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Research article, Young investigator

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2014**Dynamic Training Volume: A Construct of Both  
Time Under Tension and Volume Load**Quan T. Tran<sup>1</sup>, David Docherty<sup>2</sup>, 

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ScholarGoogle[Author Information](#)[Publish Date](#)[How to Cite](#)[Email link to this article](#)[Full Text](#)[PDF](#)**ABSTRACT**

The purpose of this study was to investigate the effects of three different weight training protocols, that varied in the way training volume was measured, on acute muscular fatigue. Ten resistance-trained males performed all three protocols which involved dynamic constant resistance exercise of the elbow flexors. Protocol A provided a standard for the time the muscle group was under tension (TUT) and volume load (VL), expressed as the product of the total number of repetitions and the load that was lifted. Protocol B involved 40% of the TUT but the same VL compared to protocol A; protocol C was equated with protocol A for TUT but only involved 50% of the VL. Fatigue was assessed by changes in maximum voluntary isometric force and integrated electromyography (iEMG) between the pre- and post-training protocols. The results of the study showed that, when equated for VL, greater TUT produced greater overall muscular fatigue ( $p \leq 0.001$ ) as reflected by the reduction in the force generating capability of the muscle. When the protocols were equated for TUT, greater VL ( $p \leq 0.01$ ) resulted in greater overall muscular fatigue. All three protocols resulted in significant decreases in iEMG ( $p \leq 0.05$ ) but they were not significantly different from each other. It was concluded that, because of the importance of training volume to neuromuscular adaptation, the training volume needs to be clearly described when designing resistance training programs.

**Key words:** Resistance training, maximal voluntary contraction, fatigue, electromyography

### Key Points

- Increase in either time under tension (TUT) or volume load (VL) increases the acute fatigue response, despite being equated for volume (by another method).
- A potential discrepancy in training volume may be present with training parameters that fail to control for either TUT or VL.
- Neural fatigue may be a contributing factor to the development of muscular fatigue but is not influenced by various methods of calculating volume such as TUT or VL.

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