Movement disorders and gait disturbances

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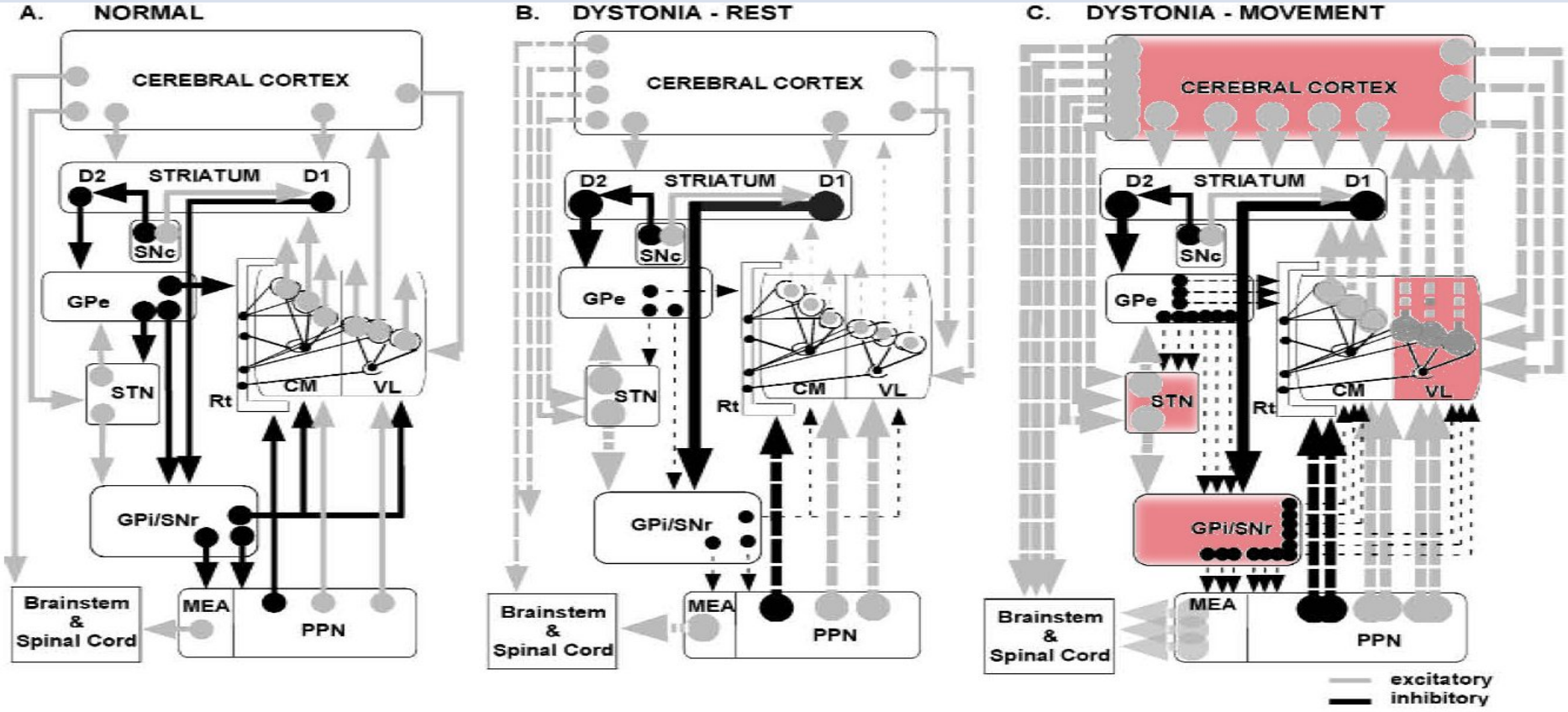
Pécs

MD pathophysiology

- Genetic mutation or environmental injury of basal ganglia functioning
- Pallidum, thalamus, subthalamic nucleus, caudate nucleus, pedunculopintine nucleus



Vitek JL. Mov Disord 2002;17(Supp 3):S49-62

Phenomenology in MD

Hyperkinetic

- Tremor (regular)
- Chorea
- Ballism
- Dystonia
- Athetosis
- Myoclonus (jerky)
- Tic (jerky)

Isokinetic

- Ataxia

Hypokinetic

- Rigidity
- Bradykinesia
- Hypokinesia

Hyperkinetic movements

Tremor classification

More or less regular, sinusoid movements

Any body parts can be affected (e.g. limbs, neck, trunc, vocal cords)

Classification:

- Intensity (invisible, barely visible, moderate, severe)
- Frequency (slow or fast)
- Position
  - Rest tremor (e.g. Parkinsonism)
  - Postural tremor (e.g. hyperthyroidism)
  - Kinetic tremor (e.g. essential tremor)
  - Intention tremor (e.g. cerebellar tremor)

Rest tremor

Cognition (e.g. counting), gait or talking about the disease[6] usually increases the amplitude

Intention tremor

The tremor amplitude is the highest at the target. Usually caused by cerebellar problems.

Postural –kinetic tremor

Postural –kinetic tremor

Essential tremor is the most frequent cause of kinetic tremor.

Postural –kinetic tremor

Always examine water drinking, writing and tableware use -- QoL

Deep brain stimulation for tremor

Chorea

The word chorea denotes rapid irregular muscle jerks that occur involuntarily and unpredictably in different parts of the body. Most important cause is Parkinson's disease

Ballism

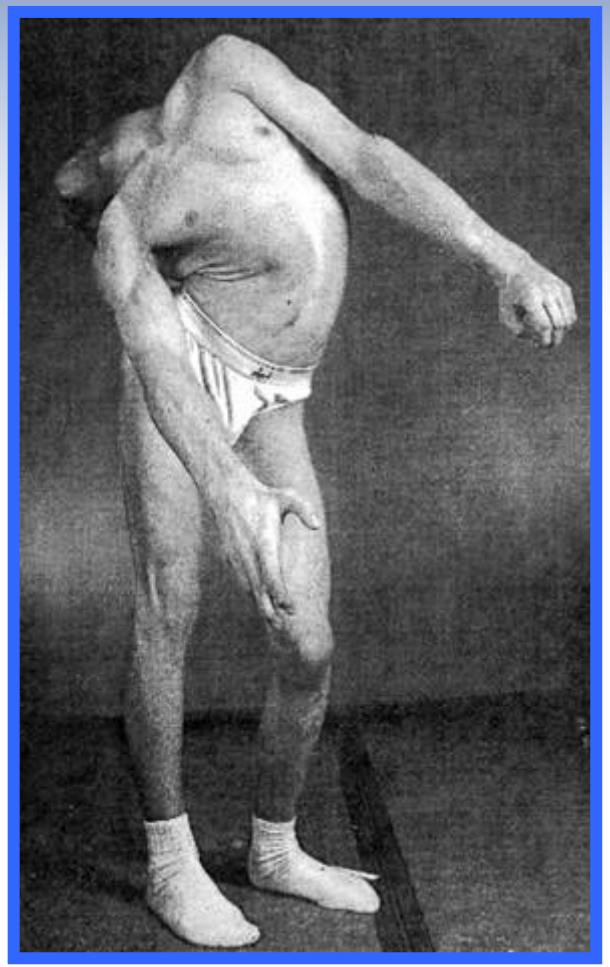
Large involuntary movements involving the whole extremity. Usually accompanies the chorea. Vascular lesion e.g. in the area of subthalamic nucleus can produce

Athetosis

abnormal movements that are slow, sinuous, and writhing in character.

Dystonia

- Not a disease, it is a syndrome
- Involuntary phasic, movement and/or
- Sustained, involuntary, abnormal muscle contractions.



Jankovic et al. Treatment of dystonia. Lancet Neurol, 2006:864-872

Classification of dystonia

Basically four different classifications

- Etiology: primary vs. secondary
- Age at the disease onset (childhood or adult)
- Topography according the the affected sites of the bode
- Type of symptoms (fix vs. Mobile)

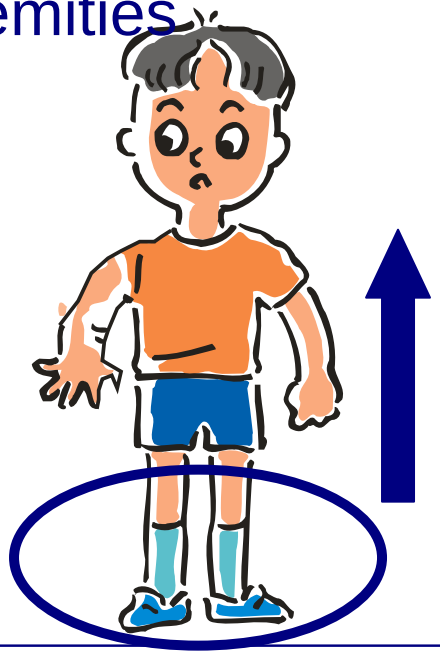
Geyer et al. The diagnosis of dystonia. Lancet Neurol, 2006:780-790

Albanese et al. A systematic review on the diagnosis and treatment of primary (idiopathic) dystonia and dystonia plus syndromes: report of an EFNS/MDS-ES Task Force. Eur J Neurol. 2006:433-444

Classification according to age

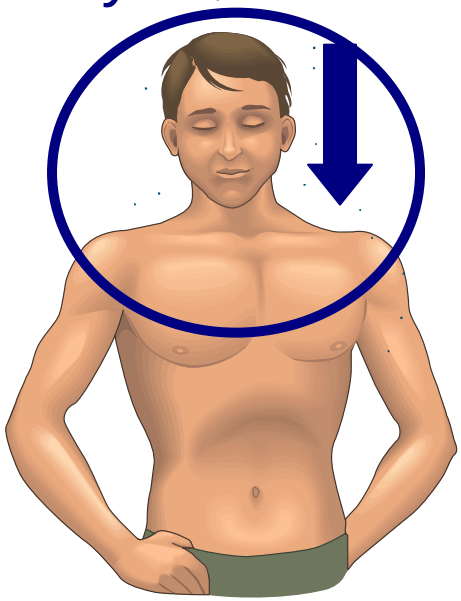
Early-onset dystonia

- <20 years
- Usually generalized
- Begins on the lower extremities



Adult-onset dystonia

- >20 years
- Usually focal or segmental
- Face, neck or upper extremity



Geyer et al. Lancet Neurol, 2006:780-790 és Albanese et al. Eur J Neurol. 2006:433-444

Etiological classification

Primary distonia

- There is no other underlying cause
- Brain MRI is normal
- Conventional lab studies are also normal

Secondary dystonia

- Other disorder evokes the dystonia
- Usually other abnormal neurological signs can be detected (except for tardive dyskinesia)

Geyer et al. Lancet Neurol, 2006:780-790 és Albanese et al. Eur J Neurol. 2006:433-444

Topographic classification

- Generalized
- Segmental
- Focal
- Hemidystonia

Geyer et al. Lancet Neurol, 2006:780-790 és Albanese et al. Eur J Neurol. 2006:433-444

Phenomenological classification

Fix dystonia

- Observable in rest
- Sceletomuscular deformity

Mobile dystonia

- kinetic > rest
- EMG: burst activity

Geyer et al. Lancet Neurol, 2006:780-790 és Albanese et al. Eur J Neurol. 2006:433-444

Torticollis

- A form of cervical dystonia, sternocleidomastoid muscle

Musician hand

- Look at the index finger! Occurs only at playing an instrument

Orofacialis disztónia

- Blepharospasm: contractions of orbicular muscles
- Oromandibular dyskinesia: chomping movements
- Meige syndrome: a combination of the above two dystonias

Deep brain stimulation

- After the age of 7 years can be used for treatment
- Early operation is needed to avoid sociological isolation and orthopedic complications

Kovács et al. Gyermekorvos Továbbképzés (megjelenés alatt)

Status dystonicus (dystonic storm)

Mariotti, Fasano et al. Mov Disord 2007;22(7):963-968
Balás, Kovács, Hollódy. Mov Disord 2006;21(1):82-85

Tardive dyskinesia and dystonia

Tics

sudden, recurrent, quick, coordinated abnormal movements that can usually be imitated without difficulty. Can be simple or complex, motoric or vocal tics.

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Myoclonus (positive)

Sudden jerky movements, rapid and short. Hypoxia, dementia, Creutzfeldt-Jacob disease

Myoclonus (negative)

Also called „flapping tremor” or asterixis. Suddenly muscle tone disappears for a second.Associated with liver failure (alcoholic or other etiologies)

Isokinetic movements

Ataxia

Hypokinetic movements

Freezing, bradykinesia, en bloc turning, festination

Almost normal tapping

Hypo- and bradykinesia

Deep brain stimulation for PD

Born: 1950

PD: 1981

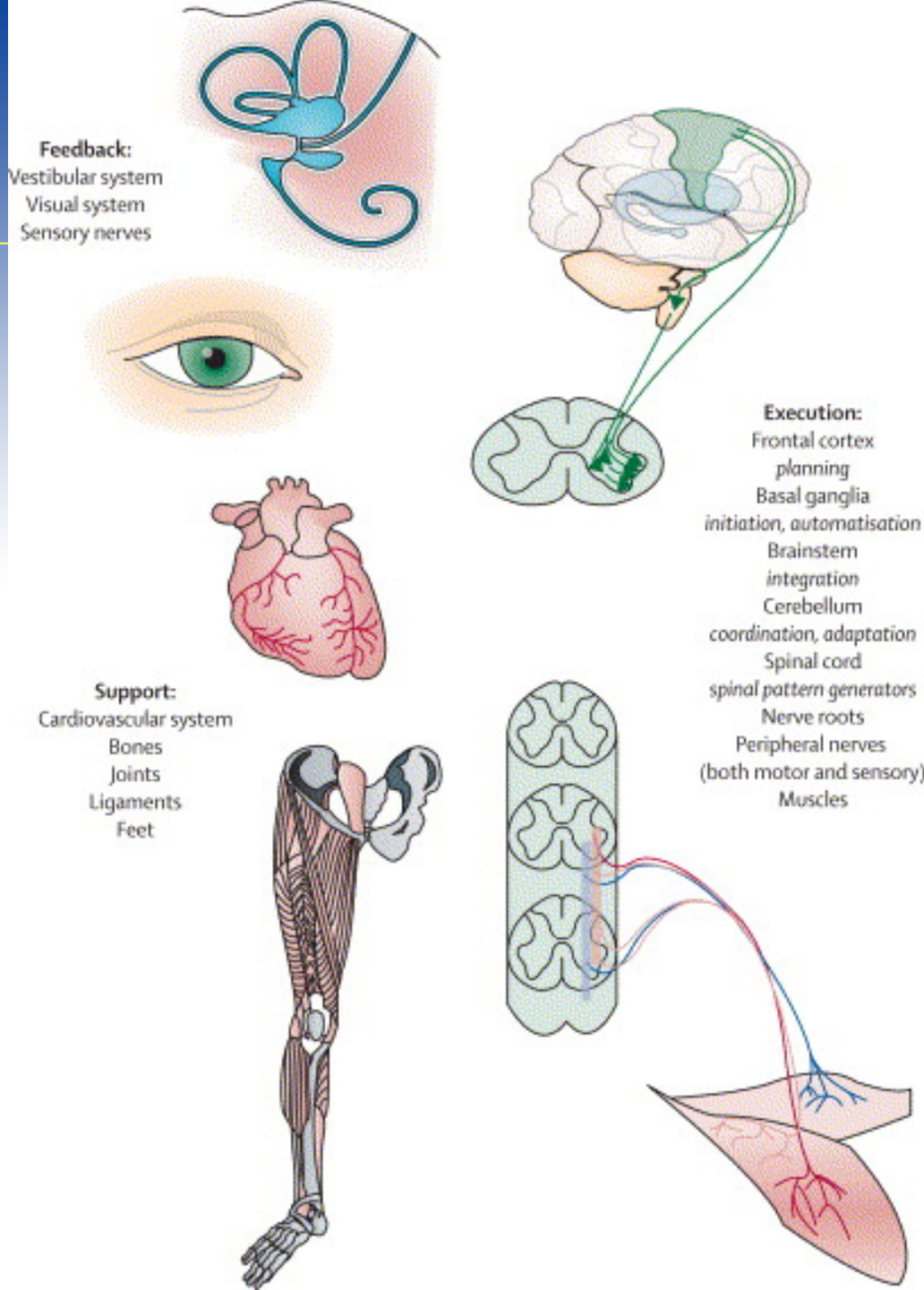
STN DBS: February, 2006

Postop Fatigue, August, 2006

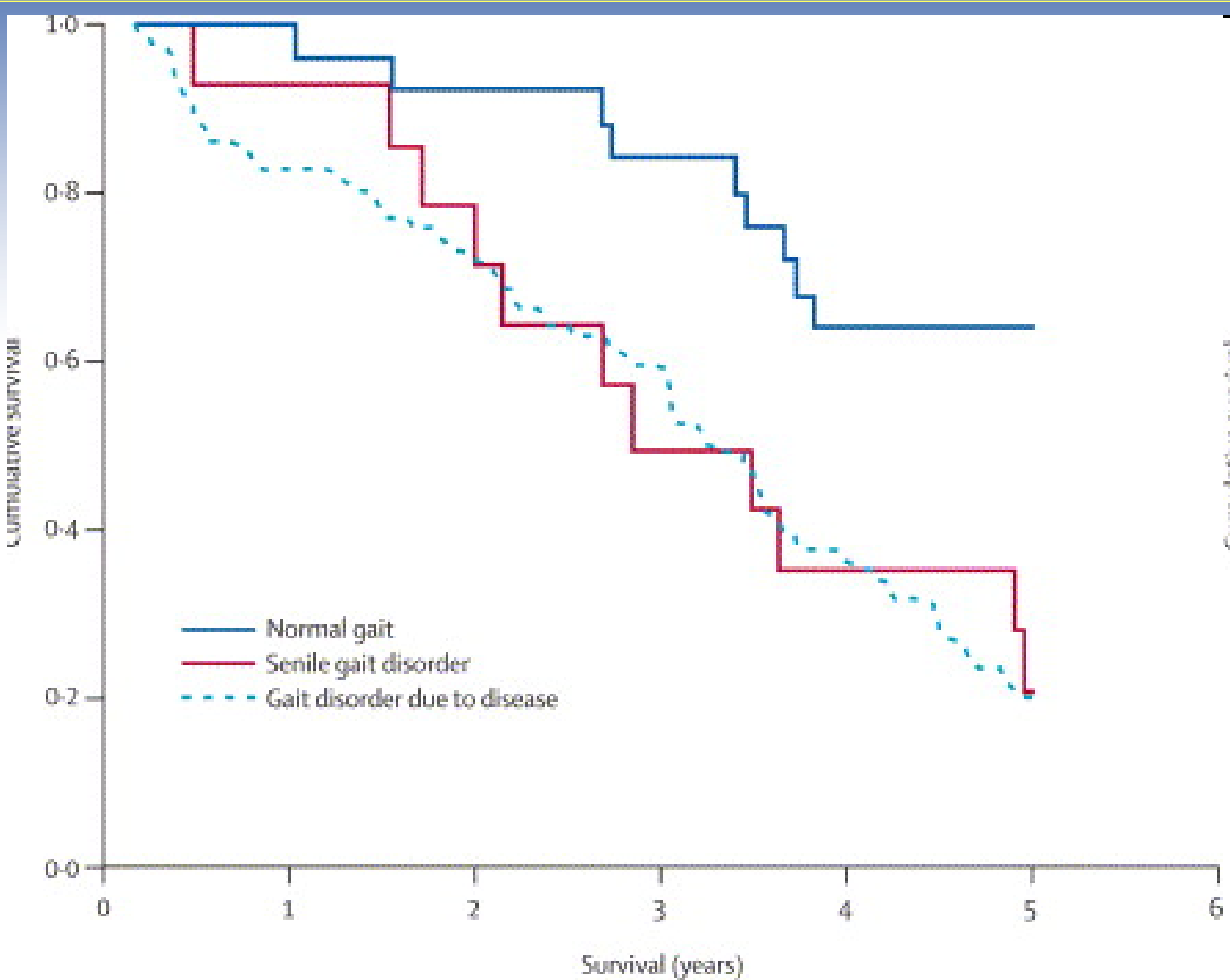
Gait disturbances

Importance of gait

- The integrity of several systems are needed for normal gait
- Abnormal gait usually suggest neurological disease, especially dementia or movement disorders



Importance of gait



Analyzing the gait

Testing the gait

- Stand up
- Postural instability: the pull test
- Gait across the room
- Heel walking (ankles are dorsiflexed)
- Toe walking
- Tandem gait

Stand up test - normal

- The arms are crossed and the patient is asked to stand up without any help or touching the arm of the chair

Stand up test - falling back

The patient falls back, but recovers without help

Stand up – only with help

Analyzing the gait

Testing the gait

- Stand up
- Postural instability: the pull test
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- Toe walking
- Tandem gait

Pull test --- normal

Compensation, maximum one step backward is normal

Pull test --- abnormal

Abnormal pull test, but there is some form of compensation

Pull test --- unable to stop

Pull test --- falling

Abnormal pull test, without help the patient would fall

Analyzing the gait

Testing the gait

- Stand up
- Postural instability: the pull test
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Gait disturbances

	Elements of the clinically based diagnostic work-up		
	Main features of gait	Specific gait or balance test*	Associated symptoms and signs
Antalgic gait	Reduced stance phase on affected limb Limping		Pain Limited range of movements
Paretic/hypotonic gait	High steppage Dropping foot Waddling	Trendelenburg's sign	Lower motor neuron features (eg, weakness, atrophy, low to absent tendon reflexes)†
Spastic gait	Circumduction Intermittent abduction of ipsilateral arm with each step Foot dragging: audible "scuffing toe" Scissoring; bilateral circumduction		Pyramidal syndrome Anterior-medial side of the shoe sole worn out
Vestibular gait	Deviation to one side	Aggravated by eye closure Positive Unterberger test	Vestibular features (eg, nystagmus, abnormal tilting test)
Sensory ataxic gait	Staggering, wide based	Aggravated by eye closure	Disturbed proprioception
Cerebellar ataxic gait	Staggering, wide based	Not aggravated by eye closure	Cerebellar ataxia (eg, dysarthria, hypermetria, nystagmus)
Dyskinetic gait	Extra movements that affect gait	Can be task-specific (eg, dystonic gait)	Features of dystonia, chorea, myoclonus or tics
Hypokinetic-rigid gait	Shuffling (slow speed, short stride, rigidity, reduced step height) Hesitation and freezing	Improves with external cues Aggravation by secondary task	Hypokinetic-rigid features (eg, bradykinesia, resting tremor)
Cautious gait	"Walking on ice"; slow, wide base, short steps Striking improvement with external support		Postural instability (mild to moderate) Excessive fear of falling
Higher level gait disorder	Severe balance impairment (no rescue reactions with the pull test; "falling like a log") Inadequate synergies Inappropriate or bizarre foot placement Crossing of the legs Leaning into wrong direction when turning or standing Variable performance (influenced by environment and emotion) Hesitation and freezing (ignition failure)	Abnormal interaction with environment (eg, trouble adapting with walking aids; no benefit from cues) Sometimes better able to perform cycling leg movements while recumbent (gait "apraxia")	Frontal release signs Executive dysfunction Depression Frequent falls

Normal gait

Rhythmic, the arm movements (synkinesis) are symmetric, turning is fast without unneeded steps

Antalgic gait

Antalgic gait is a response to pain—favoring one leg by putting as little weight as possible on it.

Reduced stance phase on the affected side

Paretic gait

Peripheral (not spastic) paresis. Waddling of the hip.
Trendelenburg's sign.

Ataxic gait

This is a wide-based, irregular, staggering, or reeling gait, as if drunk. Two subtypes: sensory and cerebellar ataxic gait.

Opsoclonus

Rapid, involuntary, multivectorial (horizontal and vertical), unpredictable, conjugate fast eye movements

Parkinsonian gait

Narrow-based, slow gait. Reduced synkinesia. Bended posture. Turning in several steps.

Apraxic gait disorder

Apraxia consists of an inability to execute a learned motor program. Gait apraxia is loss of the ability to walk and results from diffuse cerebral damage—more

specifically, damage to the frontal lobe—despite normal strength and coordination. The gait is similar to a parkinsonian gait, but if severe the patient will simply stand,

partially upright, unable to “remember” how to go about walking, the feet seeming to be “glued to the floor.” Alternatively, the patient will lift and lower the feet without

advancing, as if drawn to the floor by magnetic force.

Apraxic gait disorder

Dysbasia

With help- striking improvement in the quality of gait.

Belly Dancer Syndrome

What is the etiology?