# PLYOMETRICS IN HANDBAL

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# Plyometric Training

- Define plyometrics and understand the physiology underlying the ergogenic effects
- Discuss how plyometric training enhances various components of fitness and athletic performance
- Discuss how to properly manipulate acute program variables when designing plyometric training programs.
- Discuss how to integrate plyometric training with other training modalities

- The term *plyometrics* has had a few meanings and interpretations over the years depending on whether one is describing pliometrics, classic plyometrics, or modern plyometrics.

- *Pliometric* exercise translates into “more length” as loaded or explosive eccentric (ECC) muscle actions with no reversible, *e.g.*, concentric (CON), muscle actions are used. For example, landing from a jump involves yielding or high ECC loading, where impact forces can exceed the propulsive forces developed during a jump. The landing is pliometric where the athlete braces for support (by manipulating the degree of hip, knee, and ankle flexion) but does not follow with a CON or propulsion phase, *e.g.*, performing an exercise called a *depth landing*.

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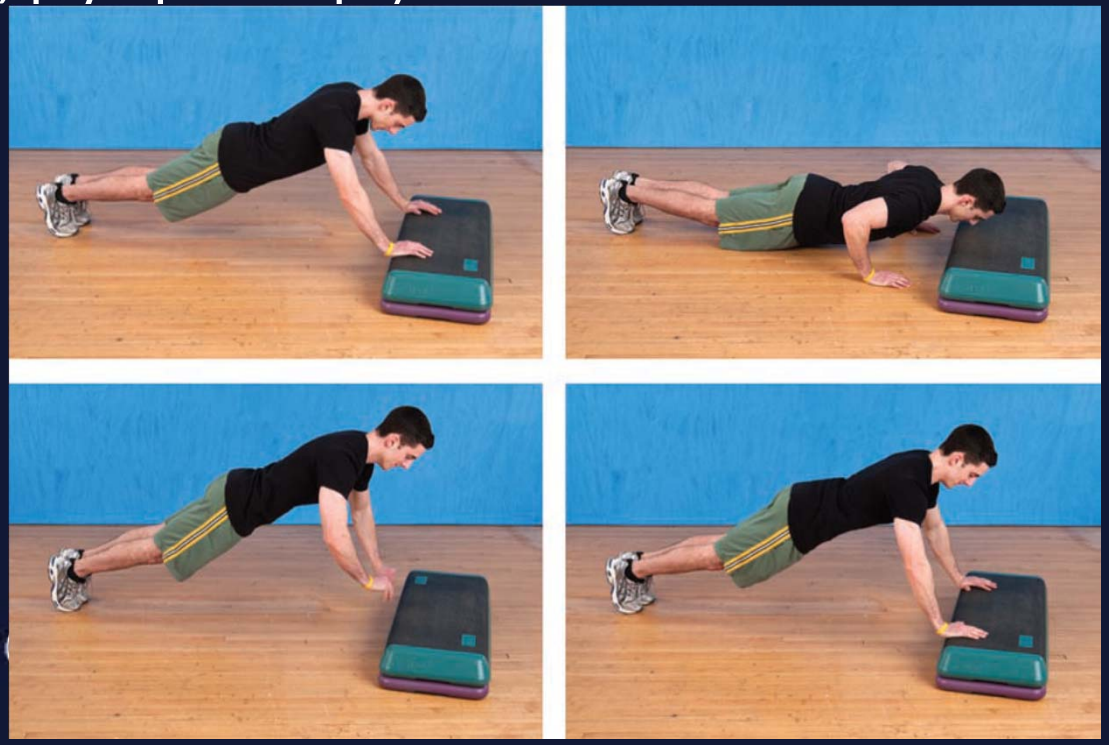
- *Classic plyometrics* (note the different spelling) is the term used to describe the origins of plyometric training where it was originally known as "shock training." Shock training consisted mostly of depth jumps and variations where the intensity was ultrahigh and predominately performed by well-trained to elite strength and power athletes.
- The term *plyometrics* was first coined in the 1970s by track and field coach Fred Wilt but was based on shock training. European athletes were known to use classic plyometric exercises and were achieving superior athletic performances in sports such as track and field, weightlifting, and gymnastics.

- One such coach/scientist was Dr. Yuri Verkhoshansky, known by many as the modern-day Father of Plyometrics, published his first study in plyometrics in 1964 (known as the *Shock Method* of training). Dr. Verkhoshansky preferred the term *shock training* or *shock method* when describing the classic plyometrics because the high-intensity element distinguished itself from modern plyometrics. In fact, Dr. Verkhoshansky has proposed the term *powermetrics* to be used in lieu of plyometrics to limit confusion.

- *Modern plyometrics*, or simply *plyometrics*, is the term
- commonly used in the United States which embodies
- shock training as a segment but also embraces inclusion
- of exercises that simply consist of *plyometric actions.*
- *Plyometric actions* refer to the lengthening or prestretching
- of skeletal muscles under loading that allows a more
- forceful CON muscle action. Plyometric actions utilize
- the stretch-shortening cycle (SSC) and are substantially
- reliant upon loading and the rate of lengthening during
- the ECC phase.

- Plyometric exercises are classified based on the intensity level. *Maximal plyometrics* involve ultrahigh-intense muscular contractions and typically comprise depth jumps and variations.
- *Submaximal plyometrics* involve low- and moderate-intensity drills that comprise most exercises other than depth jumps. In addition, plyometric exercises can be impact-oriented (jumps, hops, skips, plyo push-ups).



# PLYOMETRIC PROGRAM DESIGN

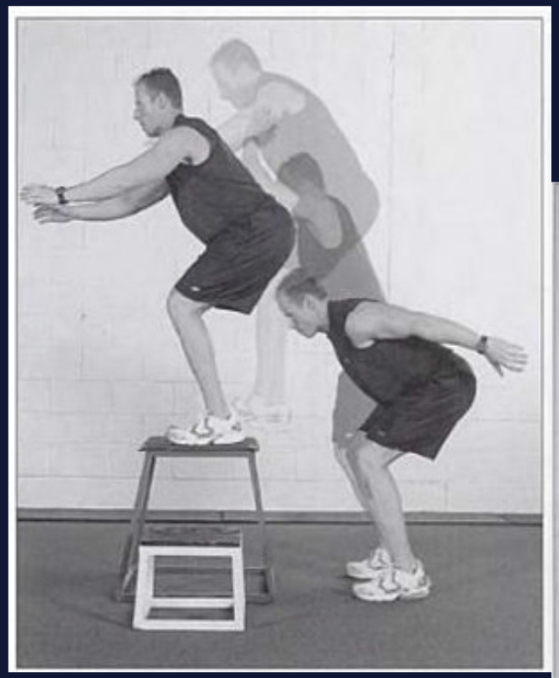
- The basic principles of designing process must follow the next:
  - WE MUST CRAWL BEFORE WE WALK;
  - ….**and…WALK BEFORE WE RUN…☺…**

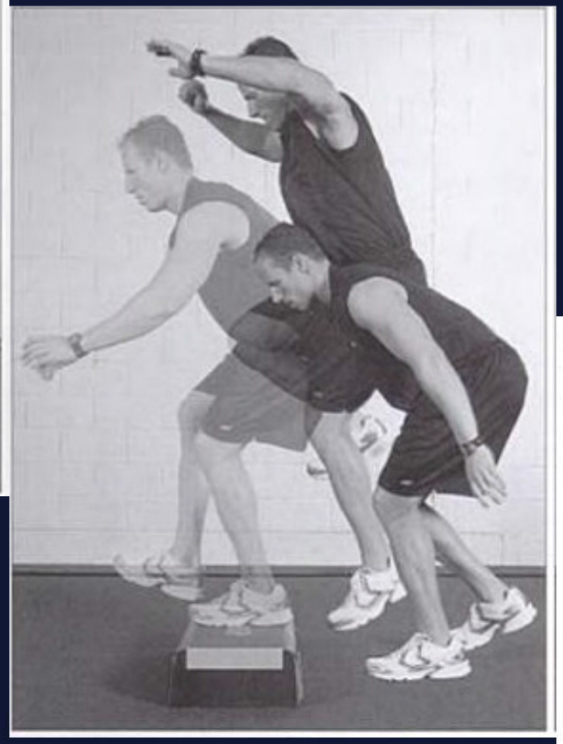
So, we must learn to jump off the ground and properly land on the ground before attempt to minimize time spent on the ground.

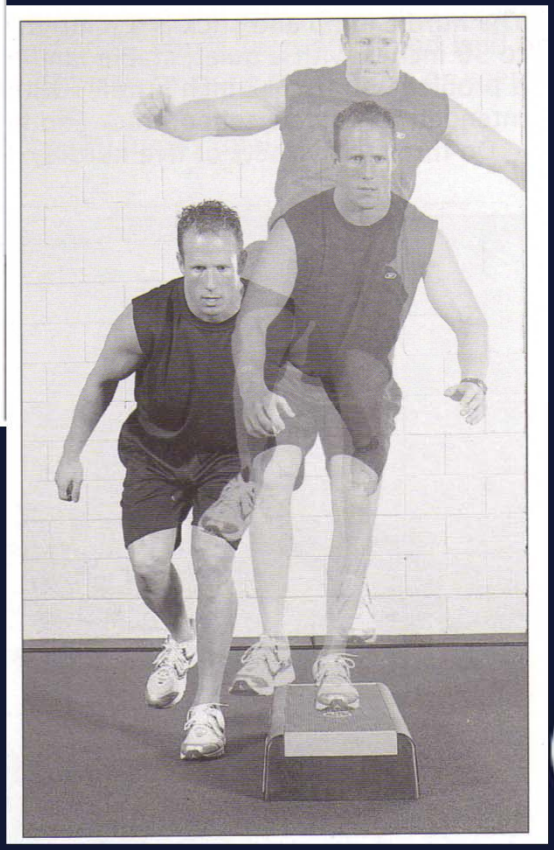
**According to this the next phases are the milestones!!!**

## Phase 1: Single response, Stabilization

- The emphasis of this first phase is on learning to jump and land. Athletes should be taught to summate forces using the arms and hips and to land *softly.* The more softly they land the better.
- The athletes must learn to absorb force with the muscles NOT with the joints.







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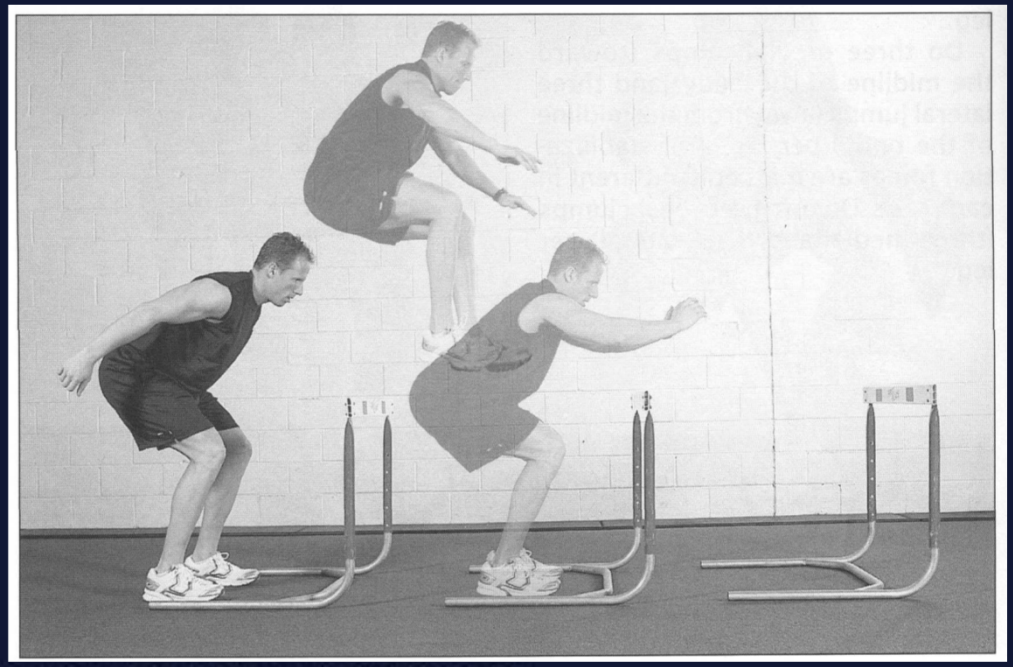
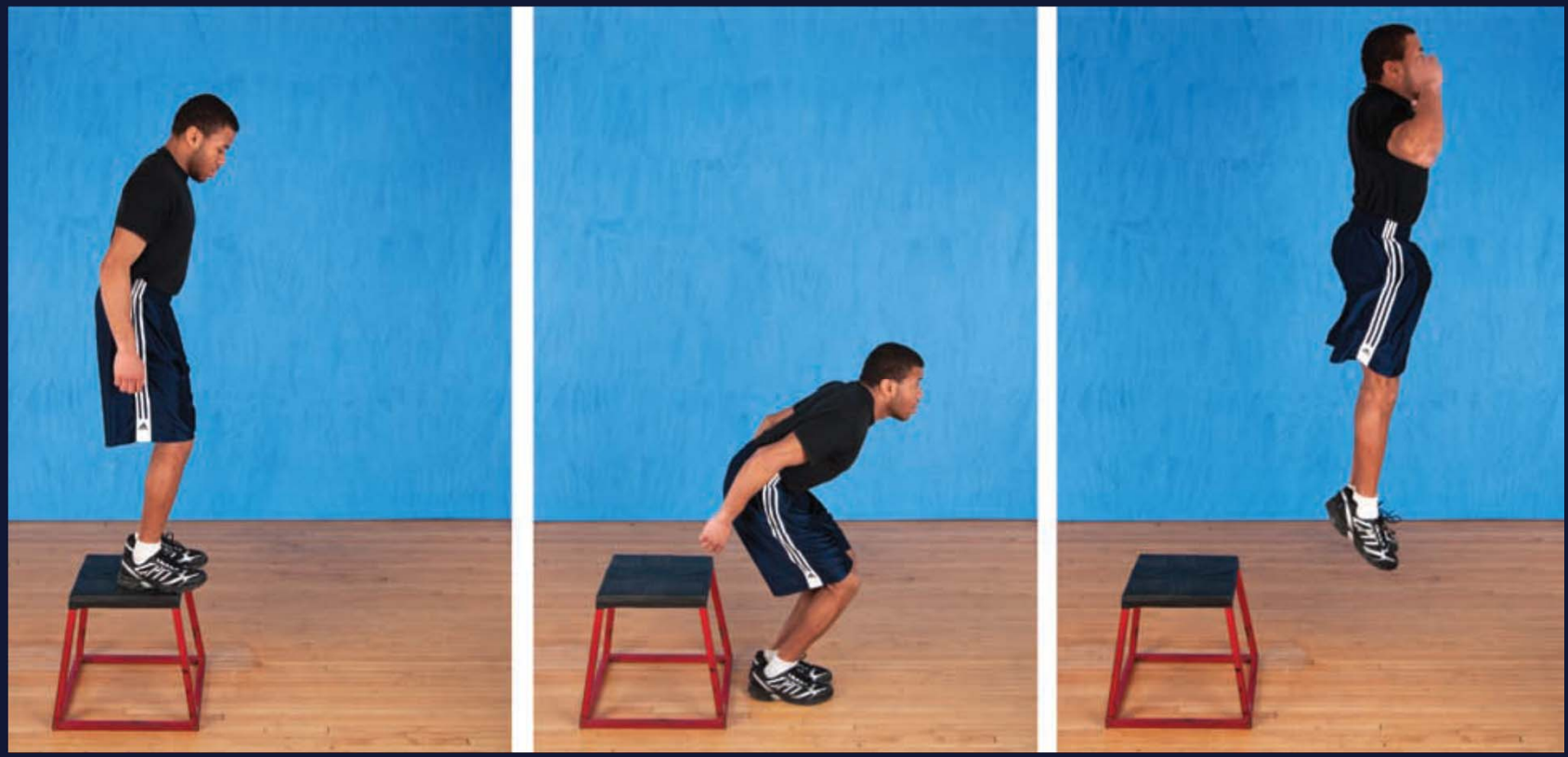
# Phase 2: Multiple Response, Stabilization

The major difference between the following linear drills and those in phase 1 is the introduction of gravity. Instead of jumping up on a box, the athlete jumps over an object, usually a hurdle from 6 to 30 inches tall, depending on the type of jump and the athlete's skill level.



# Phase 3: Multiple jumps, Introduction of Elastic Components

The third phase begins to approach what many coaches and athletes would consider real plyometrics. The emphasis in phase 3 is on switching from an eccentric contraction to a concentric contraction rather than simply developing eccentric strength. Although eccentric-to-concentric switching is the essence of plyometric training, the root of most plyometrics-related injuries is neglecting the development of eccentric landing skills. Phases 1 and 2 lay the essential groundwork for injury prevention and for later stretch-shortening-cycle work. Phase 3 introduces the stretch-shortening cycle by incorporating a bounce into the drills. The key is to gradually increase the type and amount of stress applied to the muscle and, more importantly, to the connective tissue.



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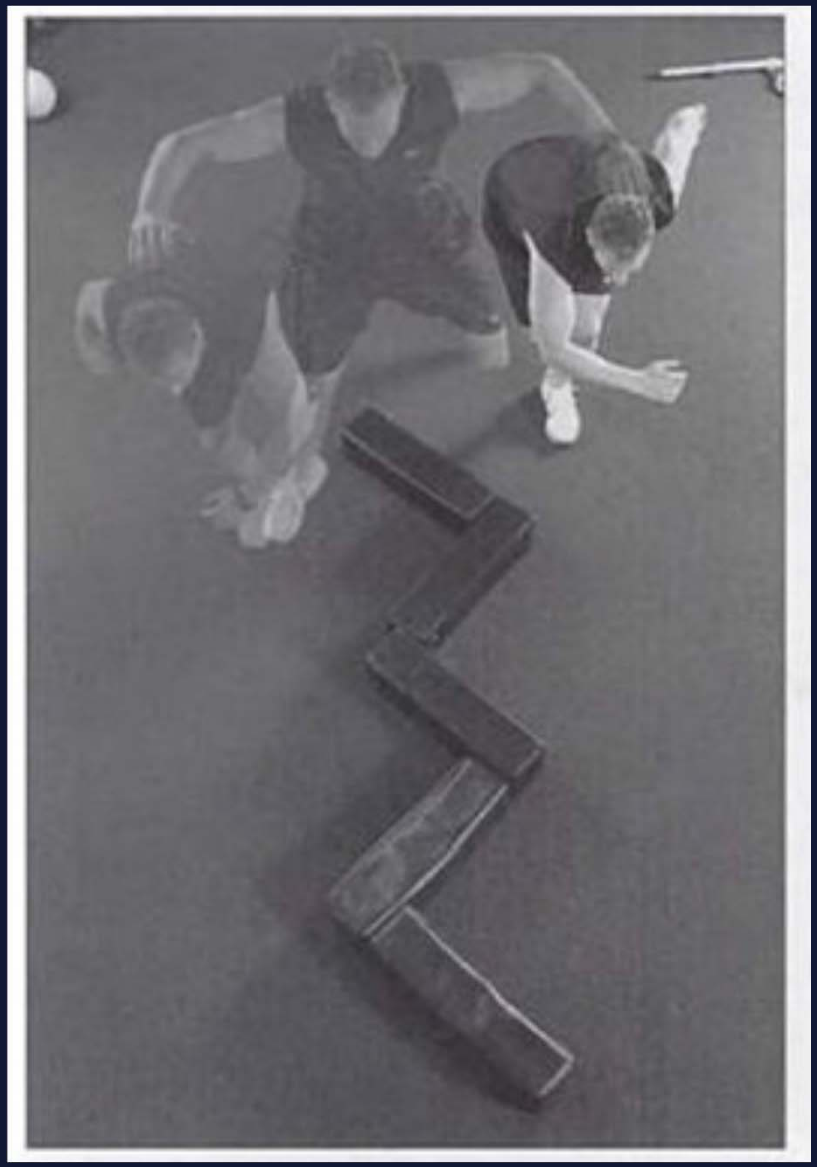
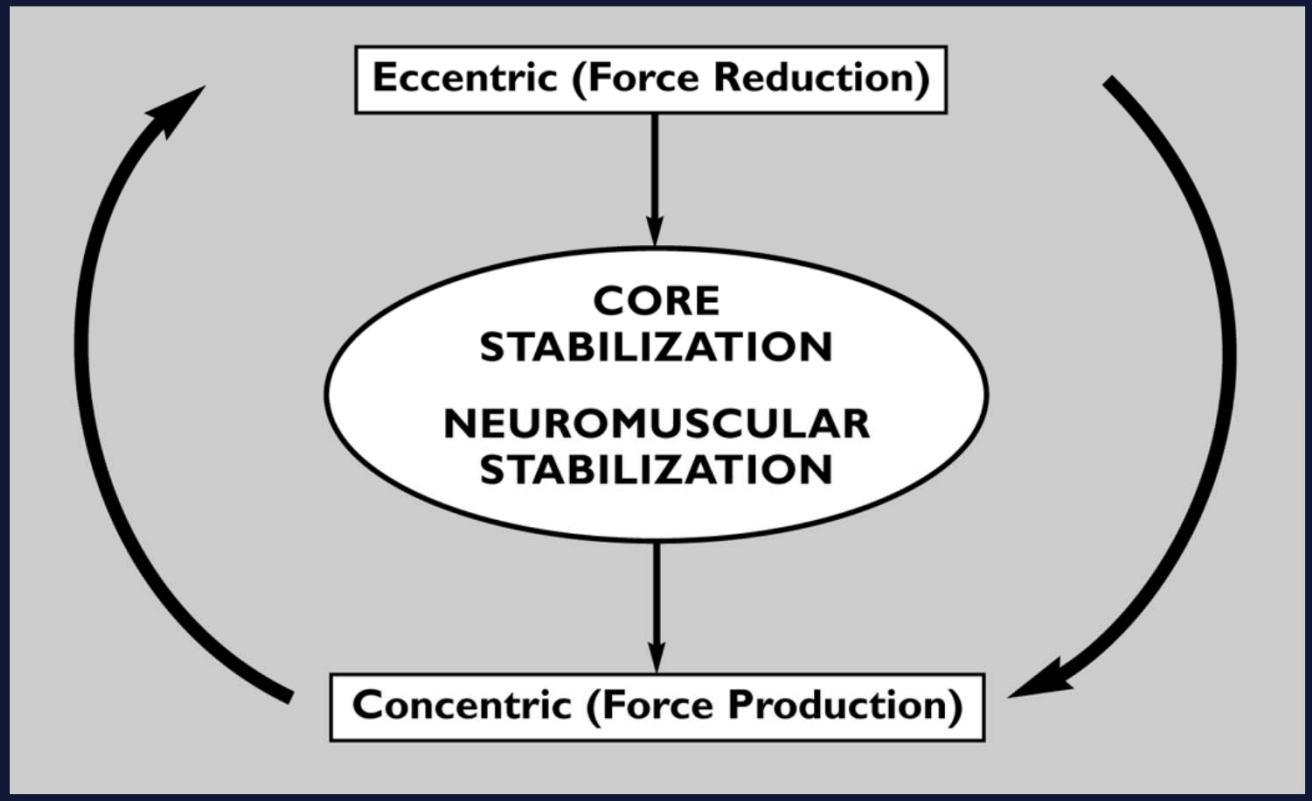


# Phase 4: Multiple jumps, Elastic Response

After all of this, the nervous system and muscular system do most of the work, with the little stress on the joints, working on shortening the time spent on the ground.

THIS IS THE GOAL OF THE PROGRESSIVE PLYOMETRIC PROGRAM.


Eccentric (Force Reduction)
CORE
STABILIZATION
NEUROMUSCULAR
STABILIZATION
Concentric (Force Production)

# DYNAMIC JOINT STABILIZATION

- The ability of the kinetic chain to stabilize a joint during movement.
  - The rotator cuff stabilizing the head of the humerus on the glenoid fossa while performing a push-up;
  - The gluteus medius and adductor complex stabilizing the hip when performing a squat;
  - The posterior tibialis and peroneus longus stabilizing the foot and ankle complex when performing a calf raise.

- **MULTISENSORY CONDITION:**

- Training environment that provides heightened stimulation to proprioceptors and mechanoreceptors.

- **CONTROLLED INSTABILITY:**

- Training environment that is as unstable as can safely be controlled by an individual.

# CONCLUSIONS

## PLYOMETRIC PROGRAM DESIGN

- Plyometric training, like other modalities, is a composite of several acute program variables that can be manipulated to achieve a target goal.

- These variables include exercise selection and order, intensity, volume, frequency, and rest intervals.

- Designing a plyometric training program for athletes is multifactorial and should include planned progressive overload, specificity, and variation

# CONCLUSIONS

## EXERCISE SELECTION

- Plyometric exercises consist mostly of jumps-in-place, standing jumps, multiple hops/jumps, bounding, box drills, depth jumps, and throws.
- These exercises can be divided into lower-body and upper-body/trunk/core explosive exercises, such as:
  - Jumps;
  - Hoops;
  - Bounds;
  - Box drills;
  - Passes, tosses, throws and ballistic exercises.

# THANK YOU

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