Facility considerations

Advantages and disadvantages of isokinetics, variable resistance and free weights

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There is a great deal of confusion among coaches concerning weight training equipment, because all of the weight training equipment companies have a sales pitch that says their equipment is the best. This article will try to eliminate some of the confusion by discussing the advantages and disadvantages of isokinetics, variable resistance, and free weights. Coaches then can decide what is best for their program based on this research.

Isokinetics

Isokinetics is a weight training system that involves a muscular contraction at a constant velocity. As the muscle length changes, the resistance alters in a manner which is directly proportional to the force exerted by the muscle.

Advantages

1. Isokinetic machines allow for the development of maximum resistance throughout the full range of motion. They are the only machines that have true maximum resistance throughout the full range of motion.
2. Exercise on isokinetic machines can be performed at a variety of speeds with maximum resistance. An athlete can do high speed training or any speed in between. This is important because most weight training systems do not involve high speed training and power cannot be maximized without high speed training.
3. Isokinetic machines are very safe to use. Injuries are very rare on these types of machines.
4. A person can train unilaterally as well as bilaterally on most isokinetic machines.

Disadvantages

1. There is no resistance during the eccentric contraction. Research has shown that training the concentric contraction and the eccentric contraction together is better than training either independently.
2. The effort can be minimal, maximal, or anywhere in between, because isokinetic machines can only control the speed of the movement. Cheating can be a problem.
3. Progress is difficult to evaluate for the athlete because he or she must read a dial instead of adding weight to a bar.
4. Machines hinder the development of neuromuscular coordination and the antagonistic and assistance muscles.
5. There are no multi-jointed total body exercises, which work the total body as a unit.
6. Generally, more maintenance of equipment is involved with machines.
7. Cost is a disadvantage for many programs.

Variable resistance

Variable resistance is a weight training system that provides a resistance that changes to match the joint’s ability to produce force throughout the range of motion.

Advantages

1. The main advantage is in the concept of variable resistance, which is that the cam or lever system provides a resistance that changes to match the joint’s ability to produce force throughout the range of motion.
2. Variable resistance involves both the concentric contraction and eccentric contraction; research has shown this combination is better than training either one individually.
3. It is very easy to evaluate progress with variable resistance machines because the athlete increases the weight or the repetitions.
4. Changing weights is very quick and easy with weight stacks and a pin.
5. Variable resistance machines are very safe to use.
6. Training can be done unilaterally as well as bilaterally on some variable resistance machines.

Disadvantages

1. The force changes through the various angles are based on averages of the force-angle curve. Most people are not average. Limb length, the point of muscle attachment, and the velocity of the movement all will affect the force angle curve.
2. Machines hinder development of neuromuscular coordination and the antagonistic and assistance muscles.
3. There are no multi-jointed total body exercises, which work the body as a unit.
4. Generally, more maintenance of equipment is involved with machines.
5. Cost is a disadvantage for many programs. Buying a machine for each exercise is very expensive.

Free weights

Free weight training (dumbbells, barbells, etc.) involves a muscular contraction against a constant resistance and movement results, either shortening (concentric) or lengthening (eccentric) of the muscle.

Advantages

1. An athlete can perform free standing total body lifts which require the maintenance of balance and coordination of many major muscle groups throughout the lifting movement. Squats, power cleans, high pulls, etc. are total body lifts. Research has shown that these types of lifts produce greater power outputs than any other type.
2. The total body lifts develop one’s neuromuscular system and the transfer...
to the neuromuscular demands of athletic competition is excellent.

3. Acceleration is utilized which is a key factor in most sport movements. Jumping, throwing, striking, and running all involve acceleration. Free weights offer acceleration, while variable resistance hinders acceleration and isokinetics does not involve acceleration.

4. Free weights offer more variability within workouts with variations of foot spacings, hand spacings, depths, etc.

5. Free weights involve both the concentric contraction and the eccentric contraction; research has shown this combination is better than training either one individually.

6. Free weights involve multiple movement direction control (balance) which better strengthens the joints.

7. The cost of equipment is less than machines because a person does not have to buy a different barbell for each exercise. In addition, barbells are much less expensive than machines.

Disadvantages

1. There is a greater chance of injury with free weights. An athlete must have proper technique, a proper conditioning base, and supervision when using free weights. If this is not possible, free weights are not recommended.

2. With a constant load, an athlete is only as strong as the weakest point throughout the range of motion.

3. There is a greater chance of losing free weights. Many schools have lost a lot of free weights because of poor supervision and an improper storage area.

4. It takes longer to change the weights with free weights. This may not be a problem because there is a rest period between sets anyway.

References


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