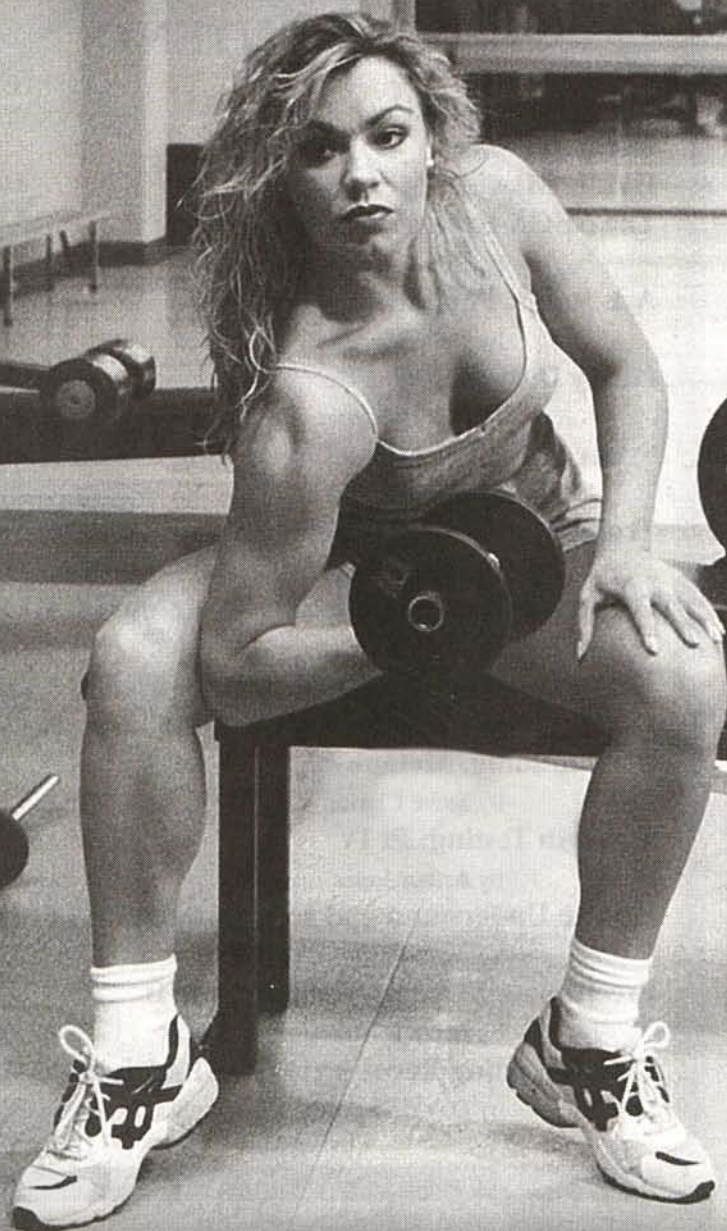


Heavy Duty

BULLETIN

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TRAINING TO MUSCULAR FAILURE: HOW IMPORTANT IS IT?

MATT BRZYCKI

Coordinator of Health Fitness, Strength and Conditioning Princeton University

For more than 50 years, a high level of effort has been recognized as being the most important factor -- other than your genetics -- in determining favorable results from strength training. Arthur Jones once defined intensity as "a percentage of momentary ability." In other words, intensity relates to the degree of the "inroads" -- or amount of fatigue -- made into a muscle at any given instant. When your muscles are fresh at the beginning of an exercise, your percentage of momentary ability is high . . . and your intensity (or effort) is obviously low. When your muscles are fatigued at the end of an exercise, your percentage of momentary ability is low . . . but now your intensity is high. (A percentage of momentary ability or intensity should not be confused with a percentage of maximum weight.)

Essentially, the harder you train, the better your response. In the weight room, a high level of intensity is characterized by performing each exercise to the point of muscular fatigue or "failure": when you've exhausted your muscles to the extent that you literally cannot perform any additional repetitions.

THE OVERLOAD PRINCIPLE

One of the most widely referenced principles in exercise physiology is the "Overload Principle" -- a term first coined by Dr. Arthur Steinhaus in 1933. According to Dr. Roger Anoka -- a biomechanist and author of the excellent college text "Neuromechanical Basis of Kinesiology" -- the Overload Principle states, "To increase their size or functional ability, muscle fibers must be taxed toward their present capacity to respond." He adds: "This principle implies that there is a threshold point that must be exceeded before an adaptive response will occur."

The word "threshold" suggests that a minimum level of muscular fatigue must be produced in order to provide a stimulus for growth. Stated otherwise, your intensity of effort must be great enough to exceed this threshold level so that a sufficient amount of muscular fatigue is produced to trigger an adaptive response: muscular growth. Failure to surpass this threshold of muscular fatigue will result in little or no gains in muscular size or strength.

Given proper nourishment and an adequate amount of recovery between workouts, your muscles will adapt to these demands by increasing in size and strength. The extent to which this "compensatory adaptation" occurs then becomes a function of your inherited characteristics.

THE INTENSITY CONTINUUM

Clearly, failure to reach a certain level of fatigue will result in submaximal improvements in muscular size and strength. This concept is similar to aerobic conditioning where your effort must be great enough in order to achieve a cardiovascular effect. With aerobic conditioning, your level of effort is a function of your exercising heart rate. With strength training, your level of intensity is directly related to the amount of muscular fatigue that is produced. Unfortunately, your level of intensity -- and the degree of muscular fatigue -- is much harder to quantify during strength training.

No one knows precisely the minimum level of intensity necessary to surpass the "threshold" of fatigue and stimulate muscular growth. However, even if the minimum level is unknown, the most productive level of intensity can be

determined by deductive reasoning. For the moment, let's suppose that a 90-percent level of intensity is the threshold for achieving maximal results. If so, how do we pinpoint 90-percent intensity . . . or 95-percent intensity . . . or any other level of intensity for that matter? Answer: You can't. (Again, a percentage of intensity should not be confused with a percentage of maximum weight.)

There are exactly two levels of intensity that can be determined easily and accurately. One level is 0-percent intensity or complete inactivity. Obviously, no intensity creates no stimulus and therefore produces no effect. The only other identifiable level is at the opposite end of the intensity continuum. That level is 100-percent intensity, which is characterized by a total, all-out effort for a prescribed amount of time. It is literally impossible to determine any other levels of intensity. Therefore, the only level of effort that is both productive and measurable is 100-percent intensity.

Do you have to train to muscle failure? Perhaps not. But how else will you know whether you surpassed the "threshold"?

FAVORABLE RESULTS

Simply, a submaximal effort will yield submaximal results. The fact that your results are directly related to your level of effort shouldn't come as much of a surprise. It's like anything else in life: How hard you work at your job, your studies, your practice sessions and even your relationships will largely determine your success at those endeavors. This also applies to your strength training. There's no question that training to muscular failure is an absolute requirement for achieving optimal gains in muscular size and strength.