Exercise Therapy

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Isometric Muscle Contraction

Muscle actions (or contractions) are described as **Isometric contraction** (constant length) or dynamic contractions consisting of concentric contraction (shortening of the muscle under load) and eccentric contraction (lengthening of the muscle under load).

When the whole muscle is activated and the bones it is attached to do not move, the muscle action is called an **Isometric contraction.**

When a muscle fibre is activated so that cross-bridges form, the sarcomeres in the fiber will stay at constant length, when the load is applied. An isometric contraction occurs when the muscle is activated, and the sarcomere does not change length.

Holding the weight without changing the joint angle means that the muscle is contracting isometrically.

During an isometric contraction, no work is being done because the joint is not moving. The formula for work is $W = F \times d$, where W is work, F is the force created by the muscle, and d is the distance that the object is moved.

The greater amount of tension can be developed in an isometric contraction than in a concentric contraction. However, this relationship may not hold true for all muscles at all points in a joint's ROM.

During an isometric contraction, the muscle shortens slightly, and the tendon lengthens slightly. In many muscles, the fibres may shorten, and the tendon may lengthen by as much as 10% of their resting length during an isometric contraction.

References:

1. Joint structure and function: a comprehensive analysis/Pamela K. Levangie, Cynthia C. Norkin.5th ed.

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