

## **Damien Howell Physical Therapy Resistance/Strength Training**

The American College of Sports Medicine (ACSM) published a position statement entitled "Progression Models in Resistance Training for Healthy Adults". The guidelines are based on extensive review of scientific research articles.

The review of the literature reveals that muscular strength can be increased approximately 40% in untrained individual. Twenty percent increase in strength in "moderately trained" and 16% in "advanced", and 2% in "elite individuals".

The ACSM guidelines identify physiological characteristics including muscular strength, muscle size, muscle power, local muscular endurance, and muscle/motor performance. Each of these physiological characteristics is measured in different ways. Muscular strength is the ability of neuromuscular system to generate force. Muscular hypertrophy is the size of the muscle, and is typically measured by tape measure to quantify the girth. Muscular power is the amount of work performed in a period of time. The more work produced in the shortest period of time is greater muscular power. Local muscular endurance is the number of repetitions that can be performed against a given load/weight. The greater the number of repetitions against a given load/weight demonstrates greater muscular endurance. Muscle or motor performance is the ability to perform in a sport or activity.

The parameter of most import to the Tri-athlete or distance runner is muscular endurance and motor performance.

Typically weight-training programs involve repetitions and sets of repetitions. The ACSM Guidelines recommend that a novice to intermediate weight lifter, should train with loads (weights) corresponding to 60% to 70% of repetition maximum (RM) for 8 to 12 repetitions. Repetition maximum is the maximum amount of weight the athlete can lift for a specified number or repetitions. In order to determine a RM you select an amount of weight and try to lift it with correct form 12 times. If you can lift the weight 12 times you select a heavier weight. If you can only lift the heavier weight 7 times you decrease the weight. Once you determine the maximum weight you can lift 8 to 12 times you calculate what 60% to 70% of that weight is in order to determine how much weight you should lift for training program. The novice should perform 1 set (8 to 12 repetitions) of a weight which is 60% to 70% of the RM. The

intermediate or advanced should perform 2 to 3 sets of a weight which is 60% to 70% of RM. The rest period between sets should be 1 to 2 minutes.

To improve muscular endurance the ACSM recommends both multiple and single joint strengthening exercises. Examples of multiple joint exercises are bench press (shoulder, elbows, and wrists). Single joint exercises are bicep curls. For the novice and intermediate ACSM recommends relatively light loads/weight, one set of 10-15 repetitions. For advanced individuals the ACSM recommends multiple sets of 10-15 repetitions. The rest period between the sets should be 1 to 2 minutes.

To improve motor performance the key is "specificity". The resistance training should closely replicate the movements, directions, velocity, of the sport or activity. Unfortunately, the ACSM guidelines do not directly address improving muscular performance, of Tri-athletes and long distance runners.

A copy of the ACSM guidelines "Progression Models in Resistance Training for Healthy Adults" can be obtained at [www.ACSM.Org](http://www.ACSM.Org) and search under Position Statements.