


Schoenfeld, B. 2012. Does Exercise –Induced Muscle Damage Play a Role in Skeletal Muscle Hypertrophy? *The Journal of Strength & Conditioning*, 26(5), 1441-1453. May 2012.

MUSCLE DAMAGE & HYPERTROPHY

THE MORE, THE BETTER?

Reference: by B. Schoenfeld JSCR 2012 

There is a sound theoretical rationale supporting a potential role for muscle damages in the hypertrophic response

- 1** Although muscle growth can occur in the relative absence of muscle damage, potential mechanisms exist whereby muscle damage may enhance muscle hypertrophy



- A** Release of inflammatory agents
- B** Activation of satellite cells
- C** Upregulation of IGF-1 system
- D** Set in motion the signaling pathways that lead to hypertrophy



- 2** Eccentric exercise has greater hypertrophic effects compared with other types of actions

BUT

A cause-effect relationship directly linking these gains to muscle damage is yet to be established

If such a relationship does in fact exist, it is not clear as to what extent of damage is optimal for inducing maximum muscle growth



MORE IS NOT ALWAYS BETTER

Evidence does seem to show that a threshold exists beyond which damage does not further augment muscle remodeling and may in fact interfere with the process

- 1** A high degree of exercise-induced muscle damage can impair an individual's ability to train, which necessarily would have a detrimental effect on muscle growth



- 2** Training in the early recovery phase may interfere with the recovery process

CONCLUSION



Even if more research remains needed, these results suggest that a moderate amount of damage would be most appropriate for maximizing the hypertrophic response

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Schoenfeld, B & Grgic, J. 2017. Evidence Based Guidelines for Resistance Training Volume to Maximize Muscle Hypertrophy, *Strength & Conditioning Journal*. December 2017.

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

Reference: by Schoenfeld & Grgic Strength Cond J 2018



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How much is enough?

- 1 10+ sets per muscle per week would seem to be a good starting point
- 2 Volume should then be manipulated based on individual response
- 3 That said, substantial gains can be achieved with volumes as low as 4 or fewer sets per muscle per week
- 4 Given that consistently training with high volumes has been purported to hasten the onset of overtraining, periodizing volume may enhance hypertrophy
- 5 Progressively increasing from lower to higher resistance training volumes over a period of several months may help to promote a state of functional overreaching, which would, in turn, result in a supercompensation of muscle proteins while reducing the potential for overtraining



Weekly distribution

- 5 When approaching high volumes of training, individuals might consider distributing the total volume into two separate daily training sessions
- 6 A lower volume phase might also be incorporated to promote recovery: a decrease in training volume by ~65% is sufficient for maintenance and, in some cases, even continued increases in muscle mass

Inter-individual responsiveness

- 7 Some individuals experience more dramatic changes in muscle mass than others. It is possible that so-called "non-responders" to training may benefit from an increased resistance training volume

