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Resistance exercise prescription is based on the manipulation of training variables such as muscle action type, type of resistance, exercise selection and their order, rest intervals, repetition speed, training frequency, volume, and load. Of these variables, load has received particular attention in the literature. For increases in muscle size, the current American College of Sports Medicine position stand for resistance training recommends using higher loads (i.e., 70–85% of 1 repetition maximum [1RM]) for 8 to 12 repetitions per set. However, these recommendations have been challenged in a recent meta-analysis by Schoenfeld et al. (2017) that compared the effects of low-load resistance training (operationally defined as less than 60% 1RM with studies generally using even lower loads such as 30% 1RM) versus high-load resistance training (operationally defined as loads greater than 60% 1RM with studies generally using even higher loads such as 80% 1RM) on muscle hypertrophy. In that meta-analysis, Schoenfeld et al. (2017) reported that both low- and high-load resistance training produce similar increases in muscle size provided the training sets are performed to muscle failure.

Despite this evidence, one aspect that should not be neglected is that these results are specific to whole-muscle hypertrophy obtained using measurement tools such as B-mode ultrasound, magnetic resonance imaging, and computerized tomography. Schoenfeld et al. (2017) could not explore the effects of low vs. high-load resistance training on hypertrophy of type I and type II muscle fibers, due to the paucity of studies conducted on this topic. At the time of the review, the authors found only four relevant studies, and the findings across these studies are equivocal. Two studies reported divergent effects of low-load and high-load resistance training on type I and type II muscle fiber hypertrophy (Campos et al., 2002; Schuenke et al., 2012). Specifically, these studies presented data indicating that high-load resistance training elicits greater hypertrophy of both type I and type II muscle fibers than low-load training. In contrast to these findings, two studies have reported similar increases in fiber size of both types regardless of the load used in training (Mitchell et al., 2012; Morton et al., 2016).

Due to the considerable physiological differences between type I and type II muscle fibers, we have hypothesized that low-load resistance training may be more effective in producing type I muscle fiber hypertrophy, while high-load may be more effective in producing type II muscle fiber hypertrophy (Grgic et al., 2018). A recent study published in *The Journal of Physiology* is a timely addition to the literature and provides intriguing information on this topic. Briefly, Morton et al. (2019) demonstrated that both low-load (30% 1RM) and high-load (80% 1RM) lower-body resistance exercise performed to muscle failure results in different effects on time-under-load, training volume, and surface electromyography amplitude. Despite these differences, the depletion of muscle glycogen and anabolic signaling were similar in both muscle fiber types regardless of the load used in the exercise session. Therefore, it seems that low-load and high-load resistance training produces similar activation and anabolic signaling in both type I and type II muscle fibers, provided that sets are performed to muscle failure.

Based on the results of this study, it would be tempting to conclude that both low-load and high-load resistance training may, over the long term, produce similar hypertrophic effects on type I and type II muscle fiber hypertrophy. However, we should not disregard that the study by Morton et al. (2019) had an acute design. Even though these findings might hypothetically suggest that hypertrophy of type I and type II muscle fibers would also be the same when training with low and high loads, there is still a need for future long-term studies that would directly answer this question.

The need for future long-term studies is especially important to emphasize if we consider the recent evidence showing that blood flow restriction training performed with low-loads (~30% of 1RM) produces significant type I muscle fiber hypertrophy (Bjørnsen et al., 2019). In contrast, a group from the same study that trained with high-loads did not exhibit significant pre-to-post intervention increases in the size of type I muscle fibers (Bjørnsen et al., 2019). Even though traditional low-load training is not the same as low-load blood flow restriction training (i.e., the latter may alter physiological responses to resistance training, such as augmenting tissue hypoxia), it has been referred to as a 'milder form of low-load blood flow restrictive exercise' (Burd et al., 2013) and these results, therefore, suggest a possible load and fiber type-specific response.

While understanding the possible logistical challenges of this idea, it would be interesting for future studies to examine the time course of muscle fiber growth when training with low and high loads. This aspect may be intriguing to explore if we consider that the two previously mentioned studies that reported divergent effects of low and high-load resistance training on muscle fiber hypertrophy utilized a shorter duration training protocol (6 to 8 weeks, equating to a total of 17 and 20 resistance exercise sessions; Campos et al., 2002; Schuenke et al., 2012). The studies that reported similar increases in both fiber types with low and high-load strategies used longer duration interventions (10 to 12 weeks, equating to a total of 30 and 36 resistance exercise sessions; Mitchell et al., 2012; Morton et al., 2016). While this idea is a speculative one—because the data are from different cohorts—it might be that the time course of type I and type II muscle fiber hypertrophy differs with varying loads. The study (Bjørnsen et al., 2019) that reported type I muscle fiber hypertrophy with low-load blood flow restriction training but not with high-load utilized very short training blocks (i.e., 2 x 5 days of training). Hence, there remains a possibility that those generally training with high-loads may consider using short term blocks of low-load training (and *vice-versa*) which may serve to maximize whole muscle fiber hypertrophy with resistance training.

In addition to future longitudinal studies, future acute research is needed to explore if there is a minimal threshold of external resistance necessary for eliciting activation of both muscle fiber types. For example, would the results by Morton et al. (2019) be replicated using even lower loads such as 10% or 20% 1RM? If future acute, as well as long-term studies, confirm that load indeed is not an important determinant of muscle fiber activation and subsequently muscle fiber hypertrophy (provided that sets are carried out to the point of muscle failure) these findings may have considerable value in the prescription of resistance training. Such results may be particularly relevant for individuals: (a) who might be less confident using high-loads; and (b) for those that do not have access to facilities with the necessary equipment for high-load training. Ultimately, such findings may serve to improve long-term resistance exercise adherence of these individuals.

Additional information

Competing interests

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