

Training Methods Used For HKSI Elite Athletes

- HKSI- SCN Department

Training Methods Used For HKSI Elite Athletes

I. Intro: Ricky

I. Warm-up, Stretching and Flexibility: Sonny

III. Strength Training Principles: Jenny

a. Free Weights

- **b. Machines**

IV. Plyometrics and Medicine Ball training: Del

V. Proprioception and Balance Training: Ricky

PROPRIOCEPTIVE TRAINING

Definition of **PROPRIOCEPTION**

The mechanism involved in the regulation of posture and movement through stimuli originating in the receptors imbedded in the joints, tendons, muscles and labyrinth.

PROPRIOCEPTIVE TRAINING

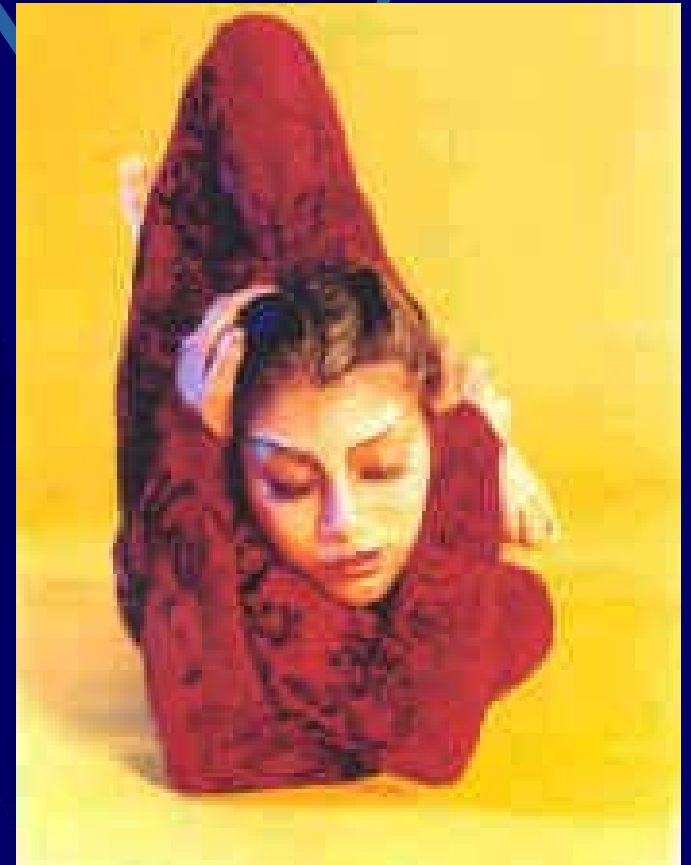
- **PROPRIOCEPTION**

The complex neuromuscular process that involves both afferent input & efferent signals & allows the body to maintain stability & orientation during both static and dynamic activities.



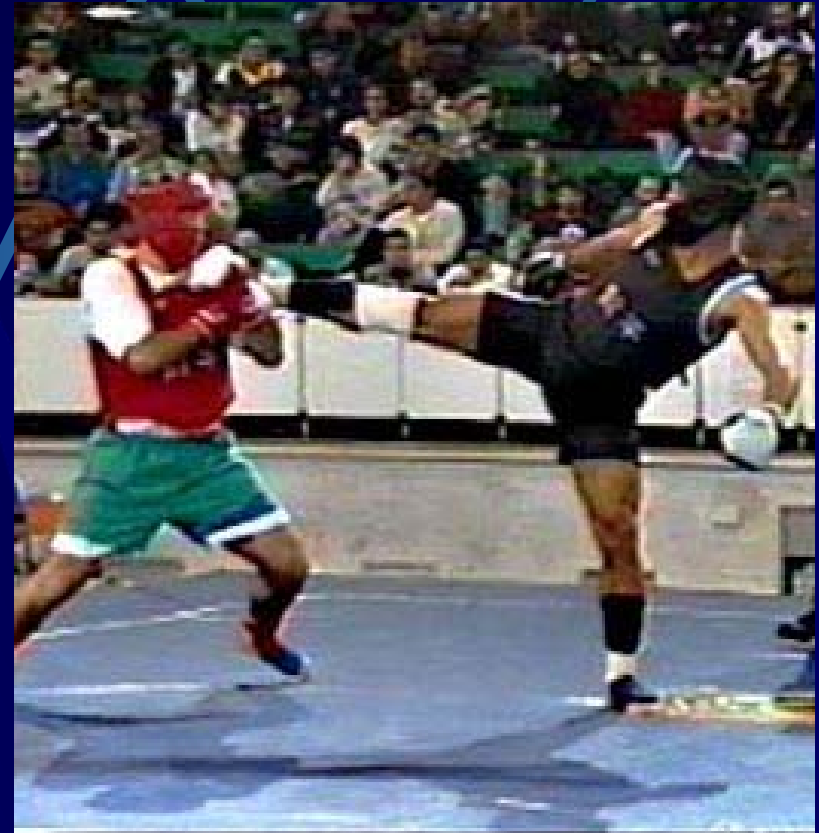
PROPRIOCEPTIVE TRAINING

- **ASPECTS of PROPRIOCEPTION**
- **Static Sense** - conscious orientation of one body part to another.



PROPRIOCEPTIVE TRAINING

- **Dynamic Sense**
- gives the neuromuscular system feedback about the rate & direction of movement.



PROPRIOCEPTIVE TRAINING

- LEVELS of Proprioception
 - **Unconscious** (Reflex Initiated)
 - Modulates muscle function and initiates reflexive stabilization of joints by way of muscle receptors.
 - **Conscious** (Voluntary)
 - Enables proper joint function in sports activities & occupational tasks.

PROPRIOCEPTIVE TRAINING

- MECHANORECEPTORS
- 1. Articular receptors
 - Joint Capsule
 - Ligaments
 - Intra-articular structures (*ex. Meniscus)
- 2. Muscle Receptors
 - Muscle Spindle
 - Golgi Tendon Organ
- 3. Cutaneous Receptors

PROPRIOCEPTIVE TRAINING

- ACL Injury
- ↓
- Interruption of the ‘ACL muscle reflex arc’
- ↓
- Triggers ‘Second Pathway’

PROPRIOCEPTIVE TRAINING

● Second Pathway

- from the remaining muscle, capsule and peri-articular soft tissue mechanoreceptors
- slower
- abnormal muscle activation patterns of hamstring & quadriceps, reducing knee stability.



PROPRIOCEPTIVE TRAINING

- 1. SAFE
- 2. CHALLENGING
- 3. MULTI-SENSORY APPROACH
- 4. SPORT ACTION SPECIFIC
 - Derived from a fundamental skill & apply directly to a sport skill

PROPRIOCEPTIVE TRAINING

● SPOTTING

- Stay in the back
- Spot close to the center of gravity
- Lower your own center of gravity
- STAY ALERT!



PROPRIOCEPTIVE TRAINING

- **Schedule**
- **Frequency**
- **Duration**
- **Sets**
- **Reps /Duration**
- **Rest**
- **Progression**

PROPRIOCEPTIVE TRAINING

● PROGRESSION VARIABLES

	STANCE	
	BILATERAL	UNILATERAL
SUPPORT		
COUNTERBALANCE		
SURFACE		
EQUIPMENT		
RANGE OF MOTION		
STATE OF MOTION		
PLANE OF MOTION		
SPEED		
REACTION		
VISUAL CUE		

PROPRIOCEPTIVE TRAINING

● BASIC EXERCISE TYPES

- STANDING
- SQUAT
- HOPS / BOUNDS / JUMPS
- JOG-RUN

PROPRIOCEPTIVE TRAINING

- SOFT SURFACE
CALF RAISE



PROPRIOCEPTIVE TRAINING

- **Soft Surface Toe
Raise**



PROPRIOCEPTIVE TRAINING

- Soft Surface
7-Point Single
Leg Squat



PROPRIOCEPTIVE TRAINING

- Soft Surface
Single leg
Floor Touch



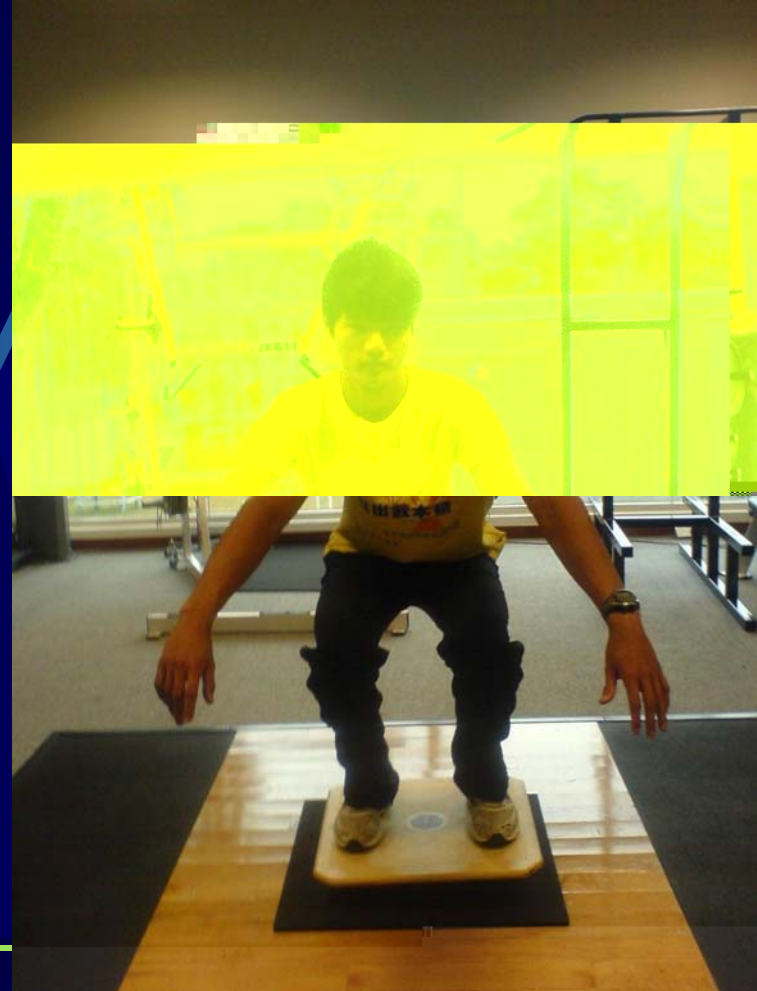
PROPRIOCEPTIVE TRAINING

- Swiss Ball Lunge



PROPRIOCEPTIVE TRAINING

- Teeter Board



PROPRIOCEPTIVE TRAINING

- BALANCE BOARD
PARALLEL STANCE
SQUAT



PROPRIOCEPTIVE TRAINING

- BALANCE BOARD
- T-STANCE
- SQUAT



PROPRIOCEPTIVE TRAINING

- BALANCE BOARD
IN-LINE STANCE



PROPRIOCEPTIVE TRAINING

- Inclined Side-Side Hops



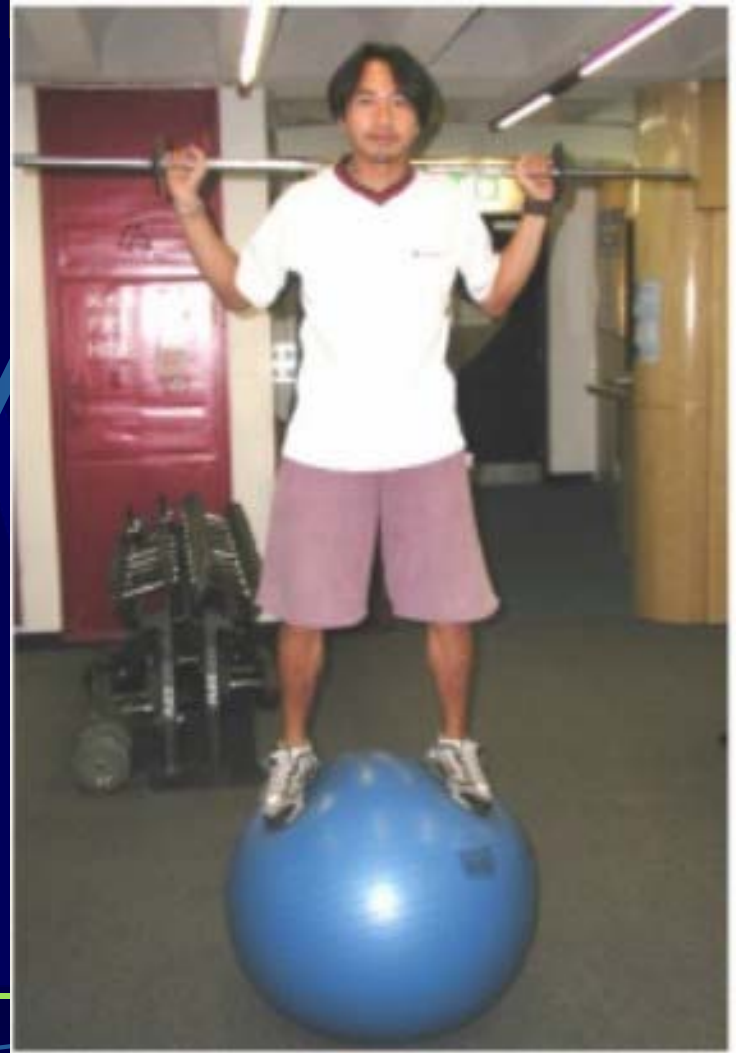
PROPRIOCEPTIVE TRAINING

- Resisted Side-Step Hops w/ Reaction



PROPRIOCEPTIVE TRAINING

- SWISS BALL
SQUAT



PROPRIOCEPTIVE TRAINING

● JOG-RUN

- a) Straight 400m-1600m
- b) Figure of 8 (F8)
- c) ↑ speed of F8
- d) ↓ Size of F8
- e) ↑ Speed : ↓ Size of F8

PROPRIOCEPTIVE TRAINING

- 6) Jog Straight, cut to unaffected side, then to affected side.
- 7) ↑ Speed of # exercise 6
- 8) Back Pedaling 25X
- 9) 20 Yards Carioca (both sides)
- 10) Sport Specific activities in non-competitive background. (Athletic Training & Sports Med., 2nd Ed AAOS)

HKSI -SCN

● THANK YOU



Warm Up



Warm Up

- Objective

- Help prepare either physiologically or psychologically and reduces the likelihood of joint and muscle injury (McArdle et al., 2001)

Warm Up

- General (McArdle et al., 2001)
 - Body movements
 - Unrelated to the specific neuromuscular actions of the anticipated performance
 - E.g. calisthenics and stretching
- Specific (McArdle et al., 2001)
 - Rhythmic movements that provide skill rehearsal in the actual activity
- Intensity & Duration

Flexibility



Flexibility (Alter 2004)

- Definition: the range of motion available in a joint or group of joints
- Limitations: no single flexibility test can be used to evaluate total body flexibility (ACSM 2000, p.8)

Flexibility (Alter 2004)

- Classification:
 - Static (no emphasis on speed)
 - Passive (no active contraction, partner)
 - Ballistic (bobbing, rebounding, plyo)
 - Dynamic/functional (sport specific)

Flexibility (Siff & Verkhoshansky 1999)

- Functional flexibility:
 - Flexibility-speed: ability to produce efficient **full ROM** at speed.
 - Flexibility-strength: ability to produce efficient, powerful static and dynamic movements over a **full ROM**.
 - Flexibility- endurance: ability to repetitively produce efficient **full ROM** under static and dynamic conditions

Stretching



Stretching (Alter 2004)

- Stretching duration:
 - static, dynamic, PNF
 - 30s: muscle belly to tendons.
 - ACSM Position stand (1998):
 - Static: 10 to 30s
 - PNF: 6s - (10s to 30s)

Stretching (Alter 2004)

- Placement and Timing of the Stretching Program
 - Before or After a workout / competition?
 - Morning or evening?

Reference

- **Atler, M.J. 2004. Science of Flexibility. 3rd Edition. Human Kinetics**
- **McArdle W.D. et al. 2001. Exercise Physiology. 5th Edition. LWW.**
- **Siff, M. C. & Verkhoshansky, Y. V. 1999. Supertraining. 4th Edition. Denver USA.**



Training Methods

Types of Strength Training
Training System and Techniques
Genevieve Serrano, CSCS

Types of Strength Training

- Isometrics
- Dynamic Constant External Resistance Training
- Variable Resistance Training
- Eccentric Training
- Isokinetic

Isometrics

- No change in muscle length
- Max or submax
- 15-20 reps, 3-5 sec
- 3 x week
- Other: joint angle, BP, motivation

Dynamic Constant External Resistance Training

- Weight is constant
- Free weights/ weight training machines
- Heavy R, multiple times per session
- 2-3 x week
- strength, power, body composition
- safety



Variable Resistance Training

- Lever, cam or pulley to match strength curve
- Proper fit & positioning



Eccentric Training

- Negative training
- Post-exercise Soreness
- 120% 1RM DCER
- Other: safety

Training Systems & Techniques

- Training goals
- Administrative considerations

<u>Training System</u>	<u>Sets</u>	<u>Reps</u>	<u>Intensity</u>	<u>Rest</u>	<u>Remarks</u>
1. Single-Set System	1	4-10	to fatigue	30-60sec	time efficient
2. Multiple-Set System:					
a. Bulk	3	5-6	5-6RM		increase isometric strength
b. Circuit	1-3	10-15	40-60% 1RM	0-minim	time efficient improved cardio
c. PHA System	3	8-12		0-minim	high fatigue / local m endurance
d. Tri Set	3	8-12		0-minim	Increase static strength
e. Light to Heavy	progress from light to heavy R				DeLorme
f. Heavy to Light	heaviest done first				Oxford

Exercise Order

Description

Remarks

a. Compound

2 muscle groups of different body parts

M hypertrophy

b. Priority

do exercises that apply to training goals first

Goals

c. Superset

**agonist + antagonist
several exercises of same muscle group**

strength

d. Split routine

several exercises of same body part per session

time consuming

Training Technique Description

Remarks

1. Cheating

break strict form

caution

2. Forced/Assisted Rep

to fatigue the assist

2-4 extra reps

<u>Specialized Training System</u>	<u>Description</u>	<u>Intensity</u>	<u>Rest</u>	<u>Remarks</u>
1. Functional Isometrics	dynamic + isometric 5-7sec			1RM
2. Negative System	lowering/eccentric part	105-140% 1RM		need spotters
3. Complex/Contrast Loading	strength ex + power ex	>85% 1RM 30-45% 1RM	1-3 min	power output

Plyometrics and medicine ball training

Del Wong
(CSCS, M.Phil)

Definition

- Quick, powerful movements using pre-stretch or countermovement involving **stretch-shortening cycle (SSC)**
- Purpose: to increase power by using both the **natural elastic components (Mechanical)** of muscles/tendons and the **stretch reflex (Neurophysiological)**

Power Development

- Two proposed models for development of muscle force and power via plyometrics exercise
 - Mechanical model
 - Neurophysiological model
- Unclear with current knowledge which model is of more significance

Mechanical Model

- Stretch-shorten cycle (SSC)
 - Stretch (lengthening) phase: Eccentric loading phase
 - Shortening phase: Force-production or concentric phase
- Elastic energy in muscle/tendon unit increases with rapid stretch and is then stored
- When immediately followed by concentric muscle contraction, energy is released, increasing force production of contraction

Neurophysiological Model

- Stretch reflex
 - Body's involuntary response to external stimulus which stretches the muscle
 - Comprised of muscle spindle activity – sensitive to rate/magnitude of stretch and spindle activity increases when quick stretch is detected

Neurophysiological Model

- During plyometrics exercise, muscle spindles stimulated by rapid stretch causing reflexive muscle activation
- Reflexive response increases activity of affected muscle/s, increasing force production
- If concentric contraction doesn't immediately follow stretch, effects of stretch reflex is **negated**

Phases of Plyometrics



- Pre-activation Phase
- Eccentric Phase
- Amortization
- Concentric Phase

Phases of Plyometrics



- Pre-activation Phase
- Eccentric Phase
- Amortization
- Concentric Phase

Phases of Plyometrics

Pre-activation
Phase

Eccentric Phase

Amortization

Concentric Phase

Phases of Plyometrics



- Pre-activation Phase
- Eccentric Phase
- Amortization
- Concentric Phase

Plyometrics: Training effect

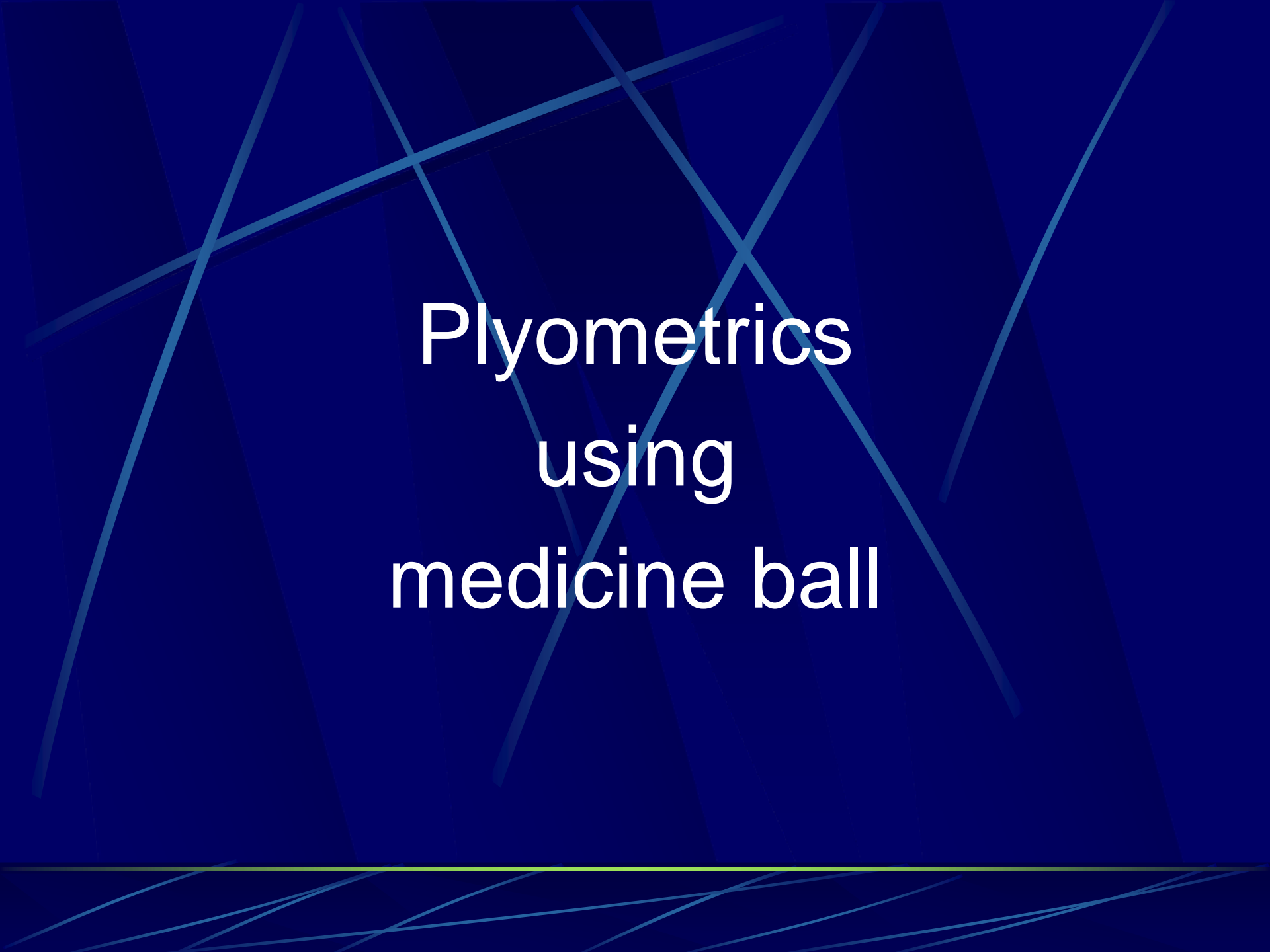
- Trains a specific movement pattern
- Dynamic balance
- Muscle power
- Efficiency of movements
- Maximize reaction time



Plyometrics
using
body weight

Lower body plyometrics: Drop jump





Plyometrics
using
medicine ball

Upper body plyometrics: Chest pass



If concentric contraction is delayed, effects of stretch reflex is reduced.



Good concentric contraction



Delayed concentric contraction



End of this part.