Journal Articles Pertaining to Advanced Resistance Training Techniques:

ARTICLE 1:
Acute Hormonal and Neuromuscular Responses and Recovery to Forced vs. Maximum Repetitions Multiple Resistance Exercises
Ahtiainen, J.; Pakarinen, A.; Kraemer, W.; Häkkinen, K.

Abstract:
Acute hormonal and neuromuscular responses and recovery three days after the exercises were examined during the maximum repetitions (MR) and forced repetitions (FR) resistance exercise protocols in 16 male athletes. MR included 4 sets of leg presses, 2 sets of squats and 2 sets of knee extensions (with 12 RM) with a 2-min recovery between the sets and 4 min between the exercises. In FR the initial load was chosen to be higher than in MR so that the subject could not lift 12 repetitions per set by himself. After each set to failure the subject was assisted to perform the remaining repetitions to complete the 12 repetitions per set. Thus the exercise intensity was greater in FR than in MR. Both loading protocols led to the great acute increases (p < 0.05 - 0.001) in serum testosterone, free testosterone, cortisol and GH concentrations. However, the responses in cortisol (p < 0.05) and GH (p < 0.01) were larger in FR than in MR. The decrease of 56.5 % (p < 0.001) in maximal isometric force in FR was greater (p < 0.001) than that of 38.3 % in MR (p < 0.001) and force remained lower (p < 0.01) during the recovery in FR compared to MR. The larger decrease in isometric strength in FR than in MR was also associated with the decreased maximal voluntary EMG of the loaded muscles. The data indicate that the forced repetition exercise system induced greater acute hormonal and neuromuscular responses than a traditional maximum repetition exercise system and therefore it may be used to manipulate acute resistance exercise variables in athletes.

Summary and Application to Training (Written by Luke Carlson):
This study lends support to the efficacy of training beyond the point of momentary muscle failure and including “forced reps.” The authors compared one group who trained to “repetition maximum” and a group that trained to failure with a heavier load and then performed 6 “forced reps.” The study included 16 total subjects. The subjects in the “forced rep” group performed an average of 6 reps by themselves and then another 6 reps with assistance from a training partner. Following the set, the isometric force that the participants could produce dropped significantly more and also recovered slower compared to the “maximum rep” group; thus indicating a more pronounced training stimulus, a greater level of fatigue, and perhaps, increased fiber recruitment. Additionally, forced reps induced a greater hormonal response that has the potential for mediating increases in muscle strength and hypertrophy. It’s important to note, that the authors did not specifically measure chronic improvements in strength or hypertrophy in this study (they simply measured forced production and hormone activity following an acute bout of either “rep maximum” or “forced reps”).

Implementation Strategy: Consider performing “forced reps” or assisted reps at the point of muscle failure to stimulate further adaptation.