

Acute Training Variables, Muscle Growth, Strength, and Power – Rest Periods

Researched and Composed by Jacob Wilson, M.S., PhD. Candidate, C.S.C.S.

Rest Period Lengths

The data on rest period lengths is fairly cut and dry and is summed below.

Hypertrophy

For muscular hypertrophy the goal is to stimulate as anabolic an environment as is possible. Data strongly suggests that this occurs with shorter (30-60 seconds) as opposed to longer rest periods (3-5 minutes). For example in one study¹ individuals performed either 5, or 10 repetition sets, with 1 to 3 minutes rest between sets. Only the 10 by 1 minute rest protocol significantly increased Growth Hormone, indicating that this is the optimal rest period range for growth (Figure 5.0). Again, the mechanism is that with shorter rest, individuals have less time to clear lactic acid, and therefore obtain greater GH responses.

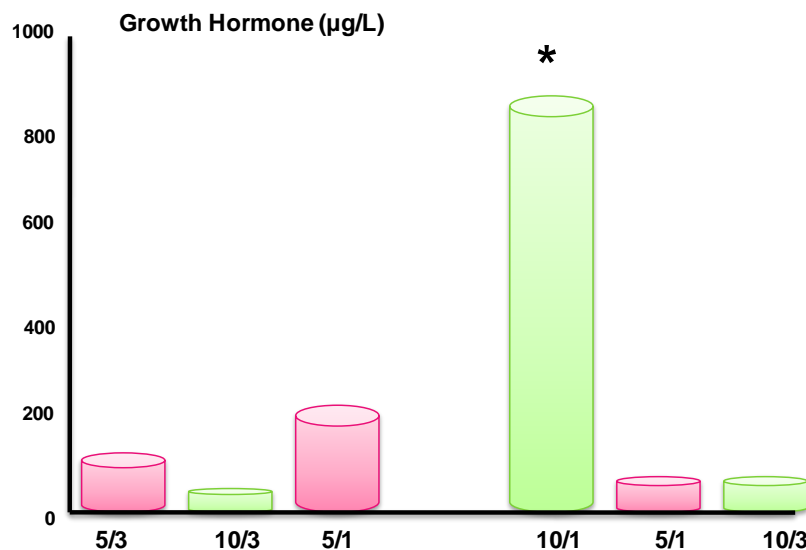


Figure 1.0 Growth Hormone Response to 4 different rep / rest schemes. Redrawn from Kraemer et al.¹

Strength and Power

We use primarily two systems when we train with weights. The first is the ATP-Creatine Phosphate system (ATP-CP) which lasts about 0 to 10 seconds of all out work, and the second which dominates at 30-90 seconds is the glycolytic system in which we use muscle glycogen or our stored form of carbohydrates to power work. ATP-PC is the most powerful system and it takes about 3-5 minutes to replenish ATP-PC stores following a hard set. For strength and power activities each set should elicit a maximum number of repetitions possible with the given weight lifted. For this to occur, studies suggest that 3-5 minutes rest are optimal, result in lower lactic acid levels, and higher ATP-PC stores on each set.

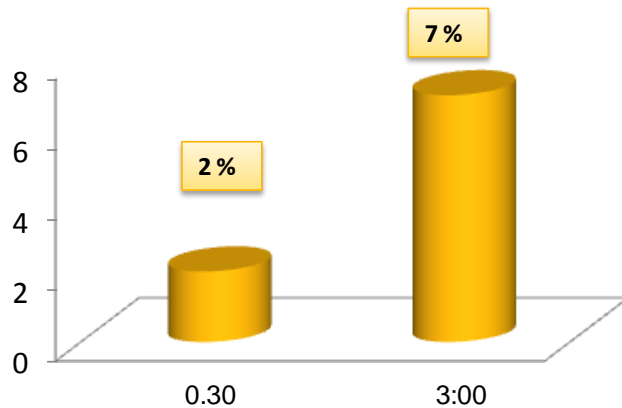


Figure 2.0 Increases in squat strength in 30 seconds vs. 3 minutes of rest between sets.

Data to construct figure was obtained from Robinson et al.²

The figure above is based on a study which showed that training with 3 minutes rest resulted in 7% increases in squat strength as compared to 30 seconds with a 2% increase. Power training requires similar rest periods to strength as it too is reliant on ATP-PC stores, and low levels of lactic acid.³

Table 1.0 Take home messages for rest period lengths and skeletal muscle growth, strength, and power.

❖ For muscle growth rest periods should last 30-60 seconds
❖ For Strength rest period lengths should last 3-5 minutes
❖ For power rest period lengths should also last 3-5 minutes

References

1. Kraemer WJ, Marchitelli L, Gordon SE, et al. Hormonal and growth factor responses to heavy resistance exercise protocols. *J Appl Physiol*. Oct 1990;69(4):1442-1450.
2. Robinson JM, Stone MH, Johnson RL, Penland CM, Warren BJ, Lewis RD. Effects of Different Weight Training Exercise/Rest Intervals on Strength, Power, and High Intensity Exercise Endurance. . *The Journal of Strength and Conditioning Research*. 1995;9(4):216-221.
3. Kraemer WJ, Ratamess NA. Fundamentals of resistance training: progression and exercise prescription. *Med Sci Sports Exerc*. Apr 2004;36(4):674-688.