STEVEN L. BRAVERMAN P.T., P.C.
RESTORE
PHYSICAL THERAPY

What is…

Isotonic Exercise?

Isotonic exercises, also known as progressive resisted exercises (PRE), place a constant or variable outside force on a muscle, which causes the muscle to shorten (concentric) or lengthen (eccentric). Isotonic exercises are the most common exercises used in rehabilitation or therapeutic exercise programs to improve strength, endurance, and power in a muscle.

The outside forces generally used in isotonic exercises are constant load resistance, variable resistance weight machines, or manual resistance. The variety of options makes this type of exercise highly adaptable and convenient to use when treating patients.

Constant load resistances commonly are applied using free weights or a simple pulley apparatus. Regardless of the position of the joint or length of the muscle, the weight remains the same. Because the tension in the muscle varies depending on its length, the highest muscle tension usually is created at only one part of the movement. The constant load is what most closely equates to most daily functional activities, such as lifting boxes, bags of groceries, yard equipment, and so on. There are exceptions, such as turning a steering wheel while driving, opening doors, swinging hammers, and so on. These exceptions have alterations of forces due to acceleration, gravity, or other outside forces that occur during the activity.

Variable resistance machines are common in fitness center settings. The machines use a complex series of pulleys or cams to create the variable resistance based on the specific joint or body part the machine was created to train.

It’s most beneficial to train using constant load resistance and variable resistance.

Manual resistance is provided by the health professional and might be manual constant resistance or manual variable resistance depending on the choice and skill of the health professional.

In most isotonic exercises, the patient performs both a concentric (muscle shortening) and an eccentric (muscle lengthening) phase. For example, when a bicep muscle lifts a free weight, the biceps shortens and the elbow bends upward (concentric). When the bicep muscle lowers a free weight, the biceps lengthen (eccentric).

More muscle tension generally is during the eccentric phase, which can contribute to better overall results in power gains when working on a very weak muscle. However, care must be taken as eccentric muscle contractions can cause higher levels of delayed onset muscle soreness, as well as placing too much force on the ligaments and tendons

during the concentric phase. Keeping the weight or force very low is usually the best choice in the beginning stages of a PRE program. Another safety alternative is to eliminate the concentric phase, called a negative lift. In later stages, the eccentric phase with high forces can stress the cardiovascular system. The health professional must consider the patient's cardiovascular situation before using eccentric exercises with high force loads.

The health professional can exercise a patient only in the eccentric phase to avoid placing excessive force on the tendons and ligaments during the concentric phase. For example, to work the biceps the patient can hold the weight in the hand with the elbow straight. As the patient begins to lift the weight, the health professional assists the patient, which can eliminate or considerably decrease the concentric phase. When the elbow is fully flexed or bent, the health professional carefully and slowly releases the assistance while lowering the weight down to the starting point. The process is repeated again for each repetition. This method if often called negative lifts in the fitness industry.

Isotonic exercise can be an effective means of rehabilitation. While the information presented here is to provide a refresher for the health professional, it is not all-inclusive. There are many other variables to consider, such as:

- Specific procedures or injuries
- General patient health
- Position
- Equipment
- Speed of exercises
- Weight and force progressions
- Exercise duration
- Sets, repetitions, frequency of exercise
- Range of motion limitations
- Functional relations
- Specificity of training

It is recommended that health professional review their professional training and courses before undertaking a therapeutic exercise program with a patient.