You Train All-Out?

Meta-Analytic Data

- “Training to muscle failure does not seem to be required for gains in strength and muscle size. However, training in this manner also does not seem to have detrimental effects on these adaptations.”



It's a Nuanced Topic...

Considerations:

- Frequency of training
- Magnitude of loading zone
- Training status
- Age
- Type of exercise
- Not necessarily a binary choice

Use RIR to guide set end-point

- Most sets carried out with an RIR between 1-3
- Last set selectively performed to failure?

RIR	Intensity of effort
0	Maximum effort
0.5	Perhaps could have done 1 more repetition
1	<u>Definitely could</u> have done 1 more repetition
1.5	Could have done 1 more repetition, perhaps even 2
2	<u>Definitely could</u> have done 2 more repetitions
2.5	Could have done 2 more repetitions, perhaps even 3
3	<u>Definitely could</u> have done 3 more repetitions
3.5	Could have done 3 more repetitions, perhaps even 4
4	<u>Definitely could</u> have done 4 more repetitions

Myth: There is an optimal number of sets for maximizing hypertrophy



Volume = Work Performed

Set Load

- Number of sets

Repetition Load

- Sets x reps

Volume Load

- Sets x reps x load

Volume Meta-Analysis



Journal of Sports Sciences

Routledge
Taylor & Francis Group

ISSN: 0264-0414 (Print) 1466-447X (Online) Journal homepage: <http://www.tandfonline.com/loi/rjsp20>

Dose-response relationship between weekly resistance training volume and increases in muscle mass: A systematic review and meta-analysis

Brad J. Schoenfeld, Dan Ogborn & James W. Krieger

Inclusion Criteria

- 15 studies identified that compared different daily resistance training volumes in traditional dynamic resistance exercise at intensities $\geq 65\%$ 1RM

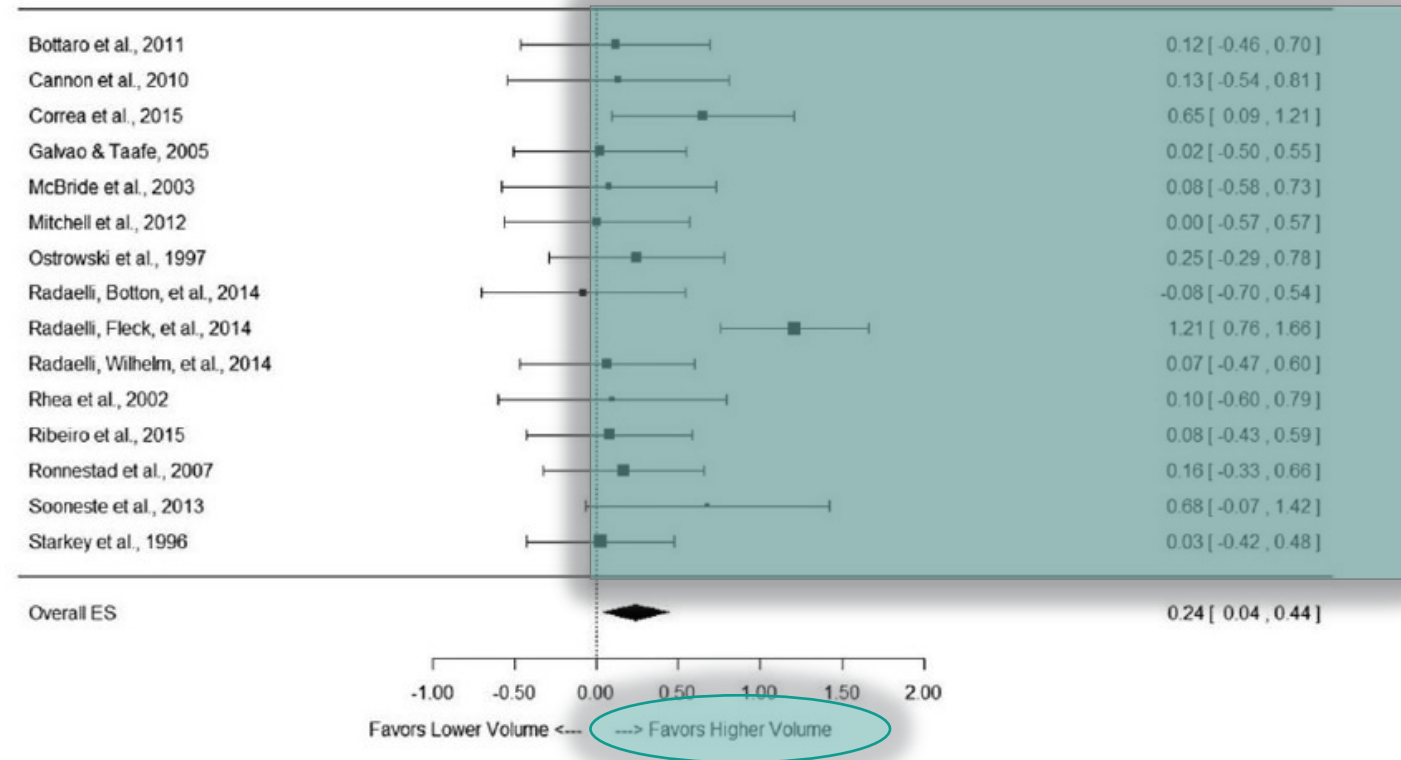
Meta-Analytic Results

Stratified ES showed clear dose-response relationship

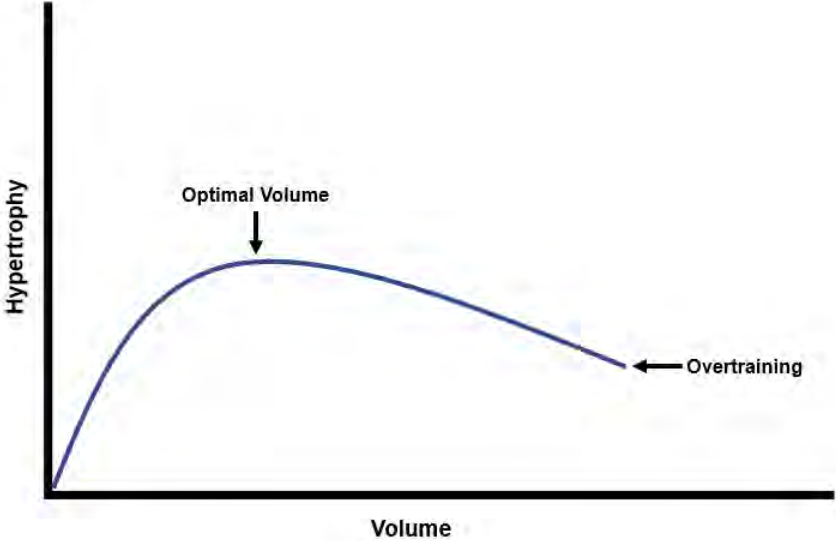
- 0.29 for <5 sets for gain of 5.5%
- 0.31 for 5-9 sets for gain of 5.6%
- 0.60 for 10+ sets for a gain 10.3%

Effects strengthened for higher volumes when only direct measures of hypertrophy analyzed

Forest Plot of Results



Inverted-U Response to Volume



Key Point!

Threshold exists for benefits from increased volume; beyond a certain point there potentially are negative consequences from overtraining

- Benefit to periodizing volume to culminate in period of overreaching?

Evidence-Based Guidelines for Resistance Training Volume to Maximize Muscle Hypertrophy

Brad Schoenfeld, PhD, CSCS, CSPS, FNCSA¹ and Jozo Grgic, MSc²

¹Department of Health Sciences, Lehman College, Bronx, New York; and ²Institute of Sport, Exercise and Active Living (ISEAL), Victoria University, Melbourne, Australia

Table 2
A theoretical example how training volume can be periodized through a year

Weeks 1–12	Weeks 13–24	Weeks 25–36	Weeks 37 and 38	Weeks 39–46	Weeks 47–52
7–10 sets	10–15 sets	15–20 sets	2–3 sets	20–25 sets	5–7 sets
Goal: to stimulate hypertrophy with lower training volumes and acclimate the body for higher volumes.	Goal: progressively increasing the rate of hypertrophy with moderate training volumes.	Goal: progressively increasing the rate of hypertrophy with higher training volumes.	Goal: deloading phase aimed at promoting recovery.	Goal: to promote a state of functional overreaching with a high-volume mesocycle.	Goal: reduction of training volume by ~65% for supercompensation of muscle proteins and maintenance of muscle mass.

All sets are expressed as per week per muscle group.



Myth: Short rest periods enhance growth



Rest Interval Basics

Defined as the time taken
between sets

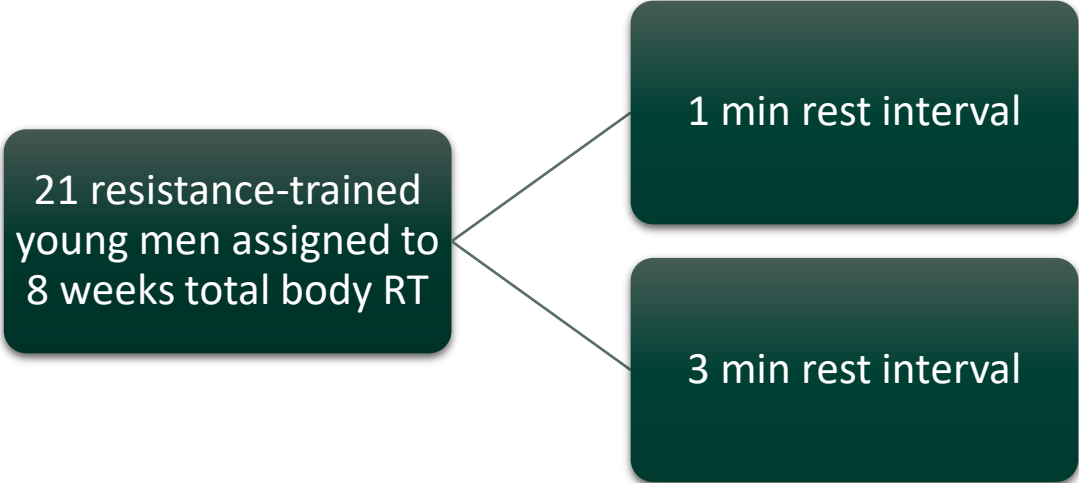
- General guidelines recommend short intervals for hypertrophy (~60 secs) and long intervals for strength (~3 mins)

Filling the Research Gaps

LONGER INTERSET REST PERIODS ENHANCE MUSCLE STRENGTH AND HYPERTROPHY IN RESISTANCE-TRAINED MEN

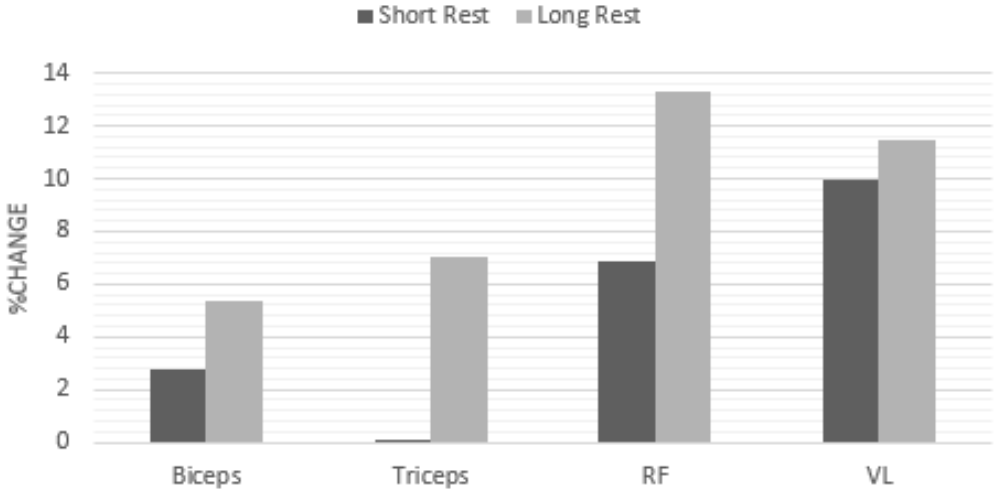
BRAD J. SCHOENFELD,¹ ZACHARY K. POPE,² FRANKLIN M. BENIK,² GARRETT M. HESTER,² JOHN SELLERS,² JOSH L. NOONER,² JESSICA A. SCHNAITER,² KATHERINE E. BOND-WILLIAMS,² ADRIAN S. CARTER,² CORBIN L. ROSS,² BRANDON L. JUST,² MENNO HENSELMANS,³ AND JAMES W. KRIEGER⁴

¹Department of Health Sciences, CUNY Lehman College, Bronx, New York; ²Health and Human Performance, Oklahoma State University, Stillwater, Oklahoma; ³Bayesian Bodybuilding, Gorinchem, the Netherlands; and ⁴Weightology, LLC, Redmond, Washington



Results...?

Changes in Muscle Thickness



Measures of muscle thickness favored the longer rest period condition

Bottom Line:
Findings indicate hypertrophic benefit to longer rest periods

Interference Due to Effects on Volume?

Original Research

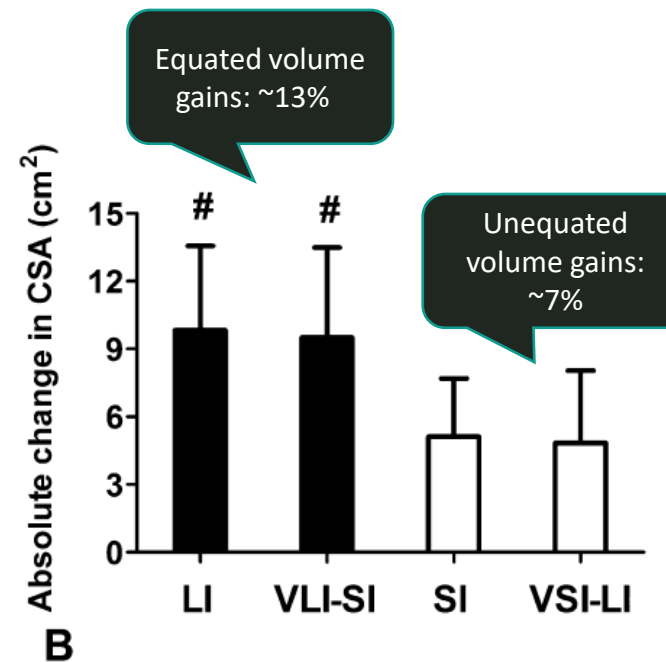
Journal of Strength and Conditioning Research

Volume Load Rather Than Resting Interval Influences Muscle Hypertrophy During High-Intensity Resistance Training

Ariel Roberth Longo,¹ Carla Silva-Batista,^{2,3} Kelly Pedrosa,¹ Vitor de Salles Painelli,¹ Thiago Lasevicius,² Brad Jon Schoenfeld,⁴ André Yui Aihara,⁵ Bergson de Almeida Peres,¹ Valmor Tricoli,² and Emerson Luiz Teixeira^{1,2}

Young untrained men performed 3 sets unilateral inclined leg press at 80% 1-RM to failure

- 1 min rest
- 3 mins rest
- 1 min rest with volume load matched to 3 mins
- 3 min rest with volume load matched to 1 min



Takeaways from Literature

European Journal of Sport Science, 2017
<https://doi.org/10.1080/17461391.2017.1340524>



The effects of short versus long inter-set rest intervals in resistance training on measures of muscle hypertrophy: A systematic review

JOZO GRGIC¹, BRUNO LAZINICA², PAVLE MIKULIC³, JAMES W. KRIEGER⁴, & BRAD JON SCHOENFELD⁵

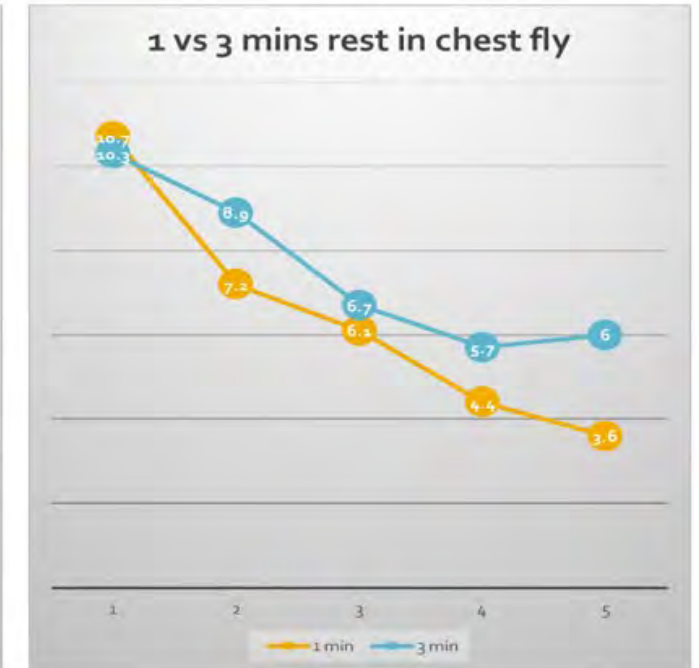
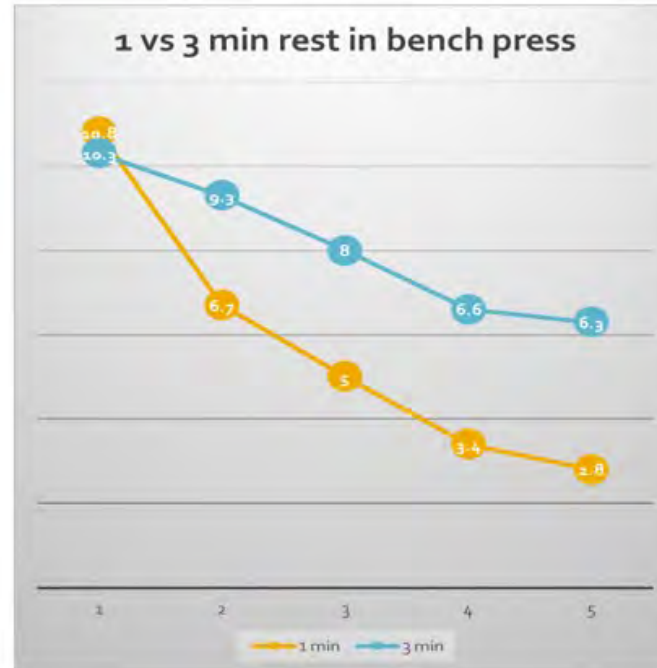
- Current evidence indicates that both short and long inter-set rest intervals may be useful for achieving gains in muscle hypertrophy in untrained individuals.
- Novel findings in trained lifters using measures sensitive to detect changes in muscle hypertrophy suggest a possible advantage for longer rest intervals.

Other Considerations

Short rest periods heighten metabolic stress

Could integrating phases of short rest in combination with longer rest evoke responses that enhance muscular gains over time?

Acute Reductions in Repetitions



Senna et al. (2012). Influence of different rest interval lengths in multi-joint and single-joint exercises on repetition performance, perceived exertion, and blood lactate. *Journal of Exercise Physiology*, 15(5), 96-106

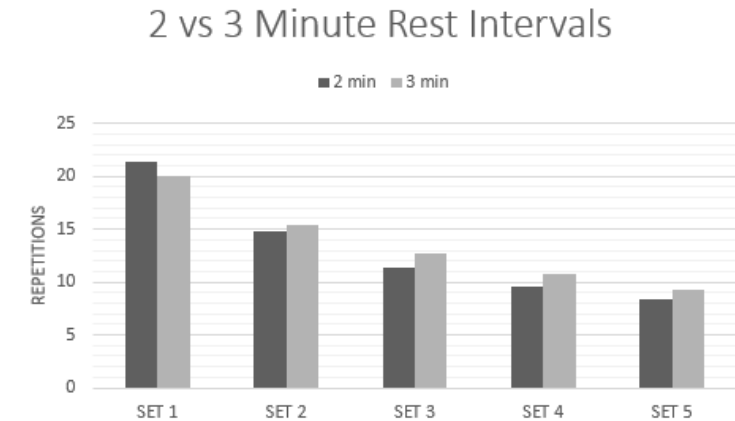
Ideal Rest Period for Compound Lifts?

Does rest interval between sets affect resistance training volume, density, and rating of perceived exertion when adopting the crescent pyramid system in young women?

Witalo KASSIANO ¹*, Alexandre I. MEDEIROS ², Bruna D. de VASCONCELOS COSTA ¹, Ana D. ANDRADE ³, Mário A. MOURA SIMIM ², Leonardo de SOUSA FORTES ³, Edilson S. CYRINO ¹, Cláudio de OLIVEIRA ASSUMPCÃO ²

- Resistance-trained young women performed RT with 2 vs 3 mins rest in cross-over fashion
 - Exercise consisted of 5 sets of the leg press at 60%, 65%, 70%, 75%, and 80% of 1RM

Similar number of reps performed between conditions



Practical Applications

Volume Higher volumes of training are beneficial up to a certain point; periodize to culminate in a period of functional overreaching?

Loading Train through a variety of rep ranges (3 to 20+ RM)

Rest Interval Majority of rest intervals at least 2 mins – integrating shorter rest on single joint exercises may be beneficial

Set End Point Focus on mind-muscle connection throughout the ROM in both concentric and eccentric actions

Thank you for coming!

I can be reached through my website: www.lookgreatnaked.com

