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Training for strength and hypertrophy: an evidence-based approach

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Juneau and Tafur's letter on our paper highlights a minor semantic dispute rather than a fundamental difference of opinion. Nonetheless, we provide here a more nuanced evidence-based explanation than was provided in our paper [1].

Progressive overload is obviously a cornerstone of any sound resistance training program. All of the programs cited in our paper, along with our own research, clearly emphasize that progression is required for any stimulus to continue to evoke a response—hypertrophy and/or strength gains. Thus, Juneau and Tafur's extensive description of how low loads would, over time, become 'too low' to be effective is not something we consider to be a point of debate. The same would of course be true of higher load (i.e. that they would become less effective). However, this observation does not negate the fact that lower load (30–50%1RM) and higher load (>70%1RM) training programs – progressively altered to match gains in strength over time (something we consider to be inherent in citing a %1RM) – cause similar hypertrophy, as we [and many others – see for review Ref. [2]] have shown [3].

When expressing the load as a % of 1RM, the implication is, of course, as one gets stronger that load be increased, thus maintaining the intensity of effort. However, it is important to distinguish between *load*, in and of itself, and *progressive overload*. As highlighted in our manuscript, 'intensity of effort can be modulated by increasing load, volume-load, training frequency, inter-set rest, time under tension, blood flow occlusion, mode of contraction . . . ' Stated differently, progressive overload is not solely a function of increasing repetition load, but can be achieved with the manipulation of multiple variables of which load is merely one.

Juneau and Tafur highlight that loads may have a lower threshold where decreasing %1RM further results in inferior hypertrophy compared to higher loads. Although we reference examples [4,5] of hypertrophy with very low or even no load training with high effort, we acknowledge that lower loads may result in less hypertrophy, but do result in hypertrophy nonetheless. As stated in our paper, ' . . . muscular hypertrophy is similar between lower-load (30–50%1RM) and higher-load (>70%1RM) RET [resistance exercise training] when loads are lifted to the point of volitional fatigue . . . thus, load does not mediate RET-induced muscular hypertrophy.' We could perhaps amend the concluding statement to say that load, in and of itself, plays a much smaller role in hypertrophy than once thought? Perhaps our perspective is better expressed thus, 'the efficacy of specific training variables (e.g. load) on RET-induced muscle hypertrophy is mediated by intensity of effort' (Figure 1).

Juneau and Tafur argue that 'lifting in the 'higher-load' (>70% 1RM) range should be emphasized in hypertrophy recommendations for healthy athletes, as it is more efficient.' While this may be the case compared to very low load training (i.e. 70% versus 30% 1RM), very high load training gets increasingly *less* efficient, as a volume-matched program would require more sets and longer rest periods. Additionally, we propose that there is a greater risk of injury with very high load training [6], which is clearly an important consideration for athletes. We note that without recent investigations of effective loads and repetition ranges [2], we would still be holding on to the incorrect perception that heavy loads are *required* and not merely *sufficient* for resistance exercise training (RET)-induced hypertrophy.

Naturally, we would advocate for training with loads that are specific to an individual's goals. We did not claim, nor have we ever done so that exclusive training with lower loads is required or even recommended for hypertrophy. Programming manipulation over time should, in our opinion, be individualized to the athlete (or non-athlete) and one variable that could be manipulated is load, but there is a myriad of others that all, via a higher intensity of effort, mediate hypertrophy. We hope our clarification serves to highlight the evidence-based science and prescriptive advice we offered in our review [1].

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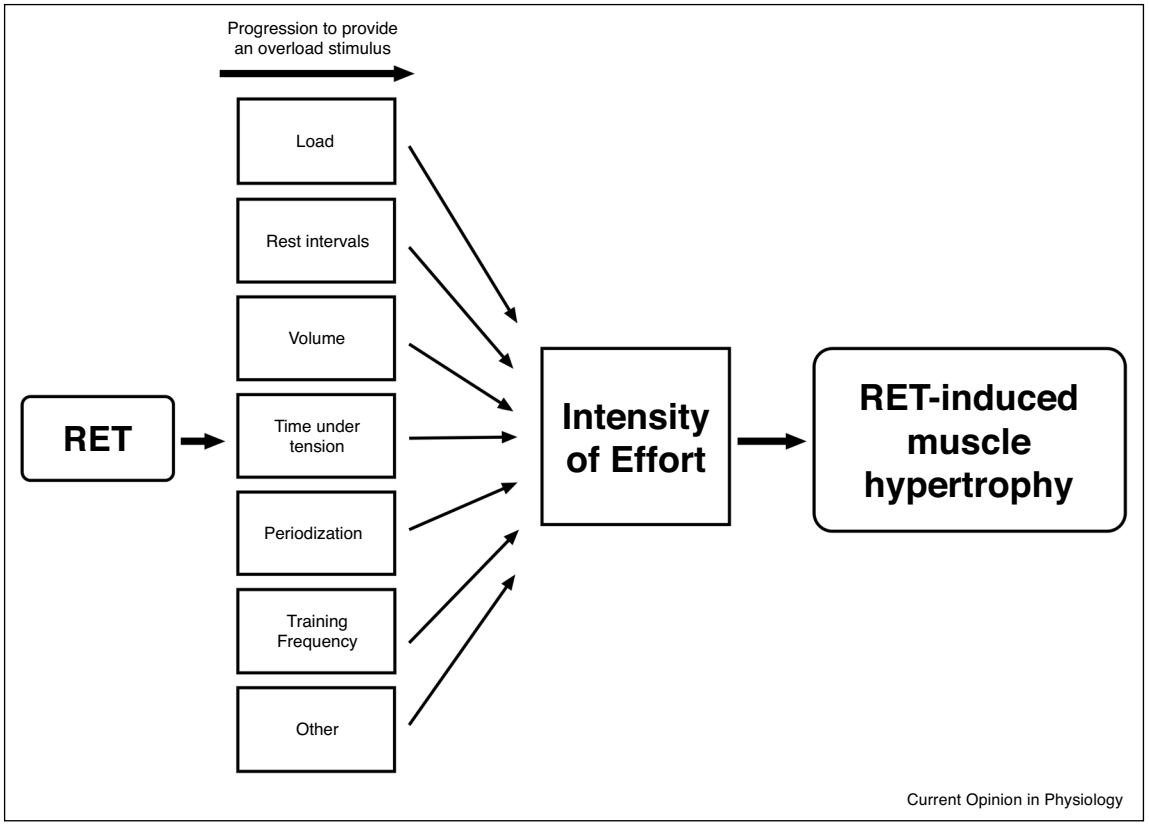
Figure 1



A common variable (intensity of effort) that we propose is the primary determinant of the efficacy of specific RET variables (of which load is one) in inducing muscle hypertrophy.

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