Abnormal movements

- **Tremor:** Involuntary rhythmic oscillations of the whole or part of the body around a point of balance
- **Myoclonus:** short, involuntary muscle contractions, with movement of a muscle segment, an entire muscle or a group of muscles.
- **Dystonia:** prolonged muscle contraction, or abnormal posture.
- **Athetosis and pseudo-athetosis:** slow, irregular, incessant movement, but mostly respiratory and distal.
- **Tic:** involuntary, sudden onset, brief, often explosive, stereotyped movement or vocalization in the same patient, with no apparent purpose, felt to be irrepressible but which can be suppressed for a variable time by the will.
- **Ballism:** sudden and rapid involuntary movement, characterised by its very large amplitude, rotatory, and the fact that it usually involves a whole hemicorpus.
- **Chorea and dyskinesia:** sudden, brief involuntary movements, highly variable in their distribution, frequency and intensity.

Cerebellar syndrome

- **Balance and gait disorders: Cerebellar ataxia**
  - **Widening of the sustentation polygon.** Feet together, oscillations in all directions, not or slightly aggravated by occlusion of the eyes: “dance of the tendons ”.
  - **Staggering gait** (reminiscent of a drunken man or a small child taking its first steps).

- **Disturbances in the execution of rapid voluntary movement**
  - Dysmetria (Hypo-/hypermetria)
  - Dyschronometria
  - Adiadochokinesia (Dysdiadochokinesia)
  - Asynergia
  - Action or intentional Tremor

- **Hypotonia**
  - Stewart-Holmes maneuver
  - Pendulous knee jerks (osteotendinous reflexes)

- **Speech disorders: Cerebellar dysarthria** with an explosive voice

- **Nystagmus**

Dementia Syndrome

- **Memory** impairment/loss
- Temporo-spatial **disorientation**
- Disorder of **instrumental functions:**
  - **Aphasia:** language disorder
  - **Apraxia:** motor control/performance disorder
  - **Agnosia:** recognition disorder
- **Impaired judgement or reasoning**
- **Loss of social autonomy**

Confusional syndrome

- Temporo-spatial **disorientation**
- Disturbance of **vigilance**
- Disturbance of **attention**
- Visual/auditory **hallucinations**
- **Reversed nycthemeral rhythm**
- **Agitation**
- **Impaired judgment or reasoning**

Frontal syndrome

- **Disinhibition (familiarity), aggressiveness, irritability, apathy**
- **Imitation**
- **Perseveration**
- **Collectionism**
- **Grasping**
- **Impaired judgement/reasoning**
- **Attention deficit**

Neurological gait disorders

Spastic gait in the hemiplegic/paraparetic (damage to the pyramidal fascicle): lower limb in extension describing a more or less obvious arc of a circle with each step, with rubbing of the tip of the foot (outer edge)

Parkinsonian/extrapyramidal small step gait: difficulty in initiating walking (called "Freezing") with stomping on the spot. Slow, small-stepped, shuffling gait with anteflexed trunk and decreased automatic swing of one or both upper limbs.

Lacunar gait: slow, small-step gait but retention of the sway of the upper limbs and associated neurological signs (pyramidal, pseudo-bulbar syndrome).

Frontal gait: may also involve small steps, feet glued to the ground but apraxia of walking (impression that the patient can no longer walk). This is known as astasia-abasia (inability to stand and to walk, despite no motor dysfunction), with frequent retropulsions.

Steppant/steppage gait: Unilateral or bilateral, it is characteristic with a knee raised too high at each step with the leg thrown forward to allow the foot to fall flat on the ground and avoid the tip of the foot catching on the ground. It results from a deficit in the levator muscles of one or both feet. Usually **fibular nerve** damage (unilateral) or **polyneuropathic** damage (bilateral).

Myopathic /waddling ("ducking") gait: tilting of the pelvis to one side and back with each step, due to *proximal deficit of the gluteus medius muscles.*

Ataxic gaits

- **Cerebellar:** *widening of the sustentation polygon, instability, lurching* (dance of the tendons with joined feet, oscillations, negative Romberg).
- **Vestibular:** *instability*, lateralized gait *deviation* (peripheral involvement) or not (central involvement) associated with a *positive Romberg* and deviation of the index fingers (Fukuda's star pattern and on the spot gait).
- **Proprioceptive:** damage to proprioceptive pathways with so-called *slapping gait* due to loss of *deep sensitivity* (poor perception of the body in space and therefore appreciation of distances from the ground). *No tendon dance, but the Romberg maneuver is positive in all directions*.
- Frontal (see above)

Other types of gait:

- **Dystonic** gait: gait with abnormal posture of a lower limb segment
- **Functional gait:** bizarre gait, not resembling anything systematisable. Variable phenomenologically and in their intensity. Sudden onset sometimes remission. Sometimes a physical and/or psychological traumatic context is found.

Meningeal Syndrome

- **Headache**
- **Photo/phonophobia**
- **Nuchal rigidity**
- **Nausea/vomiting**
- **Brudzinski's sign:** when attempting to anteflect the head, there is involuntary flexion of the lower limbs
- **Kernig's sign:** bending of the lower limbs over the pelvis, resulting in bending of the knees

Myasthenic Syndrome

- **Muscular fatigability**
- **Ptosis** (drooping of the upper eyelid), asymmetric, possibly alternating (right then left), with typically the compensatory eyebrow sign (hypercontraction of the frontal muscle)
- **Diplopia** (double vision)/**ophthalmoplegia**
- Pupillary motility is always respected
- **Nasal voice** (at the end of a conversation)
- **Swallowing disorder** (at the end of meals), sometimes false food routes (risk of inhalation pneumopathy) or food reflux through the nose
- **Deficient chewing** (at the end of the meal)
- **Normal osteotendinous reflexes**

Peripheral Neurogenic Syndrome

Symptoms:

- **Motor:** weakness, motor deficit

- **Sensory:**
  - Pain (electric shocks, burning, cramps at rest)
  - Paresthesia/**dysesthesia** (tingling, pins and needles)
  - Anesthesia or **hypoesthesia**

Clinical signs:

1. Motor deficit (rather distal) with

- **Hypotonia**
- **Amyotrophy** (advanced stage)
- **Fasciculations**
- **Abolition or reduction of osteotendinous reflexes**

2. Sensory deficit

- Superficial sensory deficit: **thermo-algesic** sensory (cold, hot, prick) and touch sensory
- Deep sensory deficit: kinesthesic disorders (altered perception of the position of the big toe), hypopallesthesia (decrease of the perception of tuning fork vibrations)

6. Trophic disorders and vegetative signs

- **Skin involvement:** dry, thinned, depilated skin, vasomotor disorders, even plantar perforating pain
- **Tendon retractions, hollow feet, rarely arthropathy**
- Signs of **dysautonomia:**
  - Orthostatic arterial hypotension
  - Impotence
  - Vesico-sphincter troubles

Parkinsonian Syndrome

Association of akinesia (mandatory) **+ plastic rigidity/hypertonia and/or rest tremor**

Akinesia = **Bradykinesia** (slowness and sparseness of movement) and/or hypokinesia (reduced range of motion)

Symptoms/Signs:

- **Decreased gestural expression**
- **Rare blinking**
- Decreased facial expression with no facial expression (**hypomimia**)
- **Decreased sway** of upper limbs when walking
- **Slow walking, small steps**
- **Freezing of gait**
- Monotone voice (**hypophonic dysarthria**)
- **Hypersalivation** (slow swallowing)
- **Micrographia** (small writing)

Rigidity/hypertonia:

- So-called extrapyramidal (different from pyramidal/spastic)
- **"Plastic" in appearance:**
  - Constant resistance during passive extension of a limb
  - Giving way by successive jerks (**cogwheel phenomenon**)
  - Fixing the limb in each new position (**so-called "lead pipe" rigidity**)
- Accentuated during the execution of a voluntary movement by the contralateral limb and/or mental calculation (Froment's maneuver)
- Condition predominantly affecting the flexor muscles and resulting in a general flexion attitude

Resting tremor:

- Low amplitude (distal)
- Frequency 4-7 Hz
- Affects limbs, possibly the jaw but spares the head
- Aggravated by emotions or intellectual effort (e.g. mental calculation)
- Disappears during voluntary movement or during sleep

Posterior cord Syndrome

Symptoms

- Pain (electrical discharges, burning, cramps at rest): **Lhermitte's sign** (electrical discharge along the spine on anteflexion of the head in cervical cord injury)
- Paresthesia (tingling)
- Anesthesia or **hypoesthesia** ("like after a local anesthetic at the dentist", "cardboard skin", etc.)

Clinical signs:

- **Deep sensory deficit: kinesthesic disorders** (altered perception of the position of the big toe), hypopallesthesia (decrease of the perception of tuning fork vibrations): damage to large myelin fibres.
- **Positive Romberg's sign**
- **Proprioceptive ataxia**

Pyramidal Syndrome

Contralateral if lesion above the medulla (elongated cord)

Ipsilateral if spinal cord injury (cortical-spinal fibres crossing the midline at the level of the medulla oblongata)

Symptoms:

- **Motor weakness**
- **Intermittent motor claudication (painless weakness of one or both lower limbs, occurring after walking, disappearing at rest)**
- **Sensations of contractures and/or stiffness (related to spasticity)**
- **Speech and swallowing disorders (pseudo-bulbar syndrome)**
- **Urgent urination (spastic bladder)**

Clinical signs

1. Motor deficit (deficit of voluntary motor control)

- In the upper limbs, on the extensor muscles and in the lower limbs, on the flexor muscles:
  - **Barré's test in the upper limbs (arms outstretched)**
  - **Mingazzini sign** (supine position, thighs flexed and legs horizontal)

- In the face, in the lower facial territory: facial paralysis with automatic-voluntary dissociation (suppression of the nasolabial fold, asymmetry in grimaces)
- **Pseudo bulbar syndrome: paralytic dysarthria**

2. Muscle tone disorders

- In case of acute and extensive injury: hypotonia (flaccid deficit)
- In case of partial or progressive lesion: **spastic hypertonia (or rigidity) / Spasticity**

Predominates on the anti-gravity muscles: flexors in the upper limbs and on the extensors in the lower limbs **(Circumduction gait)**

3. Abnormalities in osteotendinous reflexes and skin reflexes

- Osteotendinous hyper-reflexia: the osteotendinous reflexes are brisk, diffuse, polykinetic ; diffusion and extension of the reflex zone
- Abolition of abdominal skin reflexes
- Foot/ankle clonus
- Patellar clonus
- Hoffmann's sign (spastic finger-flexion reflex)
- Babinski's sign
- Rossolimo's sign (flexion of the toes after plantar percussion)

4. Other signs.

- Syncinesia
- Garcin's sign : the arms are flexed and the fingers are spread wide; the hand becomes progressively deeper (by deficit of the extensors)
- Slowness of rapid alternating movements such as thumb-index opposition, comparing one side to the other
- Barré's sign in the lower limbs
- Schaeffer's sign
- Gordon's sign
- Oppenheim's sign

Myogenic Syndrome

Symptoms

1. Muscle weakness
2. Myalgias and cramps (with ball contraction of a muscle)

Clinical signs

1. Motor deficit

- **Proximal and bilateral** (+++): limb roots and axial muscles
  - **pelvic girdle and paravertebral muscles**
    - **waddling** gait," like a duck "
    - difficulty in getting up from a squatting position (**Gowers' sign**) or from a sitting position
    - hyperlordosis (paraspinal muscle damage)
  - **shoulder girdle and neck**
    - deficit of the deltoids, biceps and triceps brachii
    - scapula alata (detachment of the scapulae due to paralysis of the serratus anterior muscles)
    - deficit of the neck flexor muscles

- **Other muscles may be affected, more rarely:**
  - muscles of the face (**ptosis, ophtalmoplegia**)
  - distal muscles
  - respiratory muscles (restrictive syndrome)
  - heart (cardiomyopathy)

2. Changes in muscle volume

- **Amyotrophy**
- **Hypertrophy**, rarer, especially in the calves

3. Abnormalities in muscle contraction or relaxation

- **Abolition of the idio-muscular reflex (or contraction)**
- **Myotonia** (Slowness of muscle relaxation, painless)

4. Tendon retractions

5. Negative signs

- No sensory deficit
- **No abolition of osteotendinous reflexe**s (except at an advanced stage, when the amyotrophy no longer allows the response to be obtained)
- No fasciculations

Vestibular Syndrome

Symptoms and clinical signs

1. Vertigo: Sensation of **rotation**. Accompanying **vegetative signs: nausea, vomiting**, pallor, sweating, slowing of the pulse. Intense vertigo is particularly distressing and often distressing.

1. Nystagmus: Involuntary, rhythmic and conjugated movement of the eyes, made of two unequal jerks, one slow and the other fast, the latter arbitrarily defining the direction of the nystagmus.

3. VESTIBULAR ATAXIA

- **Balance disorders**
  - **Romberg sign lateralized or in all directions**
  - **Deviation of the index fingers**

- **Gait disorders**
  - Staggering gait, marked by lateral impulses, or lurching
  - Blind walking (three steps forward and three steps back with eyes closed) may be "**in a star pattern**"
  - Blind walking on the spot of **Fukuda (Fukuda stepping test)**

Topographical forms

1. Peripheral vestibular syndrome

- **Large rotatory seizure** with nystagmus associated with **vegetative/dysautonomic signs** (nausea, vomiting, pallor, sweating, slowed pulse) and **anxiety**
- **Balance/gait disorders**
- **Cochlear semiology** often present: **tinnitus** (ringing in the ears), **hypoacusis**
- **Romberg's sign, deviation of index fingers and swerves at the** walk, occur on the **injured side**, on the same side as the slow jerk of the nystagmus. This is why the vestibular syndrome is called "**harmonious**"

2. Central Vestibular Syndrome

- **Balance/walking disturbances** are in the foreground compared to vertigo, moderate or absent.
- **Nystagmus** is usually frank, and sometimes localising: rotatory (bulbar lesion) or vertical (mesencephalic lesion).
- **Romberg** and **deviation of the index fingers absent or in all directions.** The syndrome is said to be "**disharmonious**"
- There are usually **no cochlear signs**
- There are frequently **associated neurological signs** of brainstem involvement

Differential diagnosis

1. **Dizziness: cerebellar syndrome**
2. **Non-vestibular ataxias:**
   - Cerebellar ataxia
   - Proprioceptive ataxia
   - Frontal ataxia
   - (Functional ataxias)