Examine the different types of muscular contraction and the movements that they produce

The 'All or none law' is that all the forces within a motor unit will contract maximally or not at all.

Generally there are three ways or categories of muscle contraction. They are isotonic, isokinetic and isometric. There are two more that are called concentric and eccentric.

Isotonic contraction is the most common form of muscular contraction. It occurs when a muscle is acting as a prime mover and shortening under tension, creating movement around a joint.

The definition of isotonic contraction is the force applied to a movable object or it is a dynamic movement. An example of this is picking up an object. When you pick up a bag you applied a force to a movable object. When you are lifting weights you are also applying force to a movable object. It is possible that isotonic contraction can turn into isometric contraction. An example of this if you try to pick up a heavy bag. You move the bag slightly upwards (isotonic contraction), but then you stop and you can't stand up completely erect while holding the sack. At the point when the movement stopped, contraction became isometric.

In isotonic contractions the muscle contracts and shortens, giving movement. Nearly all the training you do is isotonic.

Advantages

- Strengthens a muscle throughout the range of movement.
- You can choose isotonic exercises to match the actions in your sport.

Disadvantages

- Can make muscles sore, because of stress while they lengthen.
- The muscle gains most strength at the weakest point of the action, rather than evenly throughout.

Isometric contraction is forced applied to an immovable object. To show this, you stand in a doorway. Place your hands on the door jams. Now push outwards on them. You will notice that your arm muscles are contracting, but there is no movement so you will not be able to push the doors apart.

In isometric contractions the muscle contracts but does not shorten, and therefore there is know movement being produced.

Advantages

- Isometric exercises develop static strength - the strength you need to push or pull a heavy object or hold it up.
- They are quick to do and don't hurt.
- They don't need expensive equipment.
- You can do them anywhere.

Disadvantages

- The muscle gains strength only at the angle you use in the exercise.
- During an exercise the blood flow to the muscle stops, blood pressure rises, and less blood flows back to the heart. It could be dangerous if you have heart problems.

Isometric training is not sufficient on its own. You need to combine it with isotonic training.

Isokinetic contractions are when the muscle contracts and shortens at constant speed. An isotonic contraction is different to an isokinetic contraction because it is usually slowest at the start.

For isokinetic training you need special equipment that detects when a muscle is speeding up, and increases the load to slow it down again.

Advantages

- The muscle gains strength evenly all through the range of movement.
- It is the fastest way to increase muscle strength.

Disadvantage

- The equipment is very expensive so most gyms cannot afford it.

Concentric contraction occurs when a muscle shortens in length and develops tension. Eccentric contraction involves the development of tension whilst the muscle is being lengthened.

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