Assessment
Upper Motor Neuron Syndrome

- one practical example -
Patient after stroke with a lesion in one hemisphere

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Content

- **History:**
  - Meeting Croatia 2018:
    - Discussion about Patient demonstration -
      - How many and which test on Activity - Level
    - Patient demo: Assessment and Therapeutical Approach with the Upper Motor Neuron Syndrome
      - Feedback: to much information only Assessment
- **Upper Motor Neuron Syndrome** (Level 2/3/)
  - short introduction
  - Assessment
- **One Practical Example**
  - Patient Demo: Assessment and Clinical Reasoning

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Upper Motor Neuron Syndrome

- Upper motor neuron damage following conditions such as stroke, traumatic brain injury, spinal cord injury and multiple sclerosis often results in problems of **weakness**, **postural instability** and **spasticity** that impair *function* and, *restrict mobility* and limit *weight-bearing* activity. (Newman & Barker 2012)
- Characteristics of the UMNS include the presence of positive and negative sign

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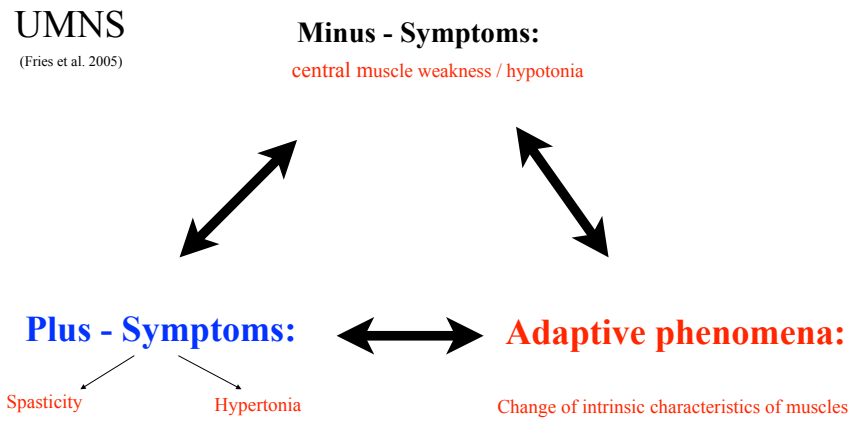
UMNS
(Fries et al. 2005)



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Assessment of UMNS

Minus - Symptoms

Assessment: Analysis of limited activity

the more selective movement is possible the less is the paresis / minus symptomatic

- **Lower Extremity: :Ankle dorsal flexion with holding the knee in extension - stepping backwards - standing on the tip toes**
- **Trunk/Hip: scooting in free sitting without arm support (crossed arms)**
- **Upper Extremity: reaching forward / upwards / clapping overhead**

Assessment of UMNS

Minus - Symptoms

Muscle weakness/hypotonia:	**Assessment / Test**
- Trunk (Core) muscles	Observation
- Hip: m gluteus max. / min.	- Mal alignment
- Ankle. plantar flex and pron.	- Picture
- Dorsi flex and pronators	- Movement analysis
- Toes extensors	- Video
- M. serratus ant. / lower part of Trap.	Scores/Test:
- GHJ: Flex Abd /ADD / AR	
- Elbow ext. and wrist / finger ext	
Loss of dexterity	selective finger movement / toes movement / mimic
Fatiguability	Repetition
- Decreased rate of force development	Hand held dynamometer
- Decreased rate of de-contraction speed	Time to relax

UMNS

(Fries et al. 2005)

Minus - Symptoms:

central muscle weakness / hypotonia

- Loss of dexterity
- Fatiguability
- Decreased rate of force development
- Decreased rate of de contraction speed

Plus - Symptoms: ⟷ **Adaptive phenomena:**

Spasticity — Hypertonia

Change of intrinsic characteristics of muscles

- Conversion of muscle fibers from PMF to TMF
- Change of viscoelasticity
- Loss of sarcomas
- shortening of the muscle - tendon junction
- change of elasticity in the muscle facia

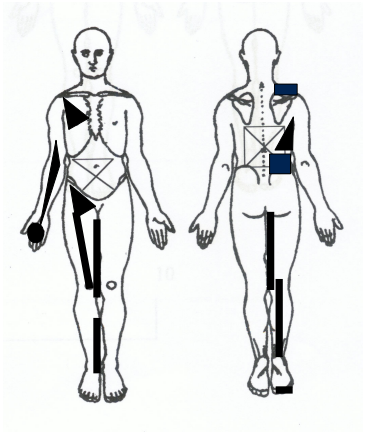
Neural Structure

Non-Neural Structure

Assessment of UMNS

Plus - Symptoms

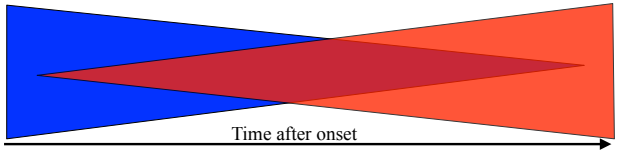
hyper tonic muscle:	**Assessment / Test**
- upper trapezius	Observation
- GHJ: Add. and IR.	- Mal alignment
- Elbow - and forearm flex.	- Picture
- Hip: m. iliopsoas	- Movement analysis
- m.rectus fem.	- Video
- Add.	Scores/Test: MAS
- Ankle. plantar flex and sup.	
- Toes flex.	



Assessment of UMNS

Assessment: differentiation between plus symptoms and adaptive phenomena

Test: MAS = the more resistance against passive movement the more non - neural structures involved



Plus - Symptoms:
- **Associated Reaction**
- **MAS 1-2**
- **hypertonia/spasticity**

Adaptive phenomena:
- **pathological pattern does not change**
- **MAS 3 - 4 + ROM limitation**

UMNS

(Fries et al. 2005)

Minus - Symptoms:

central muscle weakness / hypotonia

- Loss of dexterity
- Fatiguability
- Decreased rate of force development
- Decreased rate of de contraction speed

Plus - Symptoms: ⟷ **Adaptive phenomena:**

Spasticity
- Clonus /Hyper reflex
- catch and release
- flexor withdraw reflex

I: afferent System released spinal reflexes

Hypertonia
- stereotypical movement pattern
- Co-Contraction
- Associated Reaction

I.: efferent: modified supra-spinal output

Change of intrinsic characteristics of muscles
- Conversion of muscle fibers
- Change of viscoelasticity
- Loss of sarcomas
- shortening of the muscle - tendon junction
- change of elasticity in the muscle facia

Neural Structure

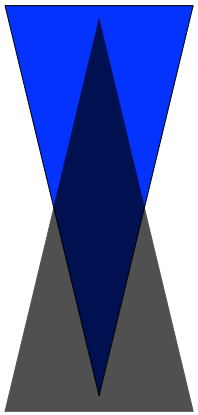
Non-Neural Structure

Plus Symptoms: hypertonicity v.s. spasticity

ICF - Body Structure Level: - hierarchically structure of the CNS

hypertonia

NP.: Imbalance Theory



Hemisphere

Brainstem

Spinal Cord

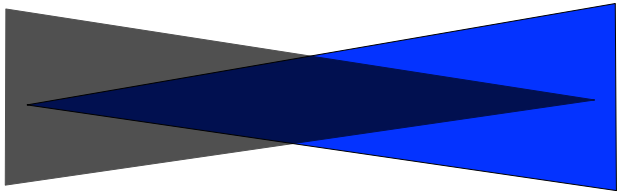
spasticity

NP.: SproutingTheory

- The incidence of spasticity ranges from 19 to 39% with stroke patient. (Moura et al. 2009)
- in 65 -78 % of patient after spinal cord lesion (one year after the incident) spasticity is present (Adams et al. 2005)

Plus Symptoms:

Assessment: differentiation between spasticity and hypertonia



spasticity:
- **MAS 1 / 1+**
- **Hyper reflex , Clonus**
- **catch and release**
- **over sensitive / withdrawal reflex**

hypertonia
- **MAS 2**
- **Associated Reaction**
- **Co-contration**
- **Mass movement**

Clinical Reasoning

Patient demonstration:

- **Diagnosis** — Probability of Impairments; Exclusions of Impairments
- **Anamnesis** — subjective complaints, case history, signs and symptoms, clinical patterns
- **Limitations on activity level**
  - Analysis of the limited activities
  - Test: T.U.G , Functional Reaching Test , 10 m Walking Test , TCT,….
- **Tests on body function/structure level for Differentiation**
  - Specific tests for body function:
  - Modified Ashworth Scala, Test for sensory, Test for perception disorder, Pain…
  - Specific tests for body structures: pROM

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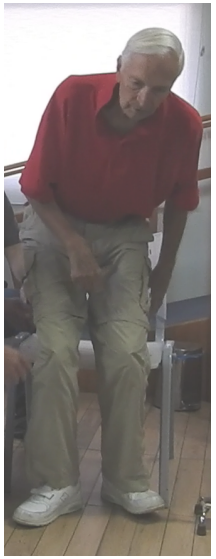
Diagnosis: stroke left with hemi right; onset 2,5 y P: walking without a stick…

A: Sit to Stand Stance phase



STANCE 60%					SWING 40%		
Weight Acceptance		Single Limb Support		Limb Advancement			
Initial contact	Loading Response	Mid-Stance	Terminal Stance	Pre-Swing	Initial Swing	Mid-Swing	Terminal Swing
Deviation	Deviation	Deviation Hip: Flex/ Add Knee: hyper ext.	Deviation Hip: Flex/ Add Knee: hyper ext.	Deviation	Deviation	Deviation	Deviation
Impairment	Impairment	Impairment	Impairment	Impairment	Impairment	Impairment	Impairment
		- hip abd / er + M. ilio psoas + M. gastronomic					
Double Limb Support		Single Limb Support		Double Limb Support	Single Limb Support		

Diagnosis: stroke left with hemi right; onset 2,5 y P: walking without a stick…

A: Sit to Stand Stance phase

Associated Reaction

flatfoot

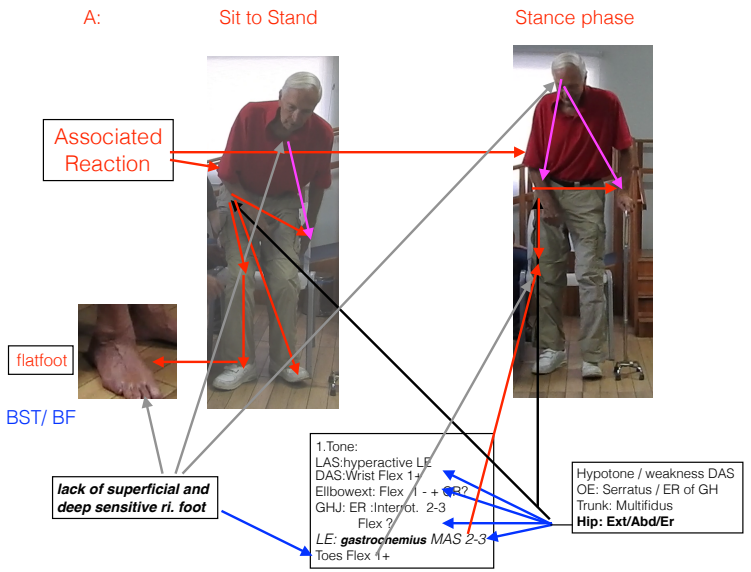
BST/ BF

Superficial and Deep sensation foot right

1.Tone:
LAS:hyperactive LE
DAS:Wrist Flex 1+
Ellbowext: Flex 1 - + CR?
GHJ: ER :Interrot. 2-3
Flex ?
LE: ***gastrocnemius MAS 2-3***
Toes Flex 1

Hypotone / weakness DAS
OE: Serratus / ER of GH
Trunk: Multifidus
Hip: Ext/Abd/Er

Diagnosis: stroke left with hemi right; onset 2,5 y P: walking without a stick…



Take Home Message

- The main feature of the UMNS is the minus symptom
- Differentiation between spasticity, hypertonia and adaptive phenomena
- Specific hemiplegia: Overactivity of the less affected side !
- Sensitive - and Perzeption disorder can increase the muscle tone