

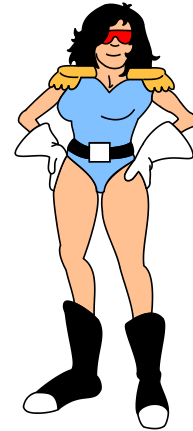
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hapter 10

Weight-Training

Building A Better Body

There are countless books on **weight-training** and **body-building**. To cover all aspects would be an impossible task. Instead, the focus of this chapter is on the important basics of weight-training. It also will outline the principles behind resistance training for improved overall health and fitness.



“Muscular” Fitness



"Muscular fitness" is paramount to achieve a particular weight-management goal. It can only be achieved through a systematic weight-resistance training program. These programs can be designed for a variety of purposes such as **power lifting**, **body building**, **rehabilitation** or just simple **muscular conditioning** and **toning**.

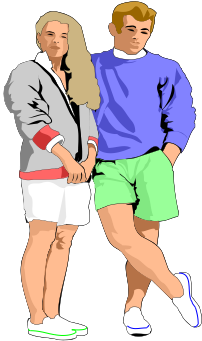
You may already be engaged in a weight-training program. On the other hand, you may not feel a need for weight-training. Many people have pre-conceived notions and stereotypes about weight-training. As a result, they have no interest in this type of exercise program at all.

Training for All Reasons

Strength and weight-training is important for **fat-burning** or **muscle-building**. The most apparent effects of weight-training (resistance) are increased **strength** and **muscular endurance**. These gains often are accompanied by an increase in the size of muscle fibers. This is known as muscular **hypertrophy**.

Sometimes an increase in muscular size is due to an increased number of muscular fibers. The increased number of fibers results from what is referred to as **longitudinal fiber splitting**. It's generally accepted, however, that increases in muscular size is a result of an increase in the size of existing muscle fibers.

Weight Training and Fat-Loss



A structured weight-training program is the **most effective** way to increase and **improve** the **quality of muscle**. This should be of particular importance to anyone interested in achieving **optimal** fitness and health. It should particularly be of interest to anyone interested in **losing body-fat**.

Why is weight-training so important to the **reduction of body-fat**? To answer that question, refer back to **metabolism**.

Muscle requires **energy** to function. Fat can **only be burned in the muscle**. Therefore, the **more muscle mass you have, the more fat you can burn**. Improving your **muscular condition** will **improve your basal metabolic rate (BMR)**, thus, **increasing the body's ability to burn calories**.

Anaerobic or Aerobic?

Since most weight-training activities last less than 3 minutes in duration, (regardless of actual workout time), **weight-training is an anaerobic activity**. This means that the primary fuel sources will be either **ATP** or **glucose**. The **aerobic** (oxygen/fat) fuel system does not come into play. Therefore, **fat isn't burned as a fuel source during weight-lifting activities**. Remember, even though weight-training does not burn fat, it does increase the body's **fat-burning potential**.

Ladies Lift Too



The thought of increased muscular size may not appeal to some. In the past, women were reluctant to weight-train for fear of becoming too **muscular** or **bulky**. For most women, however, muscular gain is not as great as in men, even when they make the same relative gains in strength.

A study that compared muscular size between men and women, demonstrated that "**muscular hypertrophy in women as a result of weight-training programs will certainly not lead to excessive muscular bulk or produce a masculinizing effect**" (Wilmore, 1974).

Methods of Weight Training

Various methods of muscular contractions have been used to improve muscular strength and endurance. Here are a few methods with explanations and benefits.

Static (Isometric) Training - Isometrics involve muscular contractions performed against **fixed, immovable** resistance. The muscle develops tension, but does not change length. Static exercises are widely used in **rehabilitation** programs. Isometric training can be used effectively to counteract strength loss and muscle atrophy, especially in cases in which the limb is temporarily immobilized. This method of training would be compared to flexing one's bicep or pushing against a wall and holding the contraction for 6-10 seconds. A major disadvantage of static training is that the strength gains are specific to the angle of the joint used during the training or contraction. Therefore, to increase strength throughout the range of motion, the exercise needs to be performed at a number of different joint angles.



Isokinetic Training - An isokinetic contraction is one in which **maximal tension** is developed throughout the **full range of joint motion**. Increases in strength, power and muscular endurance are acquired by mechanically controlling the speed of the movement with special isokinetic equipment. The availability of this type of equipment is either limited and not available to many.

Dynamic (Isotonic) Training - Dynamic (isotonic) weight-training involves both **eccentric and concentric contractions of a muscle group performed against a constant or variable of resistance**, (e.g. free weights, Universal, Nautilus, Kaiser, etc.) During a concentric contraction the muscle will **shorten** as tension is developed (e.g. curling a weight with the biceps). Just the opposite occurs with an eccentric contraction. The muscle **lengthens** as it develops tension (e.g. setting the weight back down with the biceps). Dynamic training is the most familiar kind of contraction since it is the kind used in all lifting activities. There are three important concepts used to describe and classify dynamic weight-training programs -- repetition, set and repetition maximum.

Reps & Sets

A **repetition** is one actual movement of an exercise through the full range of motion (i.e. one push up, one pull-up, one squat, etc.) A **set** is a done consecutively without rest.

One of the most common ways to calculate and measure an individual's progress and strength is to perform repetition maximums for a given exercise.

A **repetition maximum** is the maximum amount of weight an individual can lift a given number of times before fatiguing. For example, if an individual could do a bicep curl with 50 pounds for 8 repetitions and no more before fatiguing, that weight (50 pounds) is an eight-repetition maximum load.



Principles of Weight Training

There are four principles that should form the basis of most weight resistance programs. For best results training should involve **overload** and **progressive resistance** with careful attention going to **arrangement** of the program and the **specificity** of its effects.

Overload Principle

Muscular strength is most effectively developed when the muscle or muscle group is overloaded - that is, the muscle is exercised against resistance exceeding those normally encountered. If an individual is accustomed to bench pressing 150 pounds on a regular basis then a resistance of 155 pounds or more is required for muscular strength and growth to occur. The use of resistance that overloads the muscle stimulates the physiological adaptations that lead to increased muscular strength and development.

Overloading a muscle during exercise is your way of telling the body that the current muscular strength and development is not enough. Therefore, it needs more. An overload can be applied to the muscles two ways:

1. Application of a resistance or weight greater than can be lifted for one repetition (strength).
2. Forcing a muscle group to repeatedly lift a load or weight over an extended period of time (endurance).

For example, if an individual can only curl 55 pounds 2 times, then they have two options to improve strength and development.

1. The individual can force their bicep muscles to lift 60 pounds one to two times (strength) or,
2. The individual can train to lift 55 pounds 4 times (endurance). Either way the muscle is forced to overcome a resistance that it is not normally accustomed.

Resistance Principle Progressive

Throughout a weight-training program, the work load (overload) must be increased periodically to continue muscle overload. A gradual increase in resistance or maximal repetitions will ensure further improvement in strength or endurance. It is important this increase be gradual. Too much too soon may injure the musculoskeletal system. Nonetheless, it's important to understand that a muscle must encounter progressively increasing overloads. Many individuals will continue to exercise with the same resistance (weight) at the same number of repetitions for weeks, even months. By exercising against a resistance that is encountered time after time with no overload, the muscle will adapt and no gains will occur.

The Principle of Arrangement of Exercise

A weight-training program should include exercises for all major muscle groups. For optimal efficiency during weight-training, the exercises in a weight resistance program should be arranged so that the larger muscle groups are exercised before the smaller ones. Smaller muscles tend to fatigue sooner and more easily. Therefore, in order to ensure proper overload of larger muscle groups, they should be exercised first. The larger leg muscles should, for instance, be exercised before the smaller arm muscles.

Specificity Principle

The development of muscular fitness is specific to the **muscle group that is exercised**, the **type of contraction** and **training intensity**. This simply means, that to **increase the strength** of the elbow flexors (biceps), exercises must be selected that involve the **concentric** and **eccentric contraction** of that muscle group. This also applies to increasing strength for improving a specific sports skill (i.e. soccer kick ; baseball throw). This means that not only must the specific muscle be exercised for

improvements, but the exercises will be most effective if the pattern of the movements is simulated. This "**motor-skill**" specificity not only applies to specific skills or movements, but also to overall conditioning of muscles. For example, the professional skier who is in excellent condition to ski, may not have the strength or endurance to run a marathon (and vice-versa). Although in both activities the same muscle groups are used, the movement patterns they produce are quite different.

Applications

Now that we have identified the types of weight resistance exercises and the appropriate principles that accompany them, we may continue on with some guidelines and direction as to setting a specific program to meet your needs.

Remember that **all individuals are different** and may respond accordingly to different types of weight training programs. Every individual must assess their own goals and fitness levels to determine what type and intensity of a program may be right for them. Those individuals with chronic heart conditions or other musculoskeletal conditions, may want to consult their physician before starting a weight training program. Success and results will ultimately come down to consistent trial and error of the appropriate principles and techniques of weight training to determine what works for that person.