

A photograph of a person's lower body and hands using a silver metal walker. The person is wearing a white hospital gown and a white identification band on their left wrist. They are standing on a light-colored wooden floor. The background shows a white door and some sunlight streaming in from the left.

*Prof. Leila Rinatovna
Akhmadeeva*

Синдромы двигательных
экстрапирамидных расстройств.
Синдромы нарушения координации
движений и равновесия

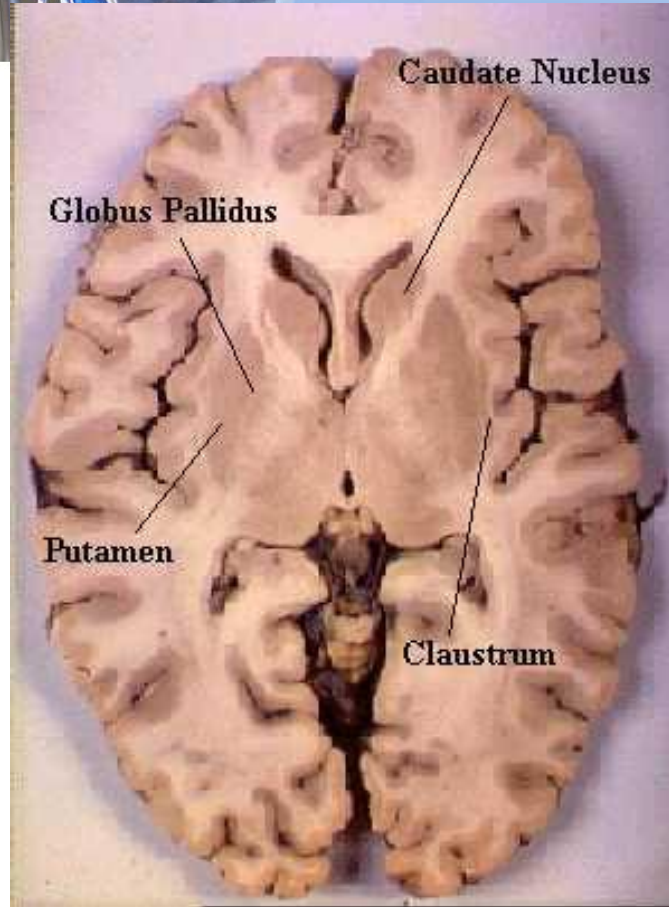
**Movement disorders
(extrapyramidal).
Coordination and balance**

Sep., 6, 2021

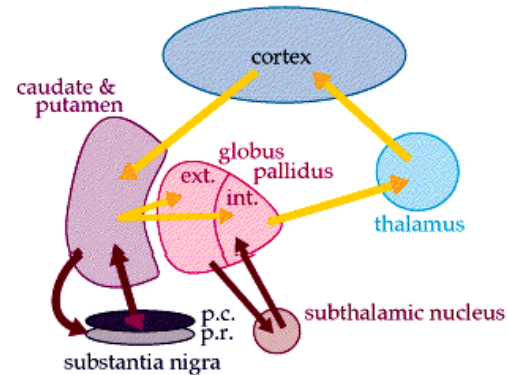
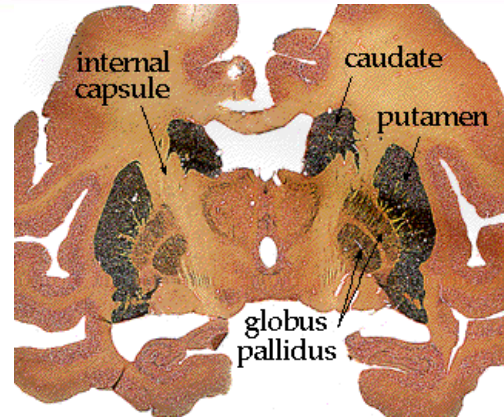
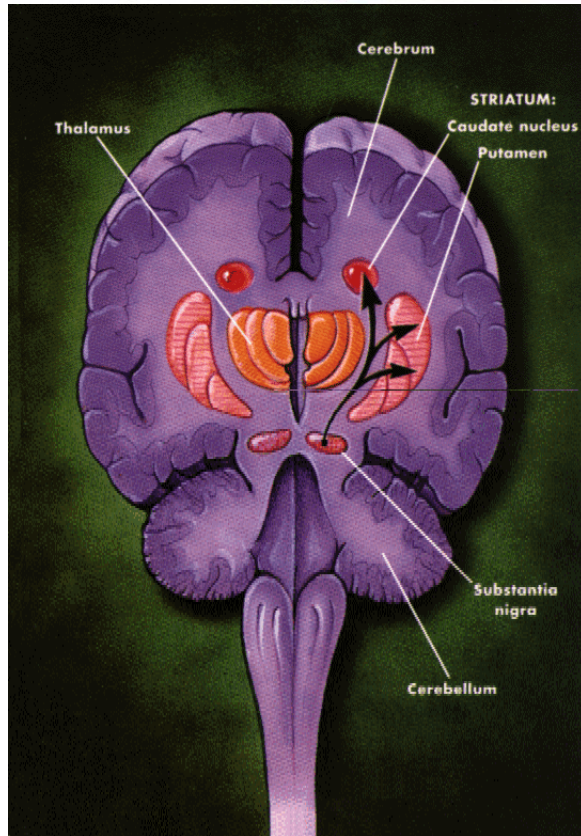


Prof. Dr.
L.Akhmadeeva's
patient

Basal ganglia



Extrapyramidal system





Clinical assessment

- **Muscle tone**
- **Movements**

A close-up photograph of a person's hands and arms as they use a silver metal walker. The person is wearing a white hospital gown and a white identification band on their left wrist. The background is a bright, slightly blurred indoor setting, likely a hospital room.

Muscle tone

Prof. Dr. L.Akhmadeeva's patient



Prof. Dr. L.Akhmadeeva's patient

A photograph showing a person's hands and arms as they use a silver metal walker. The person is wearing a white hospital gown and a white identification band on their left wrist. The background is a blurred indoor setting, likely a hospital room.

Movements

- **Hyperkinesia**
- **Hypokinesia**



To describe
movements that you
see!

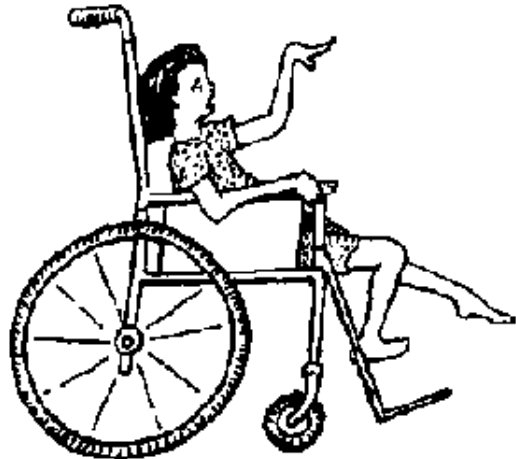


FIG. 2. Elephantiasis and spasm of jaw muscles and mouth-opening in a 61 year old lady with symptoms for three years.

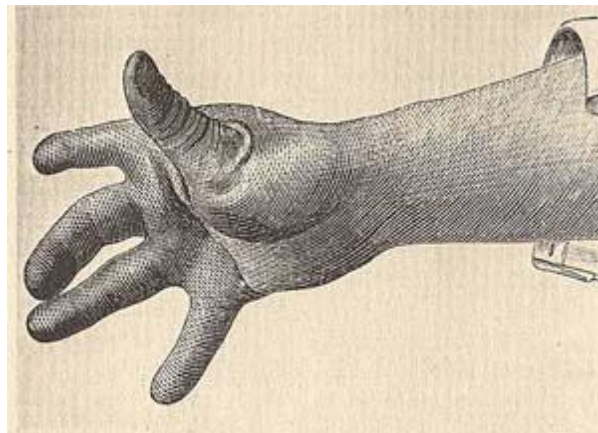


FIG. 3. Spasm of jaw opening and mouth's protrusion in a 65 year old lady with symptoms for four years.

Extra movements

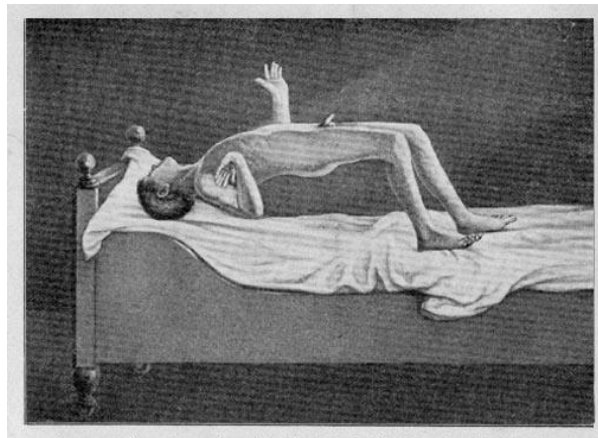
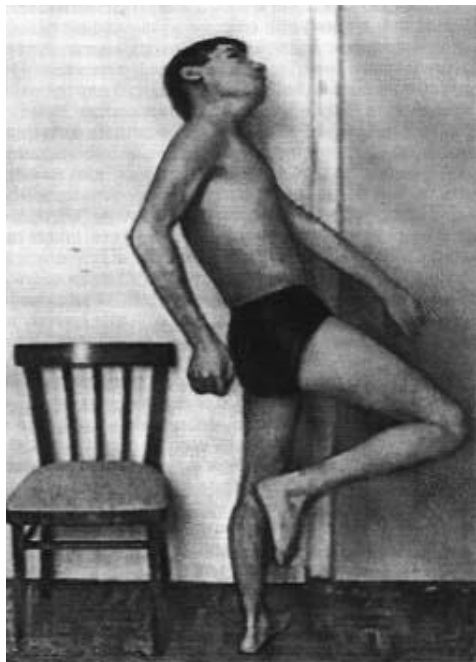


Rufina in her giant wheelchair.



Atetosis

Extra movements

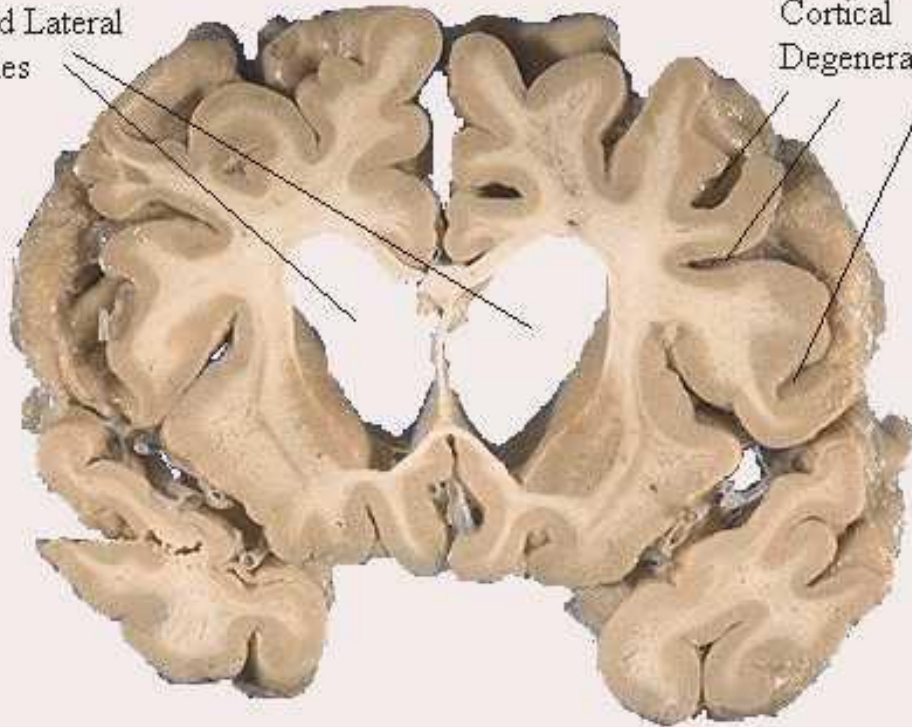


Chorea

Extra movements

Enlarged Lateral
Ventricles

Cortical
Degeneration



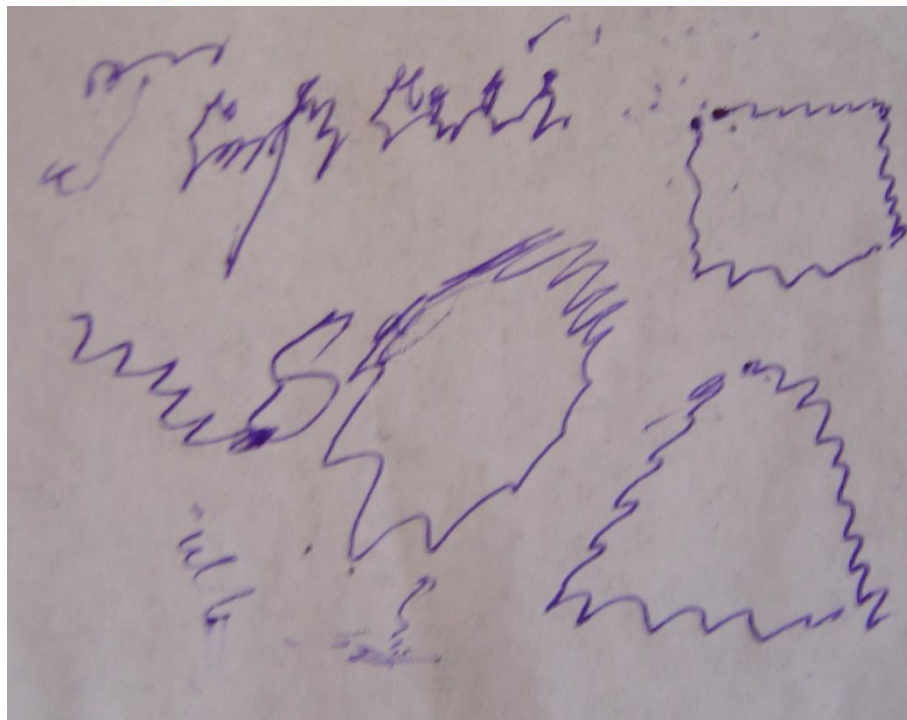


Extra movements

Prof. Dr.
L.Akhmadeeva's
patients

Tremor

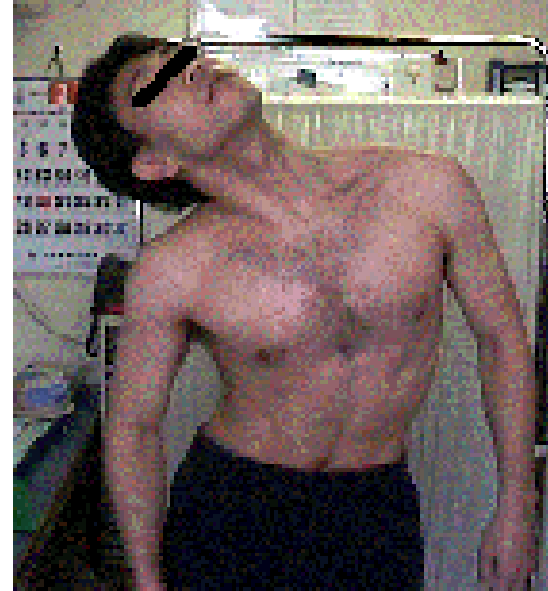
Extra movements



Prof. Dr. L.Akhmadeeva's
patient

Tremor

Hyperkinesia



Muscle dystonia

Extra movements



Focal or generalized



Prof. Dr. L.Akhmadeeva's patients

Extra movements



Torticollis – cervical dystonia



Prof. Dr. L.Akhmadeeva's
patient

A state of abnormal muscle tone resulting in muscular spasm and abnormal posture, typically due to neurological disease or a side effect of drug therapy

DYSTONIA



General - affects the entire body

Focal - affects only one muscle or a group or related muscles

DYSTONIA

Dystonia

Oromandibular Dystonia

Affects the face, jaw, and/or tongue.
Causes grimacing, tongue protrusion, jaw closure, or jaw opening

Spasmodic Dysphonia/Laryngeal Dystonia

Affects muscles of the vocal cords, making it difficult to speak

Limb Dystonia

May affect the hand/arm or foot/leg.
Causes fingers and toes to curl and limb muscles to cramp.

Blepharospasm

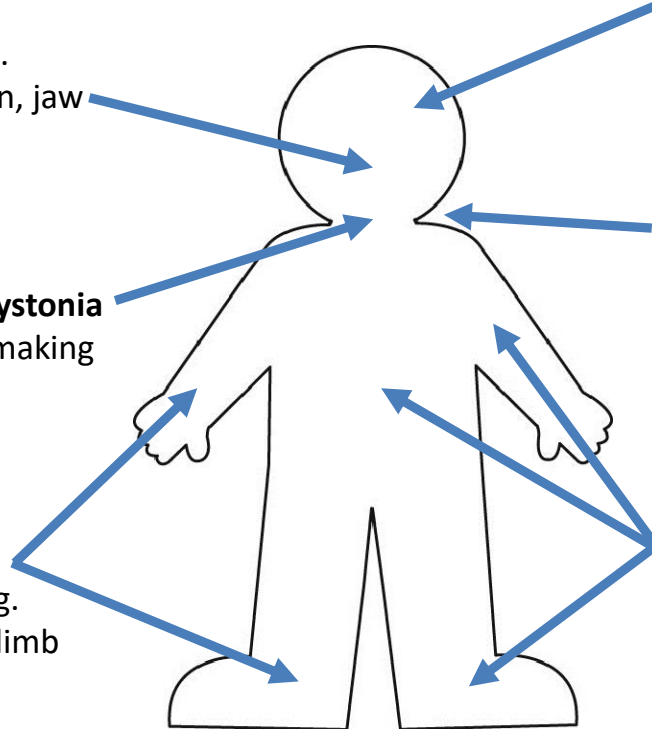
Affects the eyelids, causing them to blink uncontrollably or to remain closed.

Cervical Dystonia/ Spasmodic Torticollis

Affects neck and shoulder muscles, turning the head to the side or forcing the head back or forward. A tremor may be present.

Generalized Dystonia

Affects many part of the body simultaneously. Causes cramping and twisting of the feet, limbs, and torso.



Prolonged muscle contractions causing involuntary movements that result in twisting body motions, tremors, and abnormal patterns.



Cervical Dystonia

- Rare neurological disorder originating in the brain (<https://rarediseases.org>)
 - 3rd most common movement disorder
- Most common form of focal dystonia (Difazio, et al, 2013)
 - 8-12 cases /million person-years
 - 2 ♀ : 1 ♂
- Involuntary muscle contractions → abnormal movements and postures
 - Movements
 - Sustained
 - Spasmodic, resembling tremors
 - Posturing of the head away from the normal upright position
 - Torticollis
 - Laterocollis
 - Retrocollis
 - Anterocollis

Prof. Dr. L.Akhmadeeva's
patient



Cervical Dystonia

- Cause – unknown
 - Genetic (10-25% have family history)
 - Environmental (medications, toxins)
 - Trauma
- Impact
 - Pain, especially in area of overactive muscles
 - Activities of daily living
 - Participation, including employment
 - Quality of life
- Symptoms increase with
 - Stress and excitement
 - Certain postures and positions
- Secondary problems
 - Arthritis of cervical spine
 - Compression of nerve roots
 - Cervical stenosis
- Onset
 - Typically 40-60 years of age
- Diagnosis
 - Clinical



Cervical Dystonia – Medical Management

- Botulinum neurotoxin (BoNT) injections into the overactive muscles
 - Most common
 - Level A recommendation by American Academy of Neurology (Simpson et al, 2016)
- Deep brain stimulation to globus pallidus (surgical implant)
- Oral Medications
 - No US Food and Drug Administration (USFDA) approved oral medications
 - Dopaminergic agents
 - Anticholinergic agents
 - Baclofen
 - Clonazepam
 - Side effects common before therapeutic dose reached
 - Memory problems
 - Sedation
- Physical rehabilitation

Prof. Dr. L.Akhmadeeva's patient

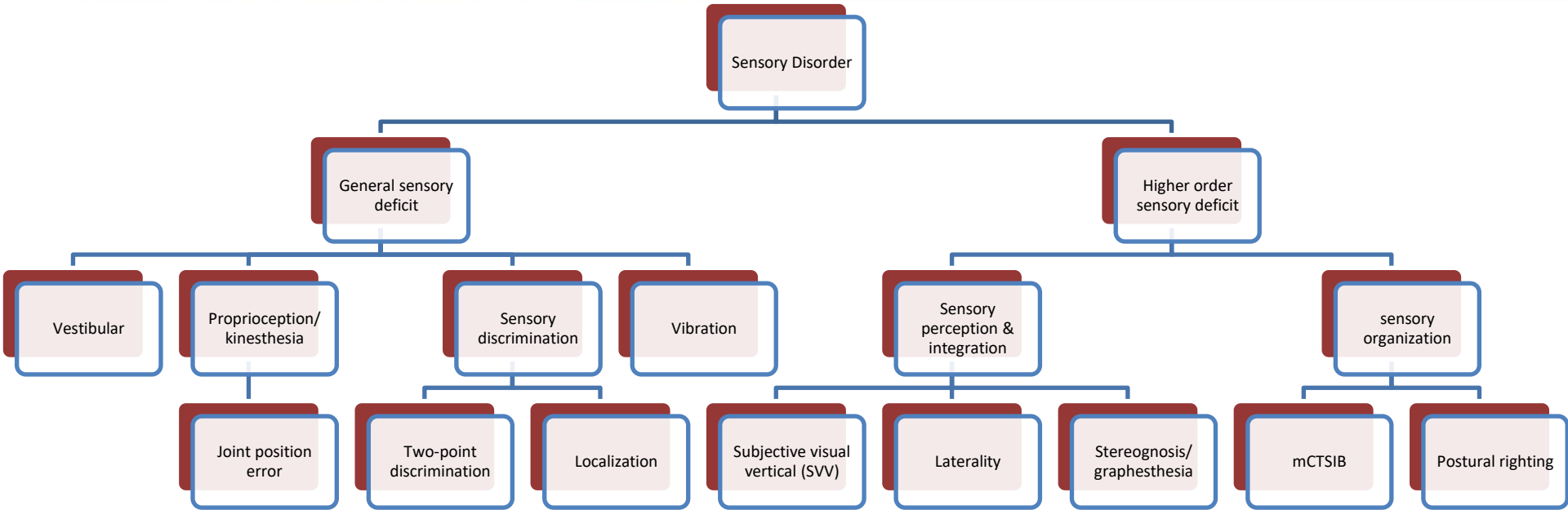


A close-up photograph of a person's hand and arm, wearing a white hospital gown and a white identification band on their wrist. They are holding the handle of a silver metal walker. The background is a blurred indoor setting, likely a hospital room.

Overview of Patient Examination

- Subjective interview
 - Get to know your patient. Are they ready for change?
 - Identify predisposing factors
- Analyze posture and movement
- Observe muscle activity
- Test sensation
- Hypothesize underlying “hardware” problems
- Evaluate “immediate response”
- Key questionnaires

Sensory Testing





Two main syndromes

Syndrome	Hypertonia-hypokinesia	Hypotonia-hyperkinesia
Muscle tone	↑	↓
Movements	↓	↑
Localizations	Globus pallidus	Corpus striatum
Synonyms	<i>Parkinson's</i>	-

Parkinson's syndrome



Parkinsonism



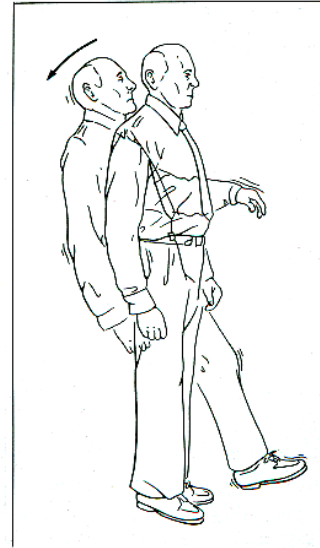


Prof. Dr. L.Akhmadeeva's
patient



Parkinson's syndrome

- Oligokinesia
- Bradikinesia
- Flexion of the body
- Oligomimia





Prof. Dr. L.Akhmadeeva's
patient

A photograph of a person's lower body and hands using a silver metal walker on a light-colored wooden floor. The person is wearing white hospital-style pants with a blue tie and has a white identification band on their left wrist. Sunlight streams in from the left, casting shadows on the floor. The image is partially covered by a blue geometric overlay on the right side.

Coordination and balance



Why is this an important topic?

- Falls in the elderly (per year)
 - ≥ 65 years – 33% (Hausdorff et al., 2001; Hornbrook et al., 1994)
 - ≥ 80 years – 50%
- Chronic stroke(> 6 months) (Harris et al., 2005)
 - 50%
- Parkinson's Disease (Ashburn et al., 2007; Wood et al., 2002)
 - 40-70%
- Multiple Sclerosis (Finlayson et al., 2006; Matsuda et al., 2009; Peterson et al., 2007)
 - 50%

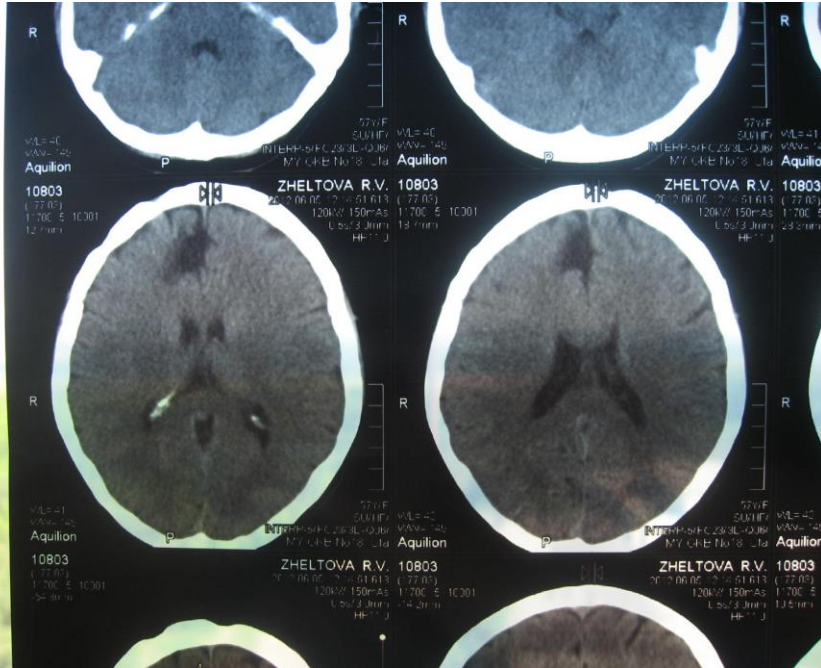


Coordination

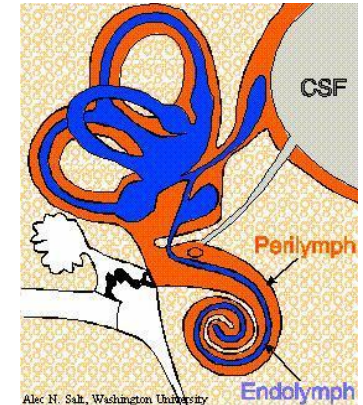
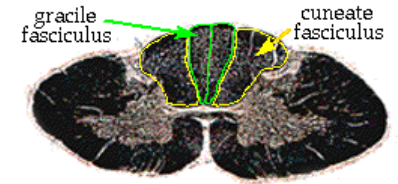
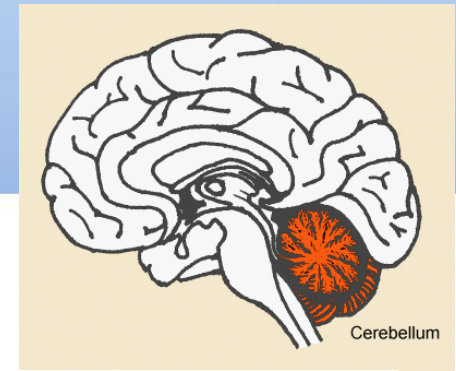


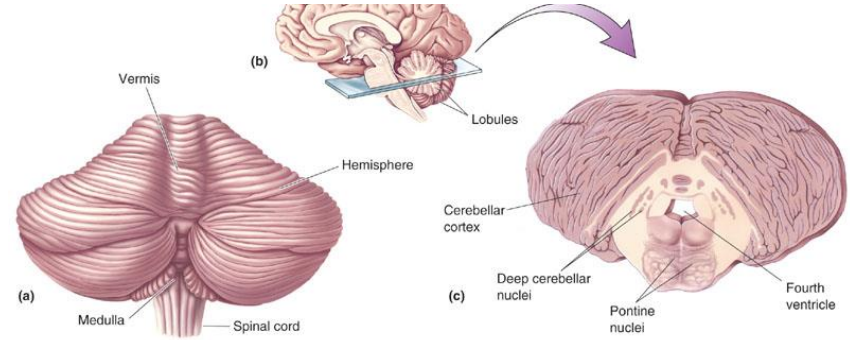
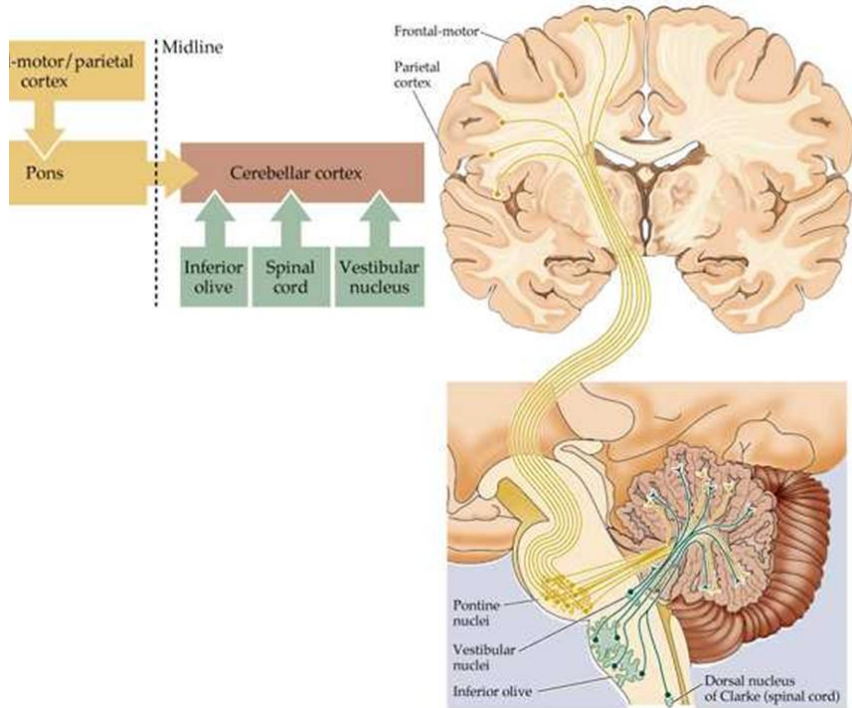
C.Robinson, 2020

Syndrome - ATAXIA



- Cerebellar
- Sensitive
- Frontal
- Vestibular



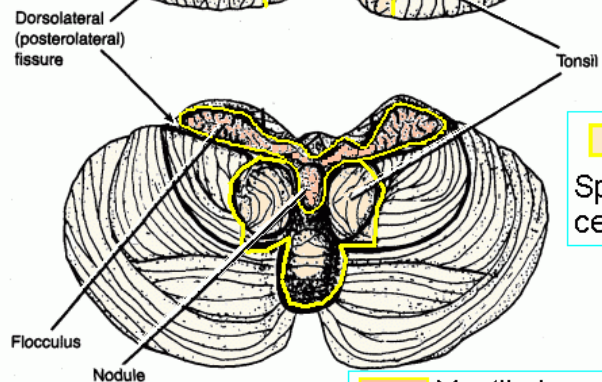
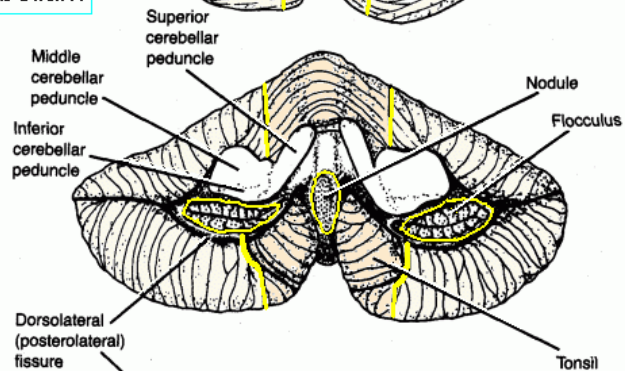
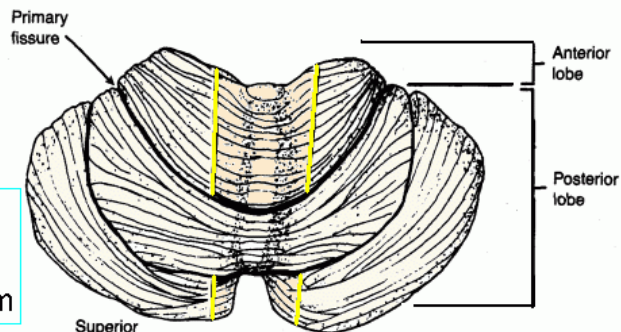


Cerebellum



Landmarks and functional divisions of the cerebellum

 Ponto-cerebellum



 Spino-cerebellum

 Vestibulo-cerebellum

Clinical tests



Clinical tests

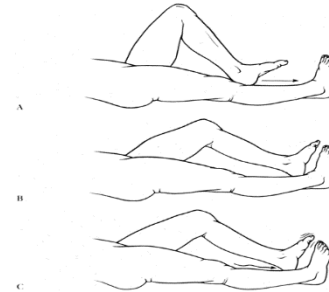
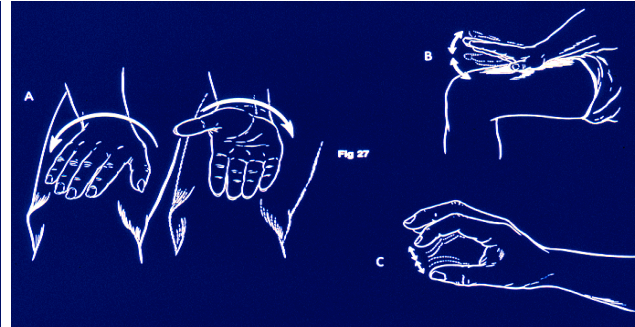
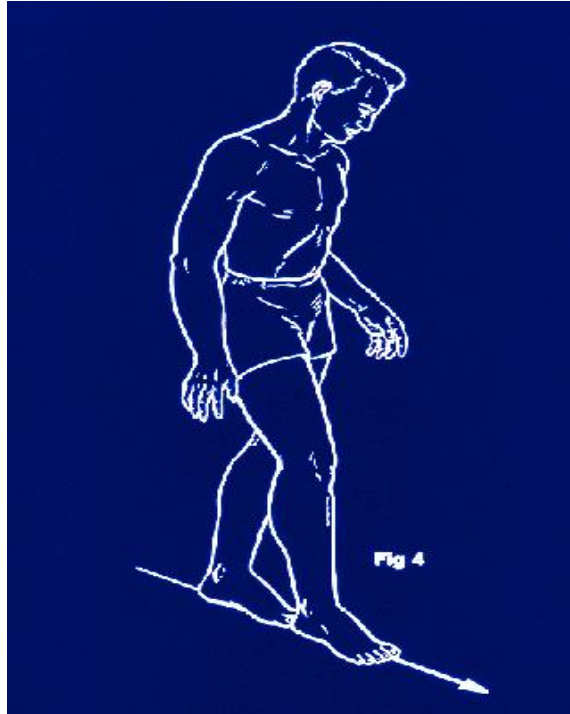


FIGURE 18-19
Heel-to-knee-to-toe test. A. Beginning the test. B. Normal result: The heel runs smoothly and straight down the shin. C. Abnormal result: The heel is ataxic and jerky and may even fall off the shin.



Coordination - Examination

- Before you examine coordination, must establish underlying functions
 - Range of motion
 - Strength
 - Sensation
 - Cognition
 - Language
 - Communication



— Coordination – Examination - Gross

- Encompass
 - Posture
 - Balance
 - Extremity movements involving large muscle groups
- Activities include
 - Reaching
 - Kneeling
 - Standing
 - Walking
 - Running



Coordination – Examination – Fine Motor

- Encompass
 - Skillful manipulation utilizing small muscle groups
- Activities include
 - Buttoning a shirt
 - Turning pages
 - Typing
 - Writing



Coordination - Examination

- Specific tests evaluate movement capability in key areas
 - Reciprocal motion – opposing muscle groups
 - Movement composition – synergy
 - Movement accuracy – distance and speed
 - Fixation or limb holding – proximal stability for distal mobility
- Specific tests evaluate four areas of function
 - Transitional mobility
 - Stability
 - Dynamic postural control
 - Skill



Coordination - Examination

Test	Gross /Fine	General Type	Key Area	Motion	Observations
Finger-to-nose	Gross	Unilateral	Movement composition Movement accuracy	Shoulder abducted 90, elbow extended, bring tip of index finger to tip of nose	Tremor Dysmetria Accuracy
Alternate finger-to-nose	Gross	Unilateral	Movement composition Movement accuracy Reciprocating movement	Patient alternately touches tip of index finger to own nose and therapist finger	Tremor Dysmetria Accuracy Speed
Finger-to-finger	Gross	Bilateral symmetrical	Movement composition Movement accuracy	Bilateral shoulders abducted 90, elbows extended, bring tips of index fingers together	Tremor Dysmetria Accuracy
Finger opposition	Fine	Unilateral Bilateral symmetrical	Movement composition Movement accuracy	Touch tip of thumb to tip of each finger in sequence. Can increase speed.	Tremor Dysmetria Accuracy Speed
Finger opposition with slide	Fine	Unilateral Bilateral symmetrical	Movement composition Movement accuracy	As above, slide thumb to base of each finger	Tremor Dysmetria Accuracy Speed



Coordination - Examination

Test	Gross/ Fine	General Type	Key Area	Motion	Observations
Pronation/ Supination	Gross	Unilateral Bilateral symmetrical	Reciprocal motion Accuracy - speed	Sitting, elbows flexed 90, arms close to sides. Turn palms up and down. Increase speed.	Speed Accuracy Dysdiadokokinesia
Foot or Hand tapping	Gross	Unilateral Bilateral symmetrical	Repetitive movement Accuracy - speed	Sitting tap hand on thigh or table, or foot on floor	Speed
Heel-on-shin	Gross	Unilateral	Movement composition Movement accuracy	Supine, place heel on opposite shin above ankle, slide along anterior tibia to knee and return	Tremor Dysmetria Accuracy
Fixation or position holding	Gross	Unilateral Bilateral symmetrical	Fixation	Raise both arms to 90, maintain position, eyes open, eyes closed	Accuracy
Functional Movements	Gross	Multi-limb	Reciprocal Movement Movement composition Movement accuracy	Bed mobility Transfers Walking and balance	Everything!



Static ataxia



To keep her balance the child with ataxia walks bent forward with feet wide apart. She takes irregular steps, like a sailor on a rough sea or someone who is drunk.



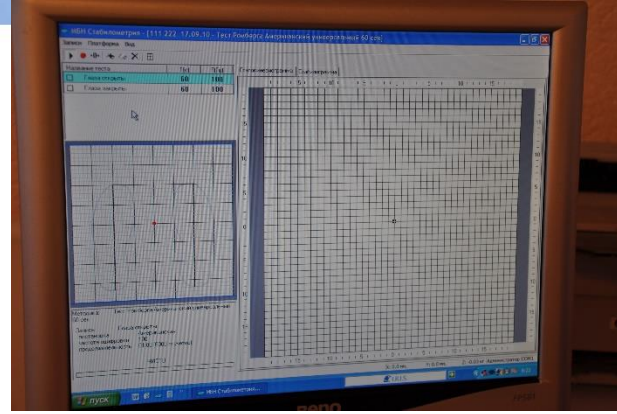


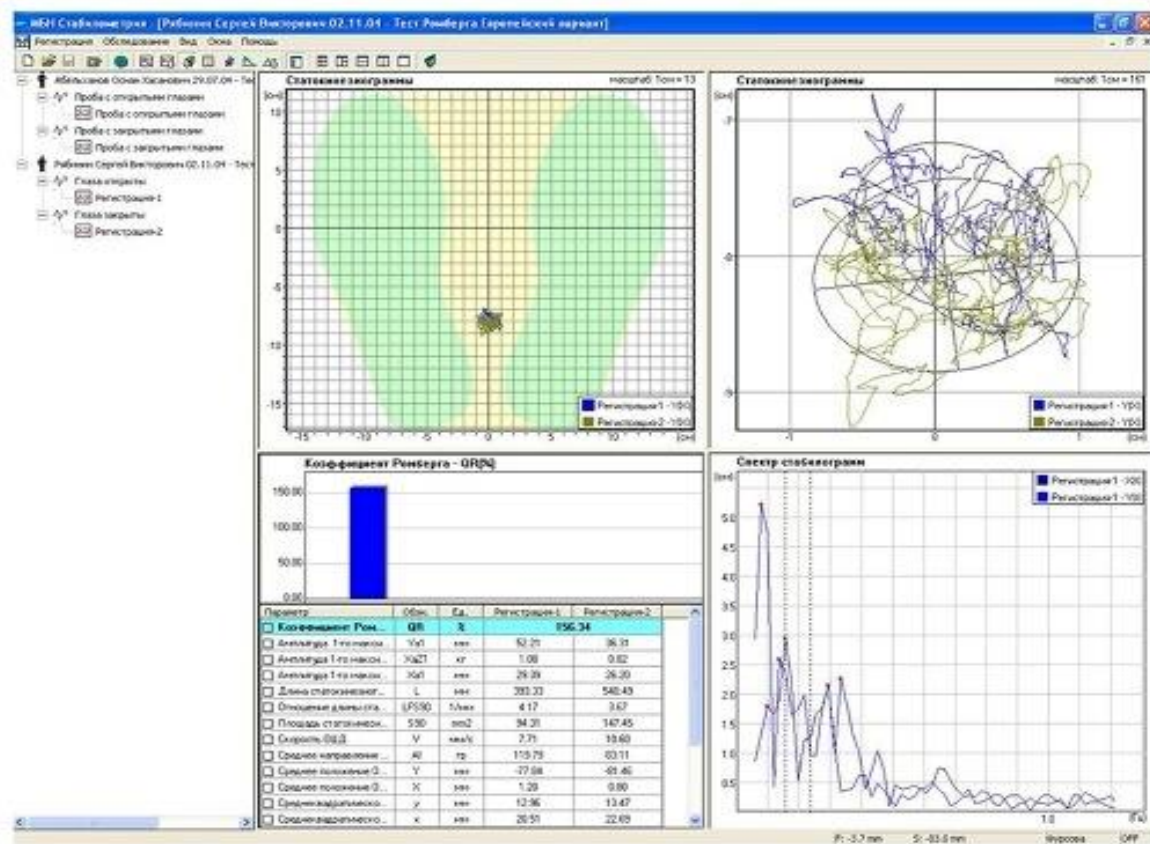
Prof. Dr.
L.Akhmadeeva's
patient

Clinical tests



Instrumental tests

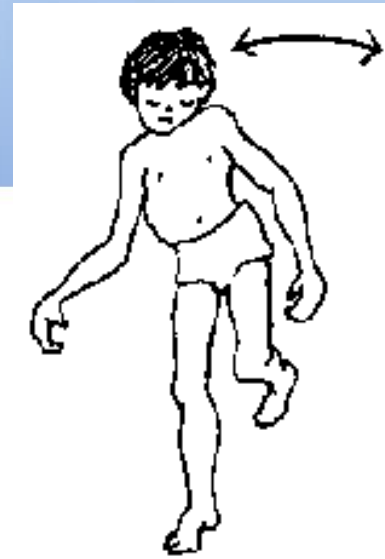




Общий вид программы



Dynamic ataxia





Prof. Dr.
L.Akhmadeeva's
patient



Prof. Dr. L.Akhmadeeva's patients



Summary: Train Multiple Aspects of Balance

- Motor coordination components
 - Alignment
 - Ability to activate and coordinate multiple muscles for reactive and proactive balance control
- Sensory Organization components
 - Ability to maintain, recover or prevent loss of stability under varying sensory conditions
- Cognitive components
 - Ability to maintain stability under multi-task conditions



Prof. Dr. L.Akhmadeeva's
patients