



A POSTURE AND MOVEMENT SYSTEM : A NEUROPHYSIOLOGICAL MODEL FOR DEVELOPING ASSESSMENT AND TREATMENT SKILLS

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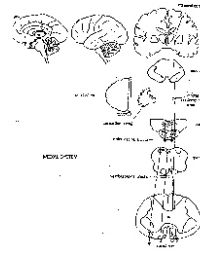
WHAT DOES A MODEL DO FOR ME?

Why have a model in organizing treatment for children or adults with cerebral palsy?

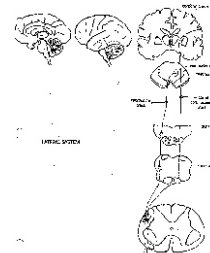


KUYPER'S MODEL

Medial System



Lateral System



Kuyper's Medial System

- Proximal or postural system
- Spinal cord organization
 - Ventro-medial group to axial muscles
 - More likely to extensors
- Inputs
 - Ventral corticospinal tract
 - Reticulo spinal tract
 - Vestibulo Spinal tract
 - Tectospinal Tract
- Bilateral nature

Functions of the Postural System

- Hold upright against gravity
- Protect joint integrity
- Preparatory set for movement
- Provide counter balance for center of mass



Basic Postural Characteristics

- Resistant to fatigue
- Slower contracting
- Produce Sustained low-level contraction
- Aerobic

Respond to:

- Lower Threshold Input
- Inhibited by antagonists Ia
- Inhibited by cutaneous afferents

Other characteristics

- Maintain stable "tonic" activation
- Input from spindles is critical "driver"
- Role alpha-gamma coactivation
- Little accommodation to steady input
- Tabary/Tardieu Research

Principles for Treatment

- Align muscle in shortened range
- Isometric contraction until fatigues
- Progress to eccentric work
- Do not allow collapse
- Limit concentric work
- Use lower threshold stimulation

Less Cognitive and Lower Threshold

- Less Instruction "Lift your Head" or "Sit up straight" ???
- Environment do not over-stimulate
- Lower threshold strategies
- Sweep tap versus Compression
- Options: Positioning, Equipment, Orthotics or Splinting, Taping

The No-No's

- Over-stretching
- Over-resisting
- Collapsing

CASE STUDIES

David

The Movement System

Theoretical Basis for Treatment

Kuypers Lateral System

- Limb or "movement" system
- Spinal cord organization
 - Dorso-lateral and to limbs
 - More likely to flexors and multi-joint muscles
- Inputs
 - Lateral cortico-spinal tract
 - Rubrospinal tract
 - Reticulospinal tract
- More unilateral

Functions of the Movement System

- Range and speed of motor acts
- Translate large segments in space
- Overcome inertia

Characteristics of Movements Produced

- Phasic Burst
- More End Range movements
- Ballistic movements
- Ramp Movement
- "Pre-programmed"

Neurophysiological Characteristics of FF Motor Unit

- Fatigues rapidly
- Quick contraction
- High tension
- Anaerobic
- Responds to polysynaptic inputs

Principles to Strengthen Movement System:

- Work through entire range start in lengthened position
- Use concentric work initially
- Alternate movement through ranges
- Use moving tactile input
- Go through wide excursions
- OK to do fast work
- Can not build control from extraneous movements
- Do Not overwhelm with resistance or load

- Think ballistic and ramped



Case Studies

Joseph



Children With Composite Impairments

Postural Control Where are key issues

Isometrics in shortened range sustained

Progress to eccentric

Limit concentric

Avoid collapsing and overlengthened work

Movement Issues Where are key issues

Concentric through full ranges in functional

activity

Inhibit use for stability

Use resistance but don't overcome muscles

Use alternating movements through range

Use moving tactile input

Big Picture Progression

Postural Work First

Movement Work

End Postural Work

Treatment Planning

Functional Outcomes

Postural Objectives and Movement Objectives

Impairment Related Objectives

Regulatory

Sensory

Mobility: Soft Tissue length

Strength

Control/Coordination

(Respiratory, CV, GI etc.)

Treatment Considerations

Preparation System/Impairment Facilitation/Inhibition

Posture/Movement Simulation Functional activities

Function/Participation

Motor Learning Function/Participation Home/School

Programs All dimensions