# The Latest stroke Rehabilitation Techniques

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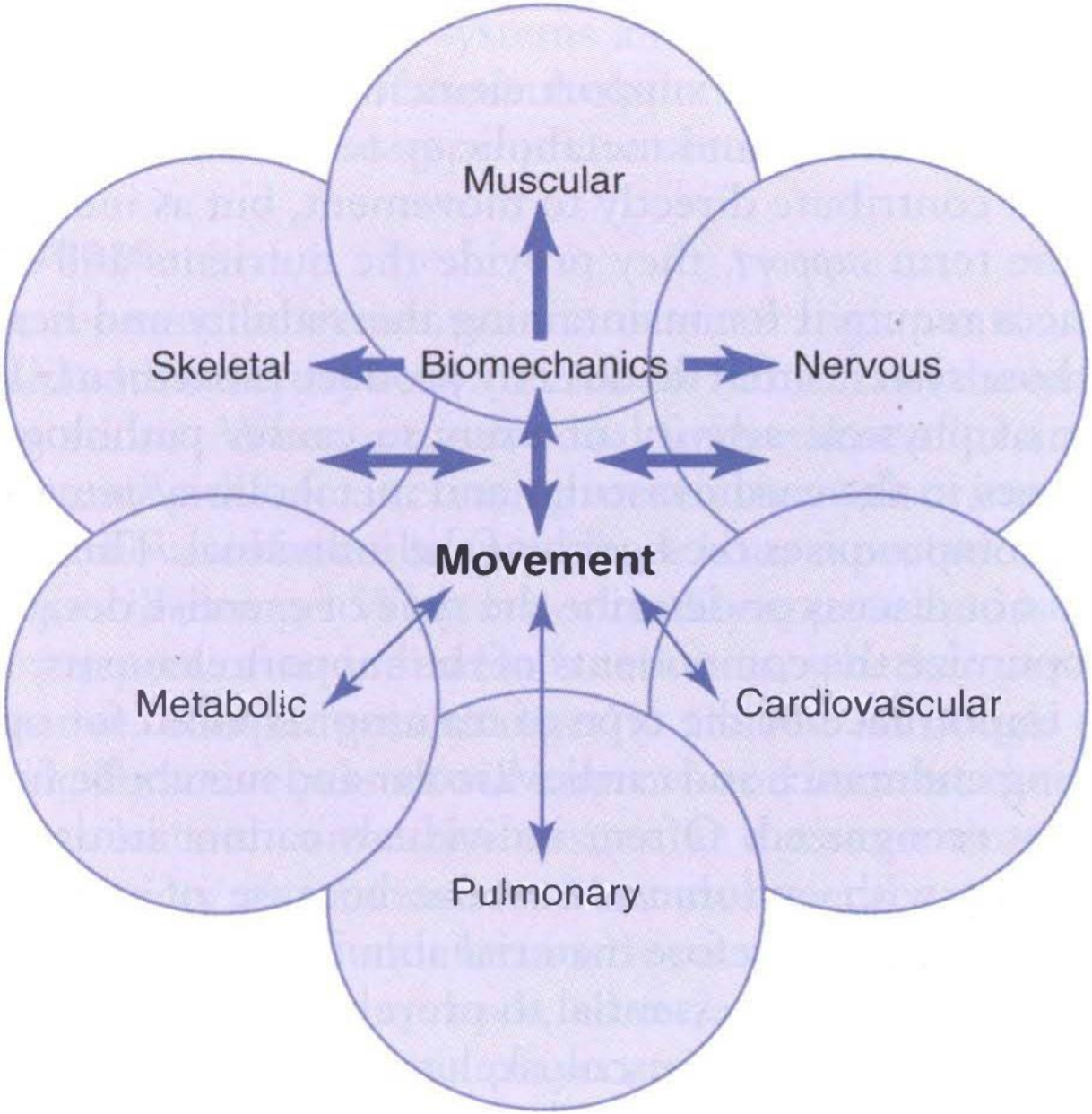
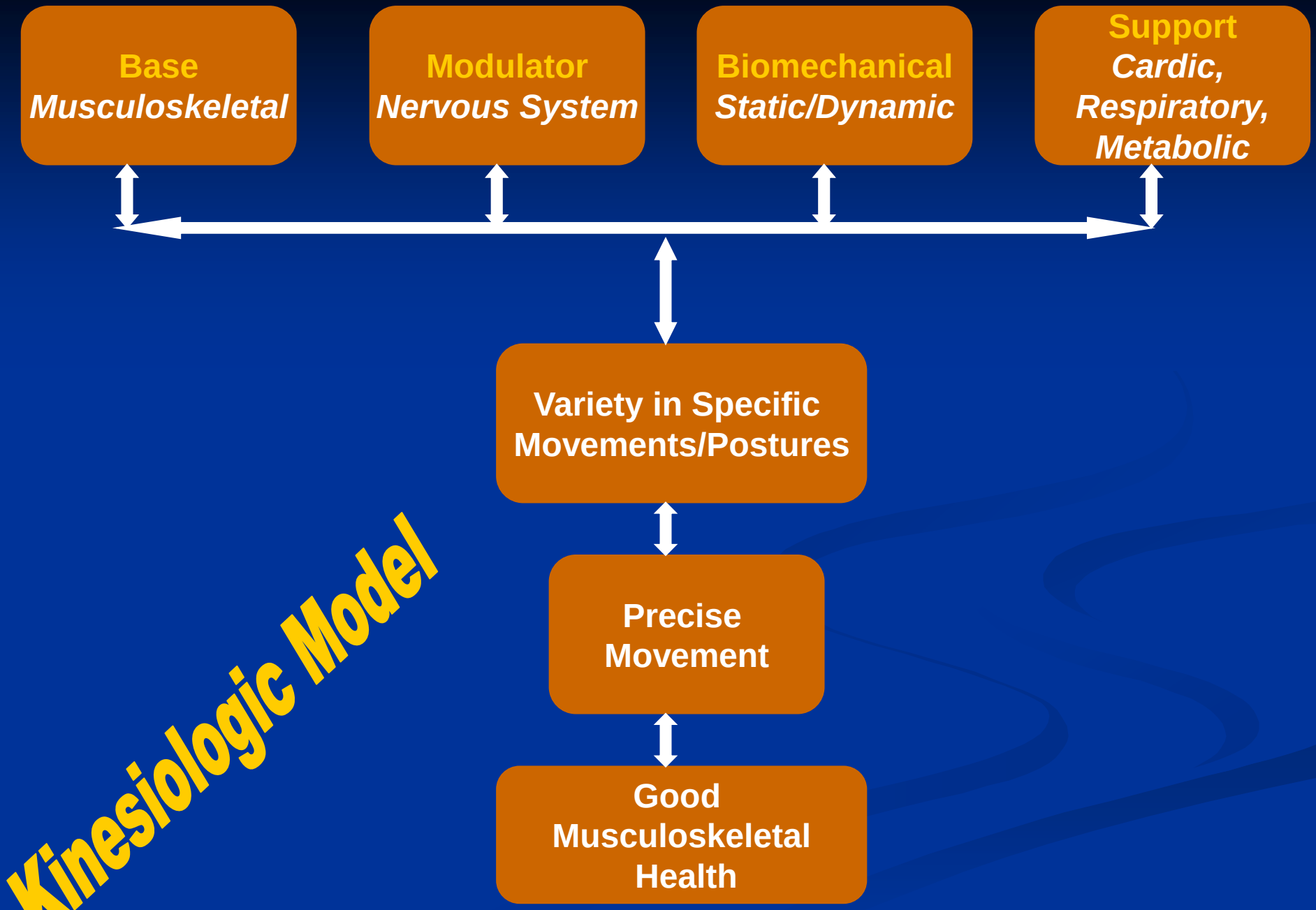
- **Stroke Rehabilitation (skill)** is a progressive, dynamic, goal oriented process aimed at enabling a person. with impairment to reach their optimal physical, cognitive, emotional, communicative, and social functional level. – Heart & Stroke foundation
- **Reability : Motor ability**

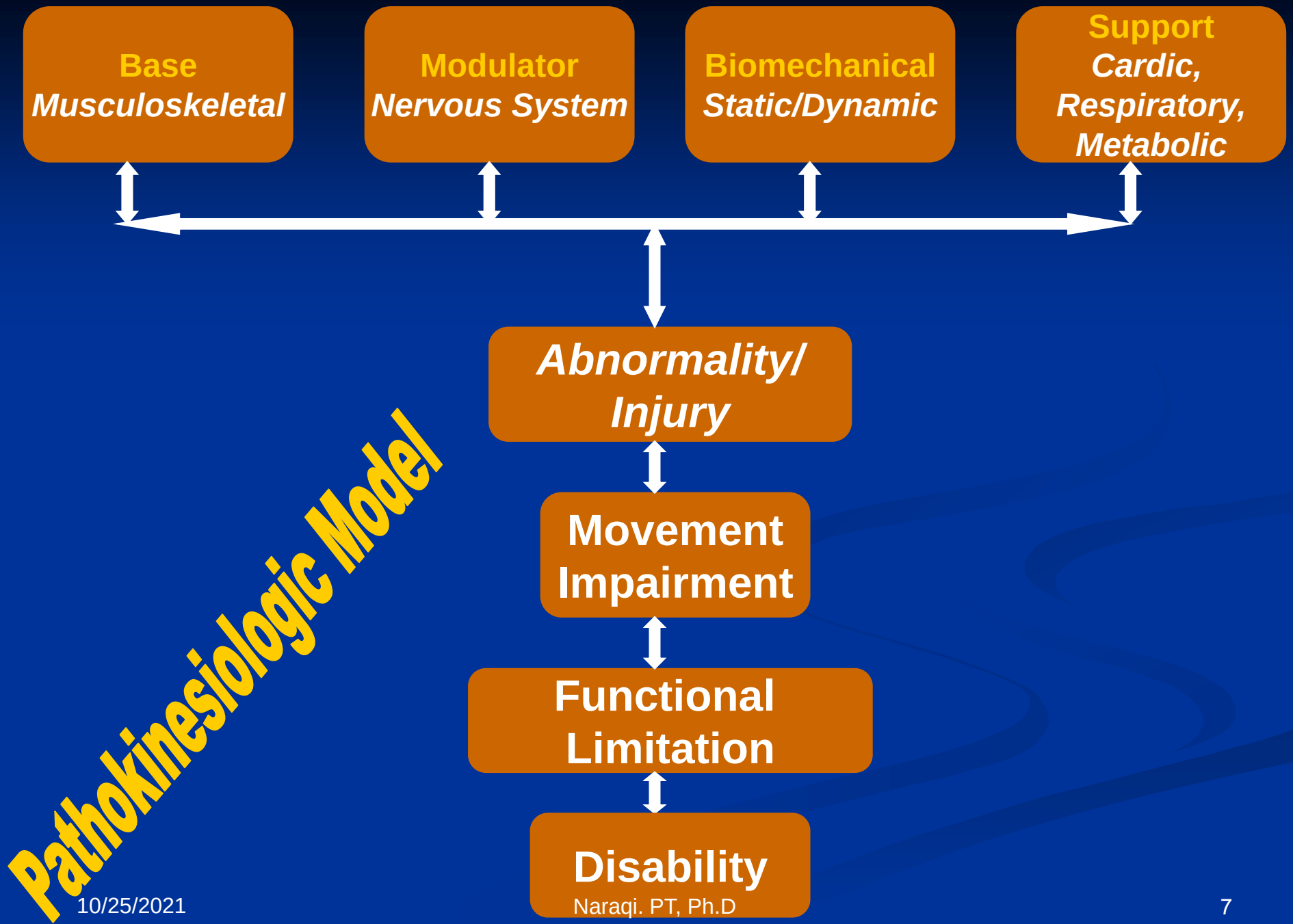
# Brunnstrom stages of stroke recovery

| | | |
|---|---|---|
| 1 | Flaccidity | The muscles aren't able to move and they might feel limp and floppy. |
| 2 | Spasticity appears | The muscles may begin to tighten reflexively and have difficulty relaxing. |
| 3 | Increased spasticity | Certain muscles might tighten more and can be more difficult to relax. |
| 4 | Decreased spasticity | The involuntary muscle tightness (spasticity) starts to decrease. |
| 5 | Spasticity continues to decrease | The spasticity is minimal, allowing your affected side to move more complexly. |
| 6 | Spasticity disappears & Coordination reappears | The muscles may begin to tighten reflexively and have difficulty relaxing. |
| 7 | Normal function returns | The muscles may begin to tighten reflexively and have difficulty relaxing. |

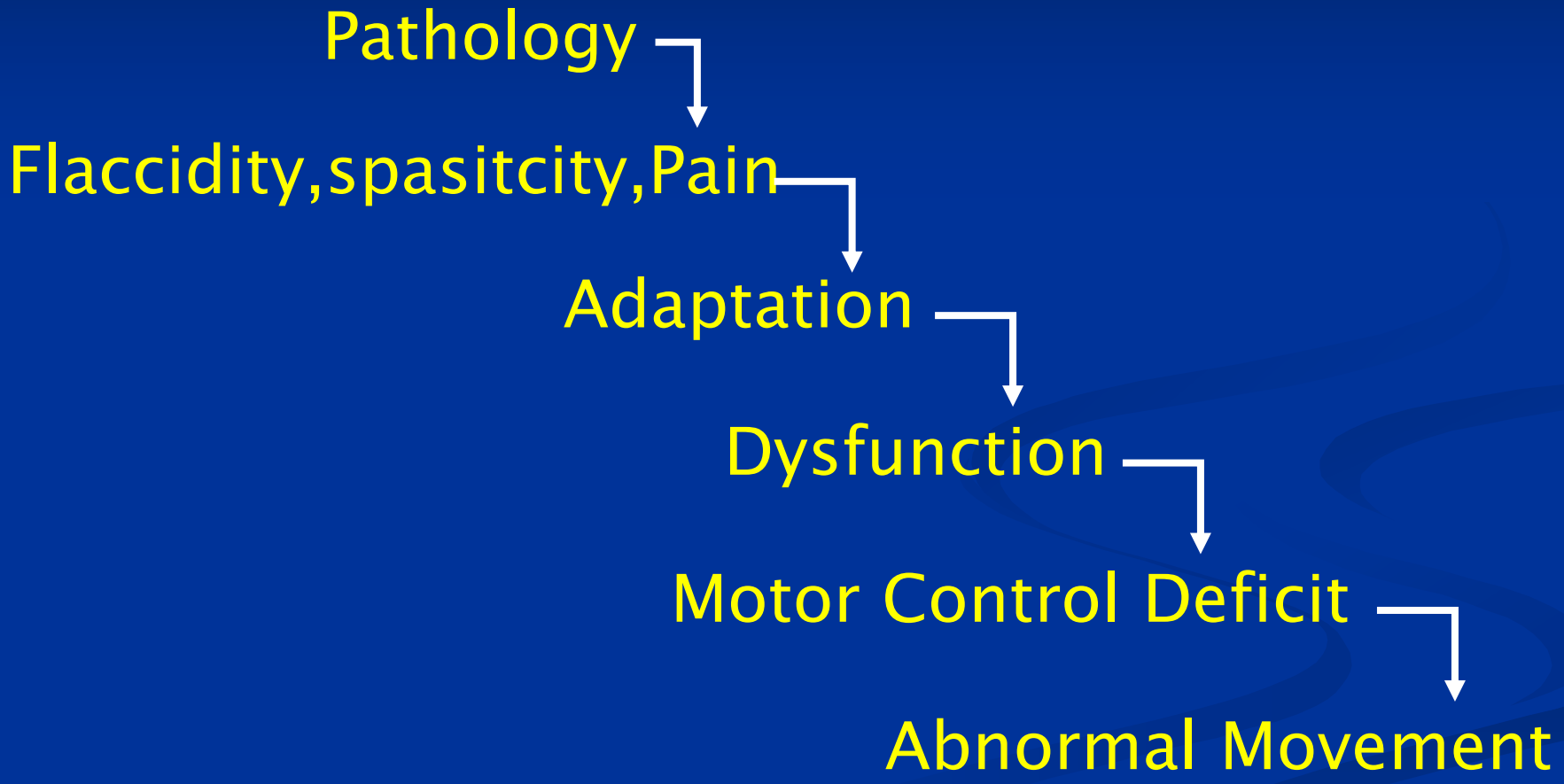
# Early Mobilization

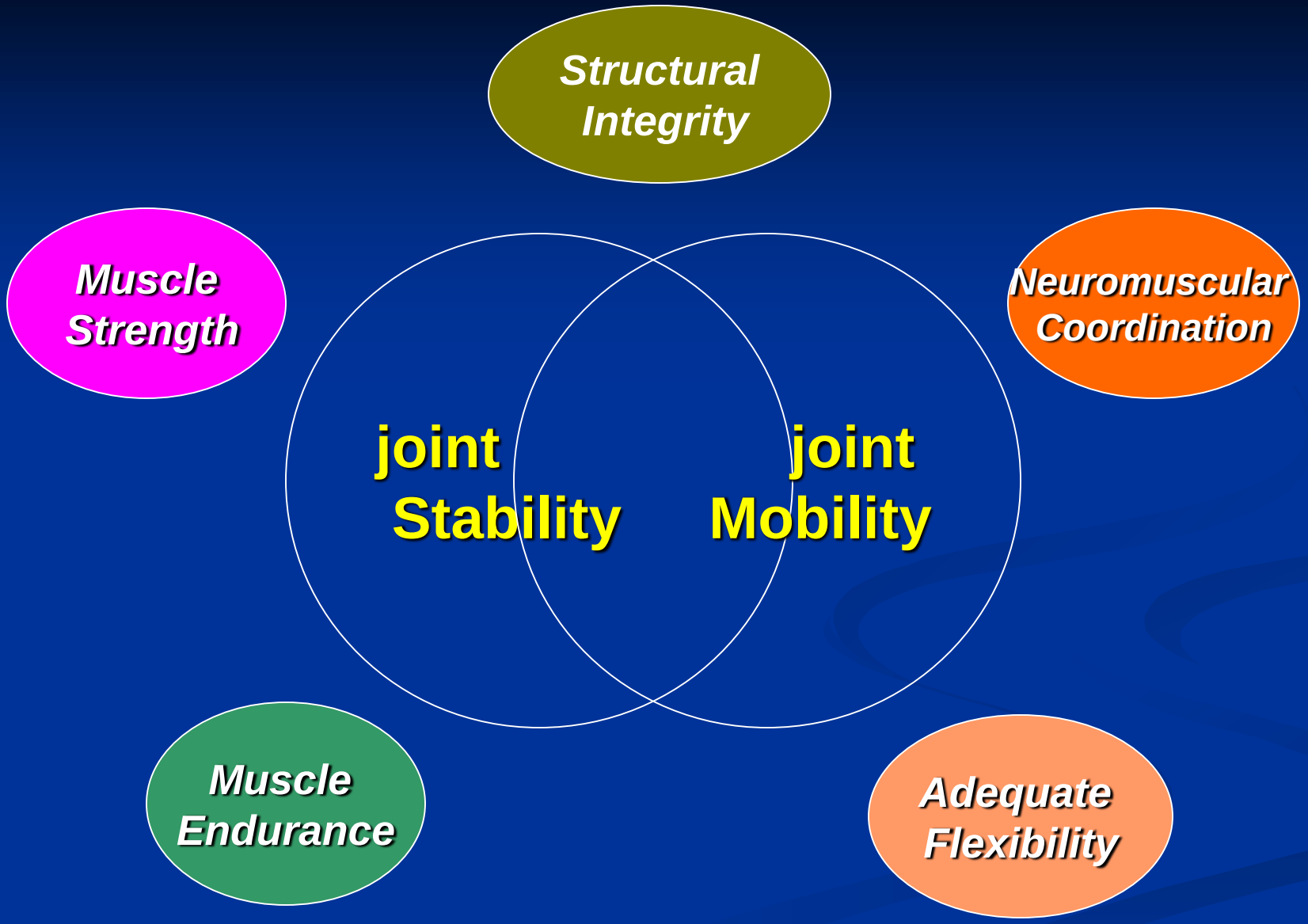

Muscular
Skeletal
Biomechanics
Nervous
Movement
Metabolic
Cardiovascular
Pulmonary


Base
Musculoskeletal
Modulator
Nervous System
Biomechanical
Static/Dynamic
Support
Cardic,
Respiratory,
Metabolic
Variety in Specific Movements/Postures
Precise Movement
Good Musculoskeletal Health
Kinesiologic Model


Base
Musculoskeletal
Modulator
Nervous System
Biomechanical
Static/Dynamic
Support
Cardic,
Respiratory,
Metabolic
Abnormality/
Injury
Movement
Impairment
Functional
Limitation
Disability
Pathokinesiologic Model

# Pathokinesiologic Model



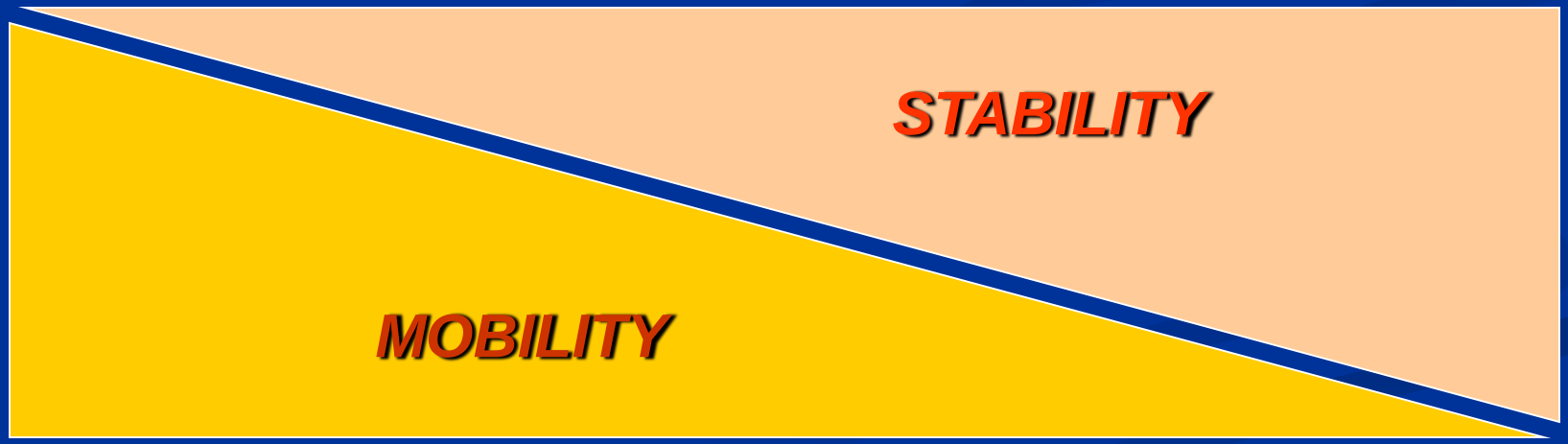

Structural Integrity
Muscle Strength
Neuromuscular Coordination
joint Stability
joint Mobility
Muscle Endurance
Adequate Flexibility

**SPECIAL SKILL**

**GENERAL SKILL**

**CONTROLLED MOBILITY**

**DYNAMIC STABILITY**



# Proprioception

- Different types in different tissues
- Precise role is not clear but generally agreed – aids co-ordination, balance and especially joint congruence (Grigg 1994)

# Proprioceptors cont'd…

- Provide feedback that enables system to select appropriate group and sequence of muscle activity
- Facilitate the accommodation of musculoskeletal mechanics; dependant on:
  - neural activity
  - mechanical properties of the muscle
  - geometry of the system
- CNS is informed of these features to cause the appropriate motor command

(Enoka, 1988)

# Consequence of decreased proprioception

↓muscle tone

↓midrange proprioception

instability through ↓ balance awareness etc

↑ risk of injury

# Components of Neuromuscular Control Training

- Proprioception
- Kinesthesia
- Dynamic Stability
- Preparatory Muscle Contractions
- Reactive Muscle Characteristics
- Conscious and Unconscious Movement Patterns

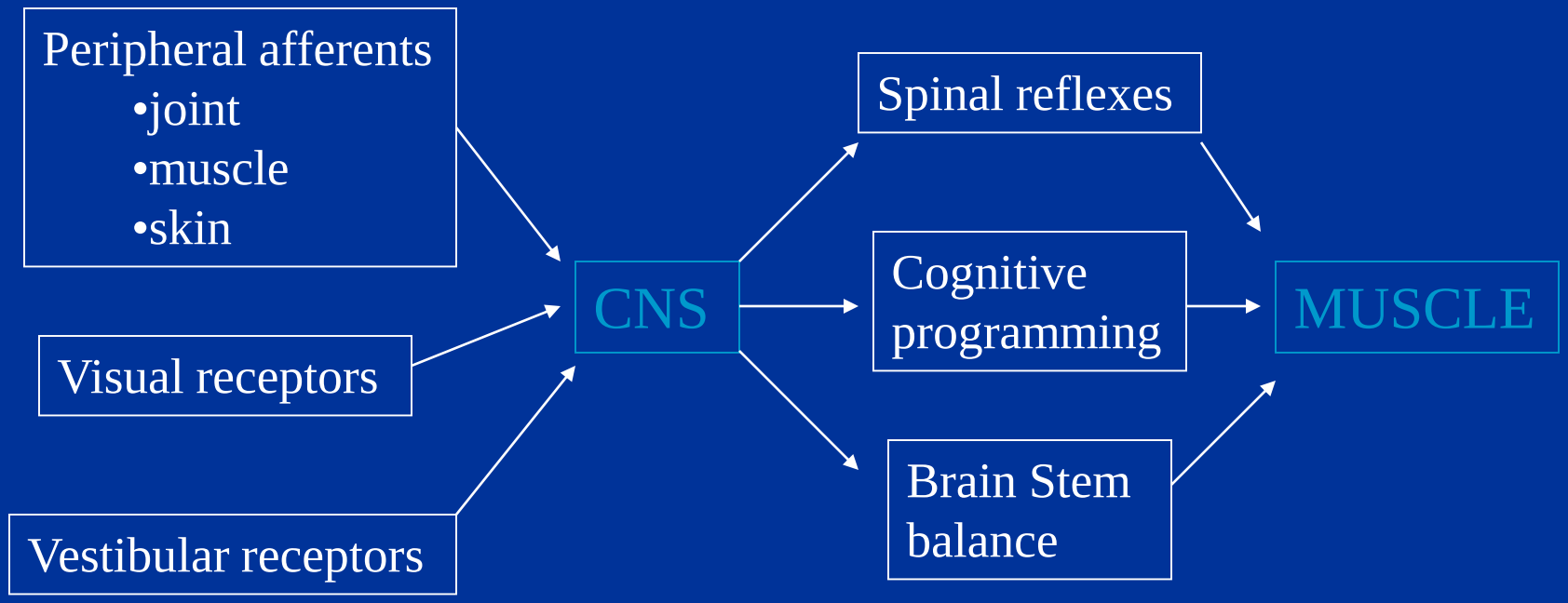
# Re-establishing Neuromuscular Control

- Four Basic Elements
  - Proprioceptiom
  - Dynamic Joint Stabilization
  - Reactive Neuromuscular Control
  - Functional Motor Patterns

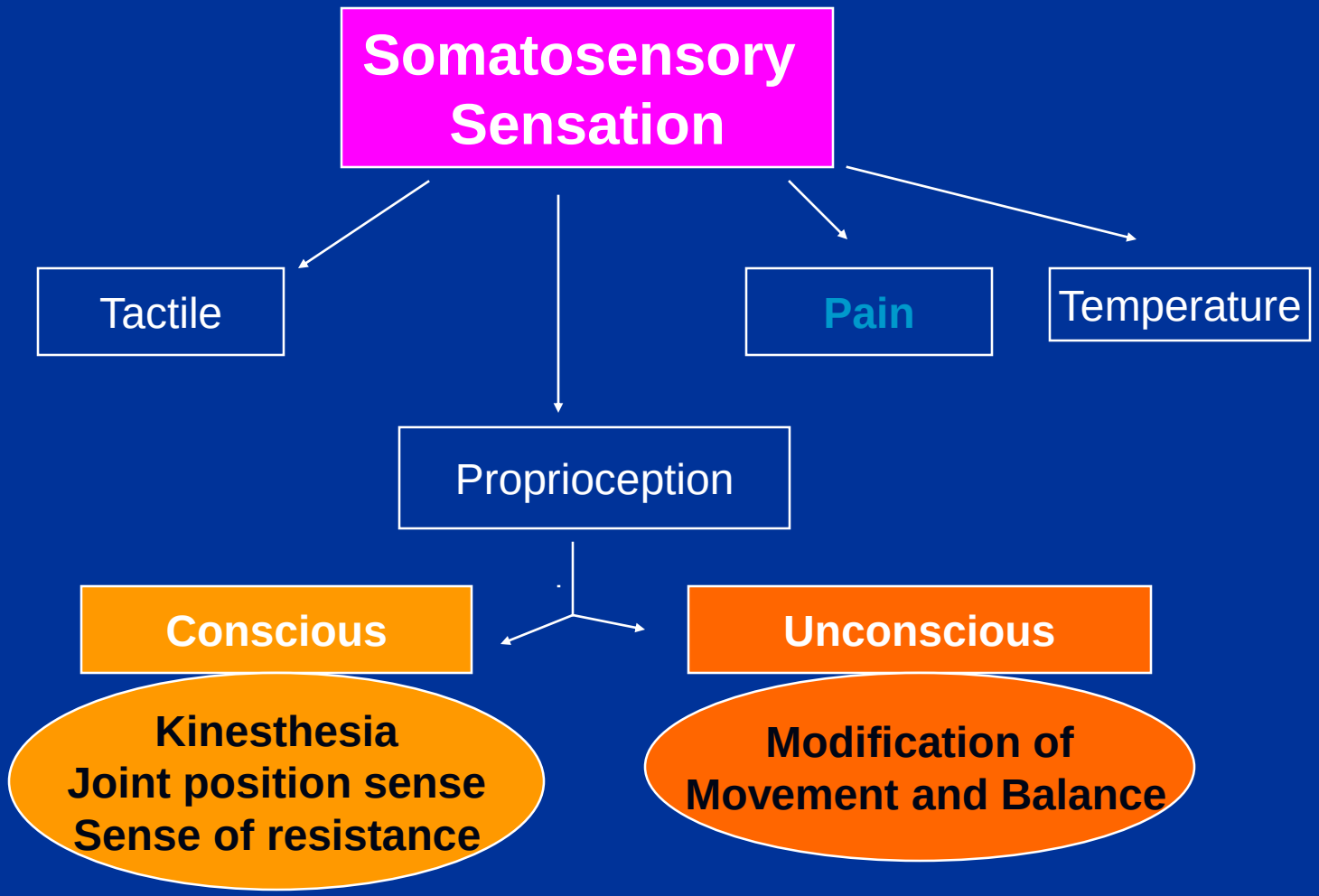
Mechanically stable joints are not necessarily functionally stable

AFFERENT INPUT

LEVELS OF MOTOR CONTROL




From Lephart SM, Henry TJ. 1996


Somatosensory Sensation
Tactile
Pain
Temperature
Proprioception
Conscious
Unconscious
Kinesthesia
Joint position sense
Sense of resistance
Modification of Movement and Balance

Critical to effective motor control is accurate sensory information concerning both the external and internal environmental conditions of the body

# Proprioceptors: feedback or control?

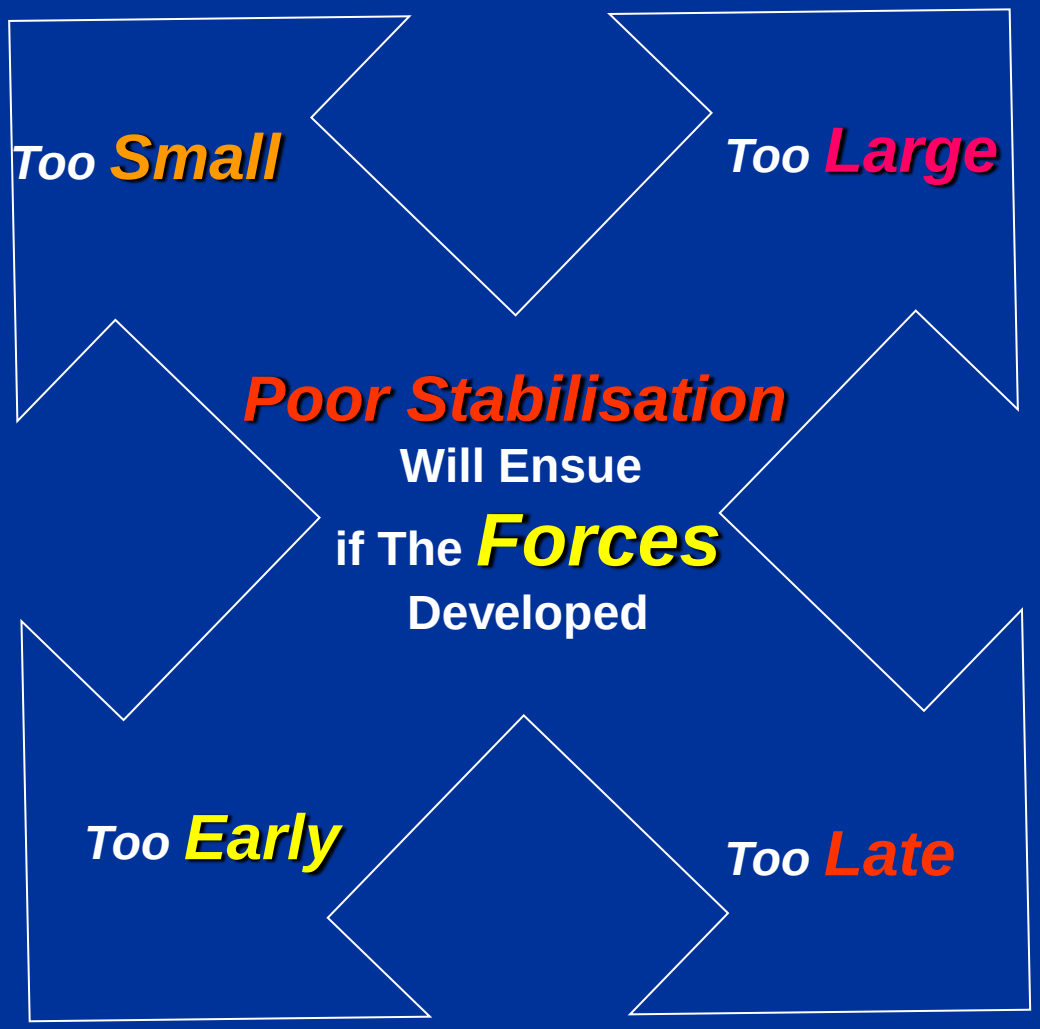
- proprioception have a controlling effect on the nervous system ???

- proprioceptors provide feedback, but do not control motor activity
- The evidences is:
  - *Delayed feedback*
  - *Reduced feedback*
  - *Absence of feedback (the 'senseless' man)*

- In the absence of proprioception the motor system is incapable of controlling fine or new learned movements, or of improving these movements

# Which one the best?

- Passive -Static
- Passive -Dynamic
- Active -Static
- **Active –Dynamic( PNF)**


Too Small
Too Large
Poor Stabilisation
Will Ensue
if The Forces
Developed
Too Early
Too Late

One major category of proprioceptive exercises is balance training

In lower extremities:

- CKC exercises
- One- legged standing balance exercises
- Progressive use of wobbel board exercises
- Use of uneven surfaces
- Crossing the arms
- Closing the eyes
- External/ internal  perturbations

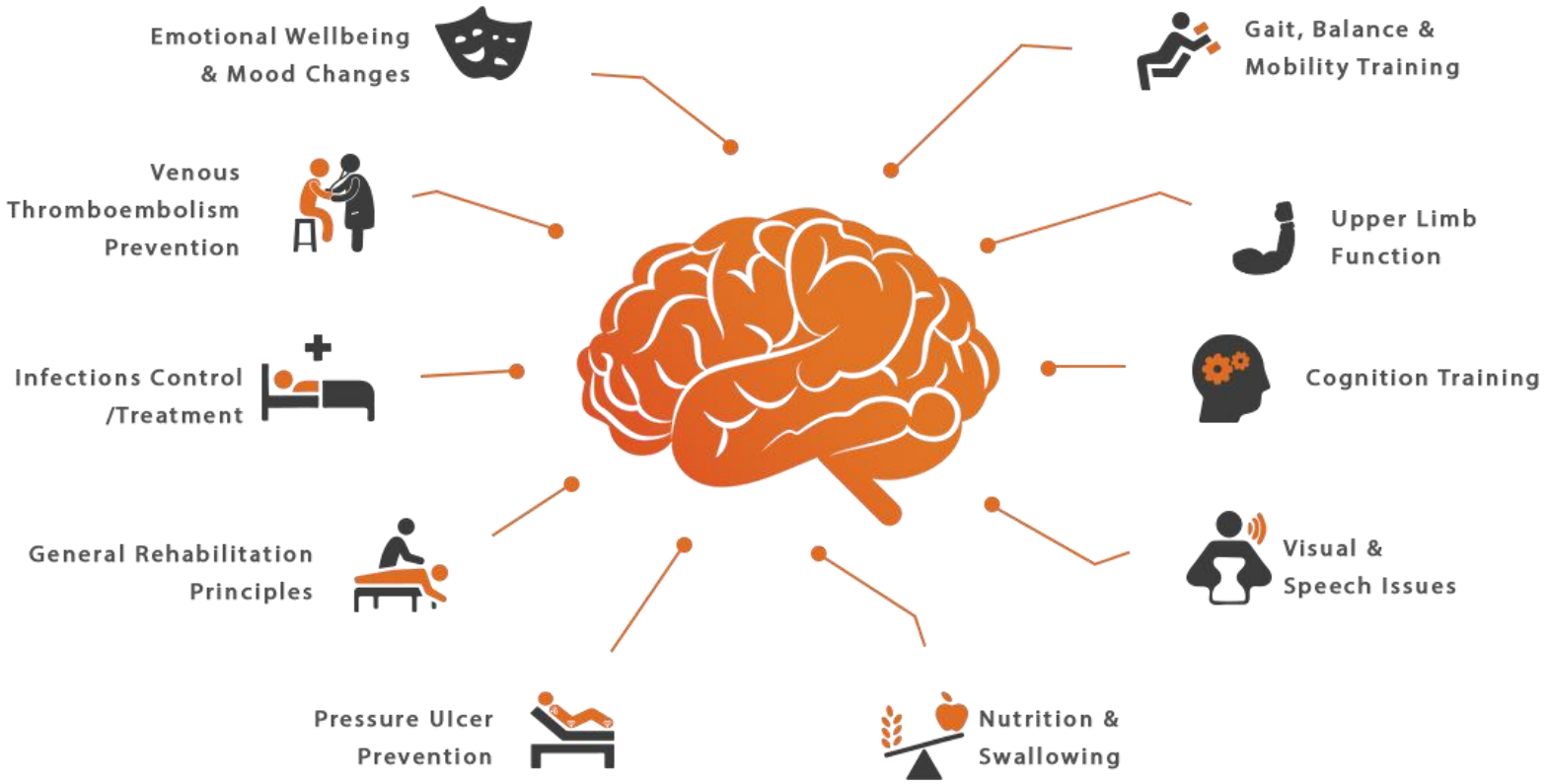
## Keynote

# Variability in Posture and Movement

- Emphasis on Quality not Quantity of Movement (Normal Movement Pattern)
- Emphasis on Optimal Alignment
- Variability in Practice
- Well-defined Rest Periods

- excite the motoneuron pool;
- commence rehabilitation early;
- perform rehabilitation regularly;
- decrease stress on joint structures;
- exercise under painless conditions;
- use low-load exercise.

# stroke rehabilitation



# somatosensory deficits after stroke

- Crossed anesthesia
- Proprioceptive Loss
- Pain and temperature deficit
- Numbness and hyperesthesia
- Loss of superficial touch and tactile
- Visual defect

# Neurological Complications

- Seizures or epilepsy
- Hydrocephalus
- Spasticity

**Psychological:**

- Depression
- Anxiety
- Emotional lability
- Aggressive behaviour

# Positioning

- The aim of positioning :
- promote optimal recovery and comfort by modulating muscle tone, providing appropriate sensory information, increasing spatial awareness, improved ability to interact with the environment and prevention of complications such as pressure sores, and contracture

# Task –Oriented Approach

- Assumption :
- Treatment principles:
- Client –Centered focused
- Occupational –based focus
- Person and environment
- Practice and feedback
- General treatment goals

# Guidelines for training

- **Music Therapy**
- **Mirror Therapy**
- **Constraint-Induced Movement Therapy**(CIMT)
- **Mental Practice**
- **Swiss Ball Exercises**
- **(**Comparison of Swiss Ball Exercises versus Conventional Therapy on Improving Trunk Control in Patients with Acute and Subacute Stroke.

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# Neural plasticity

refers to **the capacity of the nervous system to modify itself, functionally and structurally**, in response to experience and injury.

- Preventing **adaptive changes** in soft tissue
- Eliciting **voluntary** activation in key muscle groups
- ↑ muscle strength and coordination(functional task-specific training)
- ↑ walking velocity and endurance visual or auditory feedback
- Maximizing skill
- ↑ cardiovascular fitness
- Balance of body mass **during voluntary actions in sitting, standing and during body transport**
- Quick responses to **predicted and unpredicted** destabilization

# Gait & Mobility

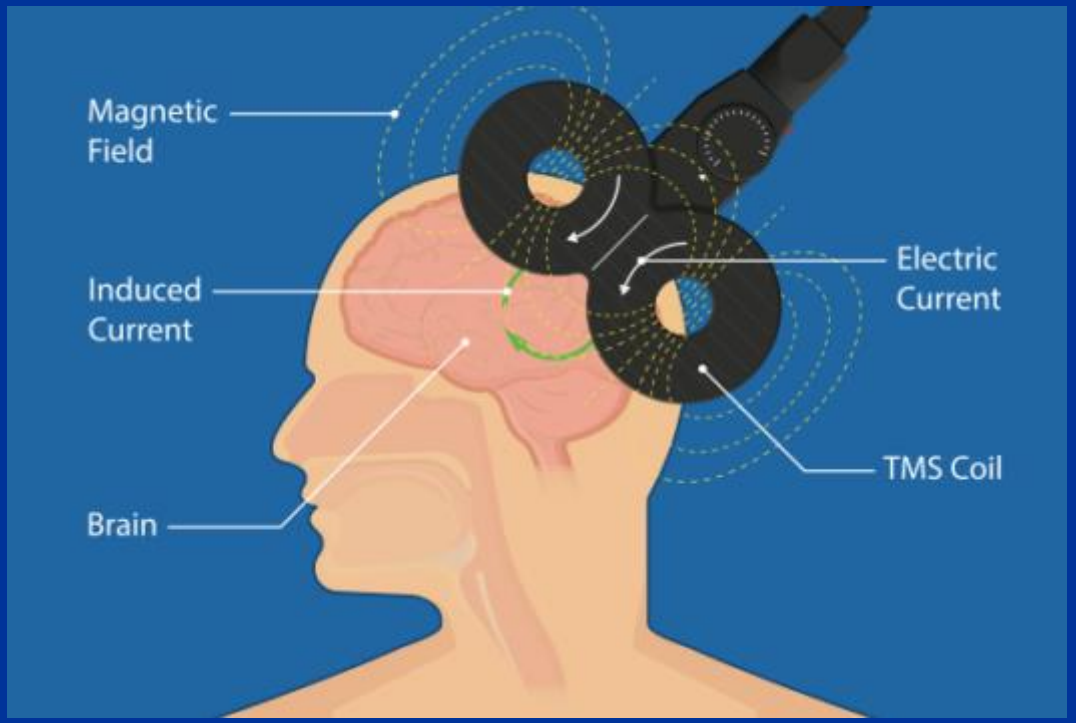
- Electromechanically Assisted Gait Training
- Biofeedback
- Cueing of Cadence
- Functional Electrical Stimulation
- Consider for an ankle-foot orthosis

# Stimulation

- Functional Electrical Stimulation (FES)
- Biofeedback
- Electro-Acupuncture
- Dry needling

# Kinesiotaping

# Magnetic Brain Stimulation



# Holistic view