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# Really High Volumes Revisited

***Are really high weekly set volumes needed to maximize hypertrophy? New study review.***

Michael C. Zourdos, Ph.D., CSCS

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# Today's Objectives

1. Review important studies on really high volumes
2. Examine what these important studies are actually showing and the nuances of each study
3. **Review a new study from Enes et al.** using volumes of up to 52 direct sets per week for the quads
4. Discuss the interindividual rate of hypertrophic response to various volumes
5. Discuss the validity of really high volumes and when they might be appropriate

# What This Video is Not About

- **This video is not about *STRENGTH***
  - There is a relationship between volume and strength, but it is not nearly as strong as the relationship between volume and muscle growth
  - We are *only* analyzing and discussing the really high volume research for hypertrophy in this video
  - This isn't to say that high volume doesn't have a place at times for strength, just that the information here shouldn't be extrapolated to strength as that is not the goal of this video

# Previous MASS Articles and Videos on Really High Volumes

## Understanding Volume
**Volume 2 Issue 10**

## Bring the Full Court Press: Evidence for Really High Volumes
**Volume 4 Issue 2**

## Volume Cycling
**Volume 5 Issue 2**

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# Overview of Really High Volumes in the Literature

***Specific Research***

***Schoenfeld et al. 2019***

***Brigatto et al. 2022***

***Aube et al. 2020***

***NEW STUDY***

***Enes et al. 2023***

# Schoenfeld et al. 2019 – Longitudinal Study

***3 Groups of trained men: 1, 3, or 5 sets per exercise***

***This was: 6-9, 18-27, or 30-45 sets per week***

## Exercises Performed

**Back Squat**
**Leg Press**
**Leg Extension**
**Bench Press**
**Military Press**
**Lat-Pulldown**
**Cable Row**

## Training Protocol

**Full-Body, 3 d/wk.**
**8-12 reps to failure**
**90s rest intervals**
**Load adjusted as needed**

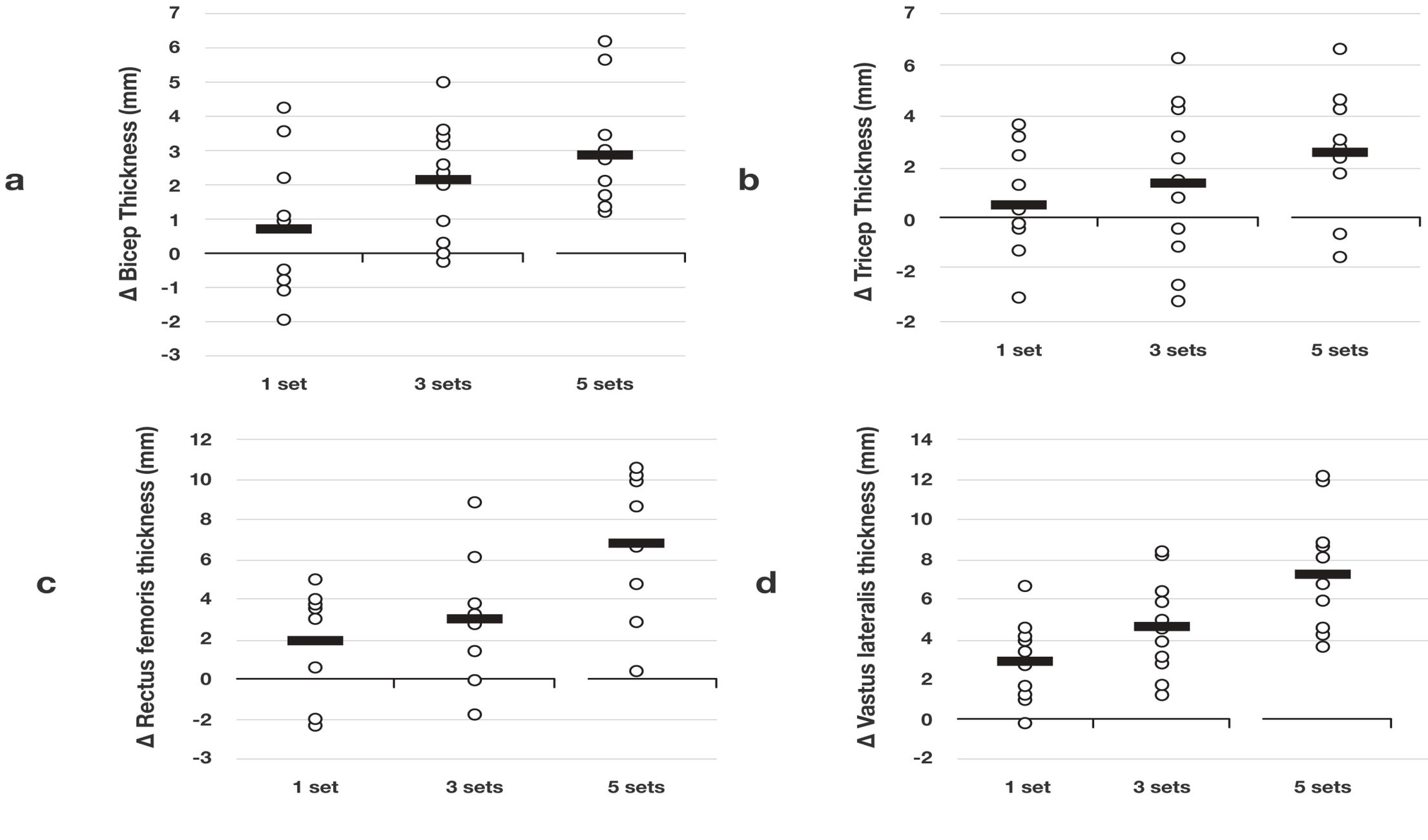
**HYPERTROPHY OUTCOME MEASUREMENTS – Muscle Thickness:**

***Biceps***
***Triceps***
***Vastus Lateralis***
***Rectus Femoris***

# Schoenfeld et al. 2019 – *Findings*

## *Generally: 30-45 > 18 – 27 > 6- 9 sets*

**Figure 1** Hypertrophy outcomes of individuals within each group



# Notes About Schoenfeld et al. Study

- **How was volume counted?**
  - *Indirect volume was counted the same as direct volume*
  - *There were 32 sets/wk. for biceps*
  - *This was: 5 sets each of rows, lat-pulldowns, cable curls, and hammer curls 2x/wk.*
    - *That's not THAT much*

- **Individual Response**
  - **Although growth did scale with volume**
  - **Not everyone benefited from higher volumes**
    - *Perhaps those few would have benefitted from lower volumes?*

- **Lifters Were Trained, so the findings might not apply to everyone**
  - *Untrained lifters can grow on much less*

# Brigatto et al. 2022 – Longitudinal Study

***3 Groups of trained men***

***16, 24, or 32 sets per week***

***Trained 4 total days per week, M/Th were the same, Tu/Fri were the same***

## Exercises Performed

***Monday and Thursday***

**Bench Press**
**DB Fly**
**Cable Triceps**
**Back Squat**
**Leg Extension**

***Tuesday and Friday***

**Lat-Pulldown**
**DB Reverse Fly**
**Biceps Curl**
**Seated Leg Curl**

## Training Protocol

**8-10 reps to failure**
**Only 60s rest intervals**
**Load adjusted as needed**

**HYPERTROPHY OUTCOME MEASUREMENTS**

**Muscle Thickness:**

***Biceps***
***Triceps***
***Vastus Lateralis***

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# Brigatto et al. 2012 – *Findings*

## *Only 1 significant group × time interaction*

### *32 set > 16 set for vastus lateralis thickness*

**Table 6** Hypertrophy findings

| Variables | Pre-study | Post-study | Δ% |
|---|---|---|---|
| Biceps MT (mm) | | | |
| G16 | 38.2 ± 3.9 | 38.4 ± 3.9* | 0.5 |
| G24 | 38.2 ± 4.5 | 38.7 ± 4.6* | 1.3 |
| G32 | 35.6 ± 3.1 | 36.7 ± 3.0* | 3.1 |
| Triceps MT (mm) | | | |
| G16 | 33.9 ± 4.3 | 34.2 ± 4.3* | 0.8 |
| G24 | 33.6 ± 4.3 | 35.0 ± 4.7* | 4.0 |
| G32 | 35.9 ± 3.8 | 38.4 ± 4.2# | 7.0 |
| Vastus lateralis MT (mm) | | | |
| G16 | 36.2 ± 4.4 | 36.9 ± 4.0* | 2.1 |
| G24 | 35.4 ± 5.0 | 37.4 ± 4.6* | 5.6 |
| G32 | 37.1 ± 5.1 | 40.6 ± 5.1# | 9.4 |

# Notes About Brigatto et al. Study

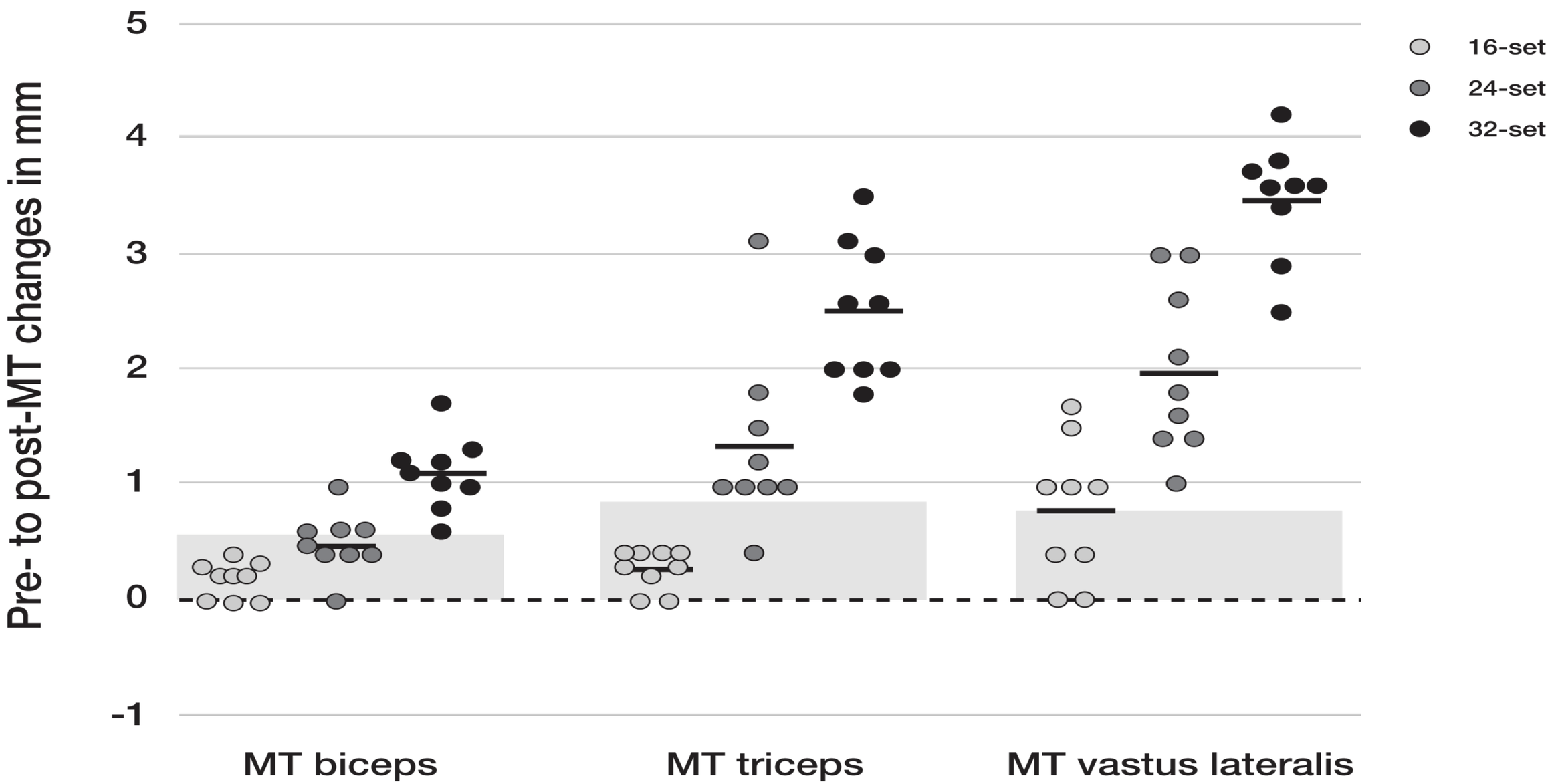
- **How was volume counted?**
  - *Large muscle groups (chest and quads) received only direct sets*
  - *Smaller muscle groups (biceps and triceps) received direct and indirect sets*
    - *For example: Lat-pulldowns and curls both counted as biceps sets*

- **Individual Response**
  - **The response was actually pretty uniform in this study**
  - ***This is ATYPICAL***

- ***Bottom Line:***

- ***The highlight is 32 sets are best***
- ***The reality is 32 sets only outperformed 16 sets for one measurement***

**Figure 2** Individual raw value changes in muscle thickness




*From Brigatto et al. (1)*
*MT = Muscle thickness (assessed via A-mode ultrasound), Gray Shaded Area = To be considered at least the "smallest worthwhile change" an individual needed to increase MT outside of the gray area, Dots = individual subjects, Horizontal Lines = Mean change for each group*

# Aube et al. 2020 – Longitudinal Study

***3 Groups of trained men: 12, 18, or 24 sets per exercise***

***Sets AND volume load (sets x reps x wt. lifted) were equated***

## Training Protocol

**2d/wk. for 8 weeks**

**Sets evenly divided between only the squat and leg press**

**12-set: 3 sets/session, 18-set: 4-5 sets/session, 24-set 6 sets/session**

**Load adjusted as needed**

**All sets to 2 RIR**

**HYPERTROPHY OUTCOME MEASUREMENTS – Muscle Thickness:**

***Anterior, medial, and distal thigh muscle thickness***

# Aube et al. 2020 – *Findings*

*No significant differences between groups for change in muscle thickness*

| | Group | Pre-Study MT | Post-Study MT | %Change |
|---|---|---|---|---|
| **Sum of all MT (cm)** | **12-set** | **9.3 ± 1.9** | **10.0 ± 2.0** | **+7.5%** |
| | **18-set** | **8.8 ± 1.8** | **9.4 ± 1.6** | **+6.8%** |
| | **24-set** | **8.9 ± 1.4** | **9.5 ± 1.1** | **+6.7%** |

# Notes About Aube et al. Study

- **<u>Per Set Difficulty and Volume</u>**
  - *This was the only study NOT training to failure (2 RIR)*
  - *Only direct sets were used*
  - *Volume load as well as sets were equated*
  - *Also, the high volume group in this study was more similar to the middle group in the other two studies*
  - *Perhaps just REALLY high volumes are needed?*

# New Study

## Enes et al. 2023

**Effects of Different Weekly Set Progressions on Muscular Adaptations in Trained Males: Is there a Dose-Response Effect?**

Alysson Enes[1], Eduardo O. De Souza[2], and Tácito P. Souza-Junior[1]

[1]Metabolism, Nutrition and Strength Training Research Group - Federal University of Paraná (UFPR), Curitiba, PR, BRAZIL; [2]Department of Health Sciences and Human Performance, The University of Tampa, Tampa, FL

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# Enes et al. 2023 – Longitudinal Study

***3 Groups of trained men: 22, 42, and 52 sets/wk.***

***BUT, subjects progressed to the 42 and 52 numbers (volume was not static)***

## Washout Period - Weeks 1 - 2

**In week 1 – All subjects reduced their habitual volume by 40%**

**In week 2 – Allsubjects reduced their volume by another 40%**

## Familiarization Period – Weeks 3 - 4

**All subjects added 4 sets from weeks 1-2**

## Main Training Program – Weeks 5 - 16

**Subjects trained 2x/wk. – one 6-8 rep day and one 8-10 rep day**

**Subjects trained squat, leg press, leg ext. to a 2 RIR in each session**

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# Enes et al. 2023 – Group Specifics

***3 Groups of trained men (n = 31): 22, 42, and 52 sets/wk.***

***BUT, subjects progressed to the 42 and 52 numbers (volume was not static)***

***ALL GROUPS STARTED AT 22 SETS PER WEEK FOR QUADS***

## 22-Set Group (n = 10)

**Start (22 sets/wk.)**

**Squat – 8 sets**
**Leg Press – 8 sets**
**Leg Ext. – 6 sets**

↓

**No Set Progression**

↓

**Start (22 sets/wk.)**

**Squat – 8 sets**
**Leg Press – 8 sets**
**Leg Ext. – 6 sets**

## 42-Set Group (n = 10)

**Start (22 sets/wk.)**

**Squat – 8 sets**
**Leg Press – 8 sets**
**Leg Ext. – 6 sets**

↓

**+4 Total Sets/wk.**

↓

**End (42 sets/wk.)**

**Squat – 14 sets**
**Leg Press – 14 sets**
**Leg Ext. – 14 sets**

## 52-Set Group (n = 11)

**Start (22 sets/wk.)**

**Squat – 8 sets**
**Leg Press – 8 sets**
**Leg Ext. – 6 sets**

↓

**+6 Total Sets/wk.**

↓

**End (52 sets/wk.)**

**Squat – 18 sets**
**Leg Press – 18 sets**
**Leg Ext. – 16 sets**

# Enes et al. 2023 – Outcomes

***Cross-Sectional Area (Ultrasonagraphy)***

***-Vastus Lateralis***

***Muscle Thickness (Ultrasonagraphy)***

***-Vastus Lateralis (proximal, middle, and distal)***

***-Vastus Intermedius***

# Enes et al. 2023 – *Findings*

*No significant differences between groups for change in cross-sectional area or muscle thickness*

*However, the authors did suggest that the range of the 95% confidence intervals shows that more volume was slightly better…*

# MASS Enes et al. 2023 – *Mean Findings*

| | Group | Mean Change | 95% CI |
|---|---|---|---|
| VL CSA | 22-set | +1.6cm$^2$ | 0.6 – 2.5cm$^2$ |
| | 42-set | +3.8cm$^2$ | 2.7 – 5.2cm$^2$ |
| | 52-set | +4.3cm$^2$ | 1.8 – 6.0cm$^2$ |

| | Group | Mean Change | 95% CI |
|---|---|---|---|
| Sum of all MT (cm) | 22-set | +0.40cm | –0.4 – 0.84cm |
| | 42-set | +0.72cm | 2.9 – 1.16cm |
| | 52-set | +1.06cm | 0.65 – 1.48cm |

1. No significant group × time interactions
2. However, there is scaling with volume
3. We need to look at the individual response

# MASS Enes et al. 2023 – *Individual Findings*

| | Group | Mean % Change | # increase CSA | # decrease CSA |
|---|---|---|---|---|
| VL CSA | 22-set | +4.0 ± 3.6% | 8 | 2 |
| | 42-set | +9.8 ± 5.0% | 10 | 0 |
| | 52-set | +11.2 ± 8.8% | 10 | 1 |

## *3 largest and smallest changes*
## *Estimated via WebPlotDigitizer*

| | Group | Largest Changes (%) | Smallest Changes (%) |
|---|---|---|---|
| VL CSA | 22-set | +2.6, +3.7, +3.2 | -1.5, +0.9, +1.6 |
| | 42-set | +5.2, +5.9, +8.1 | +1.2, +1.8, +2.0 |
| | 52-set | +6.5, +8.2, +9.8 | -3.9, +2.2, +3.1 |

# Notes About Enes et al. Findings

- **There were NOT any significant group x time interactions**
- **Things did seem to scale with volume**
- ***But, even if things did scale with volume the response was still variable***
  - ***Some did not benefit from the really high volume***

# Notes About Enes et al. Study in General

- **Sets were NOT static, they progressed**
- **Even if really high volumes are better (debatable), it's probably not something you want to do all the time**
- ***This is only on the quadriceps***
- ***Overall, I don't think we should use this study to make any confident claims***
- ***But, the data are interesting and if you are a believer in really high volumes it does suggest the need for more research***

# Summary of Studies Examined

- ***Brigatto et al:*** 32 sets/wk. > 24 > 16 for some muscle growth outcomes (only one significant difference)
- ***Schoenfeld et al:*** *Possible* hypertrophy benefit with 30-45 sets per muscle group per week than lower volumes
- ***Aube et al:*** No difference in the magnitude of muscle growth between 12-, 18-, and 24-sets per week
- ***Enes et al:*** No significant group x time interactions for 22-set, 42-set, and 52-set training per week (42 and 52 progressed over time from 22), but *possibly* better increases for more sets

# Additional Thoughts

- ***Overall***
  - Volume is a main driver of muscle growth
  - There is a clear relationship between volume and muscle growth
  - But…
  - Are really high volumes better?
  - Does the inverted U really exist?

- ***What Does this Suggest***
  - There is an individual rate of response, really high volumes may be better for some, but not others
  - This all could be evidence for volume cycling, as I doubt you want to maintain these really high volumes all the time
  - Volume cycling is very nuanced, see this previous video

# *Applications and Takeaways*

- **There is some evidence in support of really high volumes, but it's not overwhelming**
- **There is large interindividual variation in muscle growth in response to really high and low volumes**
- **Some individuals may response well to high volumes and some may not**
- **Volume cycling may be worth a try. If you do this, I'd use really high volumes on all a few muscle groups at a time and more maintenance volume on other muscle groups, then switch (practically hard to do all muscle groups together)**
- **Even if an individual grows from really high volume they have to consider if this is the same on all muscle groups for them, the perceptual response, and their recovery rate**