PRINCIPLES OF TYPICAL AND ATYPICAL MOTOR DEVELOPMENT

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CLINICAL CONSEQUENCES OF THE DEVELOPMENTAL CHANGES OF THE NERVOUS SYSTEM (1)

- A neurological examination should be age-specific

CLINICAL CONSEQUENCES OF THE DEVELOPMENTAL CHANGES OF THE NERVOUS SYSTEM (3)

Consequences for expression of dysfunction

Neurological dysfunction
- adulthood: localized, specific signs
- early infancy: generalized, diffuse dysfunction

CLINICAL CONSEQUENCES OF THE DEVELOPMENTAL CHANGES OF THE NERVOUS SYSTEM (2)

Consequences for prognosis:
- Neurological dysfunction at early age may disappear → normalization
- Infant with a normal neurological function may grow into dysfunction

Neurodevelopmental processes during human ontogeny

(De Graaf-Peters & Hadders-Algra, Early Hum Dev 2006; 82: 257-66)

- Reliable diagnosis CP
MOTOR DEVELOPMENT

NATURE OR NURTURE? 

THE NATURE – NURTURE DEBATE

Neuronal Group Selection Theory

Dynamic Systems Theory

Nature

Nurture

NATURE AND NURTURE

PRIMAR Y VARIABILITY

SECONDARY OR ADAPTIVE VARIABILITY
 Movements of head, trunk, arms and legs  
- Typical GMs characterized by movement complexity and variation which may be regarded as two forms of variation  
- Present from fetal week 9-10 until about 4 months post-term → coinciding with presence of cortical subplate

**SECONDARY VARIABILITY**

- Sucking Prior to term age  
- Postural adjustments 4 to 10 months  
- Reaching 6 to 10 months  
- Fine manipulation 12 to 18 months  
- Heel-strike during locomotion 12 to 18 months

**QUALITY OF SPONTANEOUS MOTOR BEHAVIOUR**

**PRINCIPLES OF NGST (Neuronal Group Selection Theory, Edelman)**

**TYPICAL MOTOR DEVELOPMENT:**

- **primary variability:** presence of rich repertoire, variations not adapted to specifics of condition  
- **secondary variability:** best strategy can be selected from varied repertoire → adaptation
REDUCED VARIATION

MOTOR DEVELOPMENT IN CASE OF EARLY LESION OF THE BRAIN

- Reduced motor repertoire

Normal Fidgety GM at 3 months

Definitely abnormal GM at 3 months

MOTOR DEVELOPMENT IN CASE OF EARLY LESION OF THE BRAIN

- Reduced motor repertoire
- Best motor solutions may differ from those of typically developing child

REDUCED VARIATION AND IMPAIRED SELECTION
MOTOR DEVELOPMENT IN CASE OF EARLY LESION OF THE BRAIN

- Reduced motor repertoire
- Best motor solutions may differ from those of typically developing child
- Dysfunctional processing of sensory information ➔ impaired selection ➔ need of increased amounts of 'trial-and-error' experiences

MORE INFORMATION?
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