

# Isokinetic Muscle Loading

From research labs to outpatient clinics, a look at the application of isokinetic systems over time

When therapists and trainers first adopted isokinetic systems, they praised its unique capabilities. Over time, isotonic systems offered advantages to challenge the popularity of isokinetics. What made isokinetics so popular initially? What advantages do newer, isotonic systems offer? This paper provides a brief history of isokinetics in therapy and a comparison to other established approaches.

## Definition

An isokinetic muscle contraction occurs when the velocity of the muscle contraction remains constant while the length of the muscle changes. It is distinguished by the principle of ‘accommodating resistance.’ Accommodating resistance matches the user’s force at every point in the range of motion. The force depends on the user’s participation and the position of the joint.

As a training technique, isokinetic resistance offers the following training benefits:

- Maximally loading the muscle through range
- Isolation of specific muscle groups and joint functions
- Providing resistance that matches the level of force generated by the subject

Isokinetic muscle loading can be either concentric or eccentric. In an isokinetic concentric contraction, the muscle shortens while under load. In an isokinetic eccentric contraction, the muscle lengthens while under load.

## From Research to Therapy

Isokinetic systems first served as academic research tools in the late 1960s / early 1970s. Attracted to the systems’ adaptability to various strength levels, therapists and trainers “borrowed” the concept. They began to adapt isokinetic systems for clinical and athletic practices. Transitioning from research to therapy required a more user-friendly system for patient interaction. This need, coupled with technological advancements of the time, facilitated the onset of computerized testing. Isokinetic systems pioneered the digital movement in therapeutic testing, so isokinetics quickly became the initial standard for dynamic muscle testing.

Despite their initial popularity, isokinetic systems saw a marked decline in the more modern era of functional rehabilitation. Unlike isokinetics, which works best in isolation, functional rehabilitation combines multiple muscle groups to mirror

'real life' activities. Isokinetic systems use isolated movements to target individual muscles, which presented a limitation. Clinicians and athletic trainers therefore began to abandon isokinetics, and seek a more integrative approach<sup>1</sup>. Functional rehabilitation is much better suited for treatment targeting multiple muscle groups.

## **New Alternatives**

One of the better alternatives to isokinetics is isotonic. Most of the body's movements are isotonic, including occupational, sports, and daily living activities. Isotonic resistance systems, therefore, imitate the body's natural movement patterns. As a result, they are increasingly replacing the older isokinetic approach.

Because they more closely mirror the body's natural movements, isotonic strengthening programs provide better clinical results than isokinetic systems<sup>2</sup>. More physical therapists and athletic trainers are recognizing that the natural loading of isotonic resistance provides faster, more effective results. Gathering objective performance measurements during natural movements represents a huge leap forward in the field of rehabilitation and athletic performance.

Additionally, for physical strength testing, isometric muscle loading continues to grow in popularity. Comparative analyses have also shown that isometric testing can be more logistically practical and cost effective than isokinetics<sup>3</sup>.

## **Summary**

As a rehabilitation or training technique, isokinetic systems offer the advantages of accommodating resistance. However, their usage has dropped off over the past two decades. Clinicians and researchers have leveraged new technology to produce more functional and safer systems for therapy. Because these newer isotonic systems are more natural and effective, more clinics are choosing this treatment method over isokinetics. Continued advancements in research and emerging technologies will enable clinics to provide increasingly targeted, efficient therapy.

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3. Kollock RO, Van Lunen B, Linza JL, Onate JA. (Nov 2013). "Comparison of Isometric Portable Fixed Dynamometry to Isokinetic Dynamometry for Assessment of Hip Strength" *Int J of Athletic Therapy & Aquatics*, 18(6):1-6