Strength Training Principles

The Overload Principle (Development is based on adaptation to demands)
This general principle refers to the fact that stress (demand) should be progressively increased in order to cause adaptation or change. Factors that can be used to overload include: **load (intensity), volume (repetitions & sets), rest, and frequency.**

Load refers to the intensity (weight) of the exercise. Strength development occurs when the muscle works against increased loads (weight or resistance). Load is usually stated as a percent of maximum weight (1RM) the individual can lift, push or pull. Strength training uses loads of 70-100%.

Repetition refers to how many times the load is used. Each complete exercise movement is one repetition (rep). Reps are grouped together as *sets*. *Muscle endurance* is developed if a program has a high number of reps (12-15) and low load (<70%). Greater load (>70%) and lower reps (<12) develops *strength.* High volume (sets & repetitions) and intensity (load/weight) are needed for muscle hypertrophy (increase in size).

Rest is the time interval between repetitions and groups of repetitions (*sets*). The amount of rest depends on your fitness goals. If you are trying to develop a combination of strength and endurance, rest 1 to 2 minutes between sets. Programs where maximum strength is the goal may rest 2 to 5 minutes between sets. The goal of strength training is to work against maximum resistance during each set. This requires muscles to be adequately recovered for maximal effort in each set.

Frequency is the number of training sessions per week. As intensity and volume increase, the muscle and nervous systems need time to restructure in order to handle the workloads placed on them. Lifting programs for specific muscles are usually scheduled 2-3 times per week. A common strength program might utilize 6-15 exercises performed 3 times per week. *Split Routine* programs are used when an exercise program has too many exercises or too much intensity for a single workout period. An example of a Split Routine would be to divide exercises into upper and lower body exercise days. The program then might have lower body exercises on Mondays and Wednesdays, and upper body exercises on Tuesdays and Thursdays. Muscles increase in strength and size after the workout is over, thus there is a need for rest/recovery time between workouts. Often rest is as important as the level of overload. The overload is excessive if it causes injury, difficulty in recovering or excessive soreness.

Progression (Take gradual steps)
Adaptation to stress is most effective when the stress is applied gradually. High levels of change take time to develop. It is impossible to develop high levels of physical fitness over night. Development is the result of many small gains. It is generally accepted that training should concentrate on **volume** (reps & sets) first and then on **intensity** (increased weight).

Specificity of Training (Train the way you want to develop)
"SAID" Principle: Specific Adaptation to Imposed Demands
The body develops specifically according to stresses that are placed on it. Any training program should reflect the desired adaptation you wish to occur. For example, the adaptation to endurance exercise such as biking or running differs from that of strength training. As the level of training progresses, even the training for biking and running will become specialized. In some cases training for one might hamper the development in another.

Individual Difference (Genetics)
We are not all created equal. Genetics limits our capacity to develop fitness and skill. People have different body types and develop at different rates. It is important, however, to realize that anyone can improve with consistency and hard work. Lifestyle is far more important than genetics in determining health and well-being.

Reversibility (Use it or lose it)
This principle is the reverse of the overload principle. The body develops according to the stress placed upon it. As progressive stress is increased you develop; when it is removed you lose it.

Proper Technique (Correct form)
The most common training error or mistake is the tendency to use poor form or cheating on the exercise. One cause is trying to use too much weight (resistance) too quickly, and using body movements or momentum to aid in completing the exercise. Development is based on how the body adapts to the stress, so cheating does not yield significant gains. Another cause is the use of poor posture or limb alignment that might lead to injury.

Order of exercises: If strength is your goal, start with multi-joint, large muscles first then proceed to single joint, small muscle exercises. Doing small muscle exercises first result in early fatigue thereby limiting the performance of the large muscles.

Breathing: Holding your breath and straining can cause the **Valsava Effect,** which can increase blood pressure and can cause unconsciousness. Exhale during the concentric (muscle shortening) part of the contraction, and inhale during the eccentric (muscle lengthening) part of the lift. Example: bench press: exhale while you press the weight up, inhale as you lower the weight down.

Warm up: Warm ups increase the temperature of the muscle and increase the amount of synovial fluid in the joints. This helps the muscle work better and protects it from injury. Good warm up practice is to do a light aerobic workout and then a low intensity set of the exercise before performing the overload set of the exercise.

Exercise Speed: Lifting fast creates momentum and does not promote blood flow to the muscle. Slow movement creates less momentum and less internal muscle friction. The control needed for slow lifting requires more application of muscle power throughout the range of the movement and promotes rapid blood flow into the muscle. It is even more important to slow down the eccentric (negative) part of the lift, because this action promotes increased blood flow to the muscle. This causes micro trauma (beneficial temporary muscle damage) that then yields muscle development. It is recommended that the concentric (shortening) phase last one to two seconds and the eccentric (lengthening) phase last three to four seconds.

Starting a Strength Training Program
The American College of Sports Medicine recommends that beginner strength programs consist of one set of 8-10 exercises with 10-12 reps per exercise. Weight is increased when 12 reps can be completed. The advantage of one set is that it saves time and allows for a greater variety of exercises to be completed in the normal exercise period. As the exerciser continues to progress, it sometimes becomes necessary to increase the number of sets in order to maintain development.