

BENEFITS OF HYDRAULIC RESISTANCE EXERCISE

Backed by 20 years of research and development, Hydra-Fitness Industries offers the safest and most effective exercise/rehabilitation equipment on the market today.

These unique machines, with their patented hydraulic system, work on many different levels to meet widely varying needs such as strength, power, endurance, cardiovascular conditioning, aerobic and anaerobic training, rehabilitation and cardiopulmonary activity.

Muscle contractions

In order to appreciate the nature of hydraulic resistance exercise with Hydra-Fitness equipment, a brief discussion of the various types or classifications of muscle contraction is in order.

- * An isometric contraction occurs when the muscle develops tension but does not change length. No movement occurs because the resistance is greater than the force potential of the muscle. A sub-maximal isometric contraction is termed a "static" contraction.
- * An isotonic contraction occurs when the resistance or load remains the same and there is movement involved. That is, the force developed by the muscle overcomes the inertia of the resistance. In an isotonic contraction the velocity of the movement is not necessarily controlled, but rather the main classification characteristic is the constant load.
- * An isokinetic contraction is defined as occurring at a fixed velocity. In practice this refers to a constant velocity of movement in a body part or segment rather than a fixed speed of shortening within the muscle.

Functional isokinetics provides all the accommodations or variable resistance of isokinetic training, but with variable speed and maximum overload at every joint angle throughout any range of motion.

Most isokinetic devices provide variable or accommodating resistance, which implies that the resistance is maximized according to the ability of the muscle to generate tension. The ability to generate tension is affected by the mechanical properties inherent in the lever system comprised of muscle and bone. In other words, there are "strong" and "weak" points in the normal range of motion which are usually referenced to the angle between the body segment(s) and the involved joint(s).

In an isotonic contraction, the greatest weight that can be moved through a normal range of motion is limited by what can be moved at the weakest joint angle. Therefore, the muscle is provided with maximal overload at that point only. There are usually ranges of strong and weak joint angles, but the degree of overload at the strongest joint angle is dramatically restricted if the movement is performed through the full range of movement. An alternative is to work with heavier resistance through a restricted range of stronger joint angles, which is effective, but time-consuming.

The major advantage of a system which provides accommodating resistance is that the muscle is able to generate more external force and the system provides more resistance. Many scientists and fitness professionals feel that such loading systems are superior to traditional isotonic or constant-load systems. Hydra-Fitness uses "functional isokinetics." This comprises all the advantages of "isokinetics," but with "variable speeds" instead of non-functional fixed speeds.

Strength, power and velocity

Strength is often defined as the maximal tension generated by a muscle. Functionally, a maximal isometric contraction at the strongest joint angle results in the greatest force.

Power is often defined as work accomplished relative to the time required to perform it. Since work is the product of force times distance, and work divided by time is power, the speed of movement can dramatically influence the power output of muscle. If a muscle can be trained for both force and speed, performance can be maximized. Performing at both high resistance and high speed is critical for peak performance of some athletes. Since high-velocity training with conventional weight-based systems is neither practical nor safe, hydraulic resistance systems have a great advantage due to their ability to accommodate both resistance and velocity safely.

The "specificity of training" principle

Specificity is one of the most important underlying principles governing the success of training. While exercise scientists do not yet fully appreciate the nature of this principle, it appears that maximal benefits occur when training is specific to the performance. Very simply, strength training tends to enhance strength, and aerobic training enhances endurance. But the issue becomes very complicated when athletes are preparing for competition. Sport-specific training is not always possible (e.g. rowing in the winter) or desirable (constant training in one mode may cause boredom or decrease motivation); therefore, alternatives are very important. However, in order to "transfer" as much of the training effect as possible to the actual performance, the specificity principle must be adhered to. Training with hydraulic resistance allows movement patterns and movement velocities nearer to the actual performance, thereby enhancing the specificity effect.

Cardiorespiratory fitness

Circuit training with variable resistance hydraulic equipment is becoming increasingly popular. It involves a cardiovascular response that results in improved aerobic fitness. By using a variety of work-to-rest ratios in a circuit mode, both anaerobic and aerobic energy systems can be stressed. Circuit training with the variable resistance Hydra-Fitness systems at a high

cardiorespiratory involvement can induce positive aerobic power training effects. When conducted at relatively high velocities with a work-to-rest ratio, the cardiovascular system will be stressed. This effect on the cardiovascular system has not been observed with circuit training on other strength-training equipment.

Traditionally, strength training exercises have not been utilized for cardiac rehabilitation because they were believed to represent increased risk for the patient. However, more recent studies have demonstrated the relative safety of weight-carrying and circuit weight training exercises among cardiac patients who were only three months post-clinical. The addition of Hydra-Fitness circuit training to medically supervised cardiac exercise programs may enhance the patients' ability to meet many of the physical demands associated with their daily activities.

In summary, Hydra-Fitness resistance training systems uniquely provide the opportunity to exercise with accommodating resistance over a wide range of movement velocities. Most Hydra-Fitness systems offer alternating resistance and the choice of unilateral or bilateral movements. The equipment is well suited to circuit training and appears to provide excellent strength training gains from short-term programs.

Clearly, any training program is dictated by the need and the initial fitness level of the individual. The Hydra-Fitness line of resistance exercise systems can be adapted safely and effectively, regardless of the training objectives.

Fitness among the aging population

An often observed and reported trend among the elderly is loss of muscle, gain in fat and decline in overall body composition -- a condition that is not necessarily normal, but rather may be a result of lack of the proper type of exercise. Any exercise can significantly increase muscle mass and decrease

body fat content; however, conventional exercise equipment is not readily accepted by the aging. It is often viewed as intimidating and unsafe. Hydra-Fitness equipment has been the single alternative for fitness among the aging population due to its accommodating resistance, allowing anyone at any age to begin exercising at their own level of fitness.