



UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE  
"NICOLAE TESTEMIȚANU" DIN REPUBLICA MOLDOVA

# The peculiarities of CNS development in children

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# The developmental ontogenesis of CNS

- There are a few stages in the intrauterine development of CNS.
- ***First stage***- the embryonal period corresponds to the first trimester of intrauterine life. The first signs of nervous plastinei appear at the 3 week of intrauterine development, this plastină takes the form of tube, on anterior part of which the 3 nervous vesicles appear. The anterior and posterior vesicle are also divided in half and in this way 5 vesicles are forming: telencephalon, diencephalon, mesencephalon, metencephalon and myelencephalon.



# The developmental ontogenesis of CNS

- From telencephalon the hemispheres and lateral ventricles are developing, from diencephalon the diencephalic region and III brain ventricle are developing, from mesencephalon – mesencephalic region and Sylvius aqueduct are developing, from metencephalon the pons Varoli, cerebellum and IV ventricle are developing, from myelencephalon – the medulla oblongata, spinal cord and central medullar channel are developing.



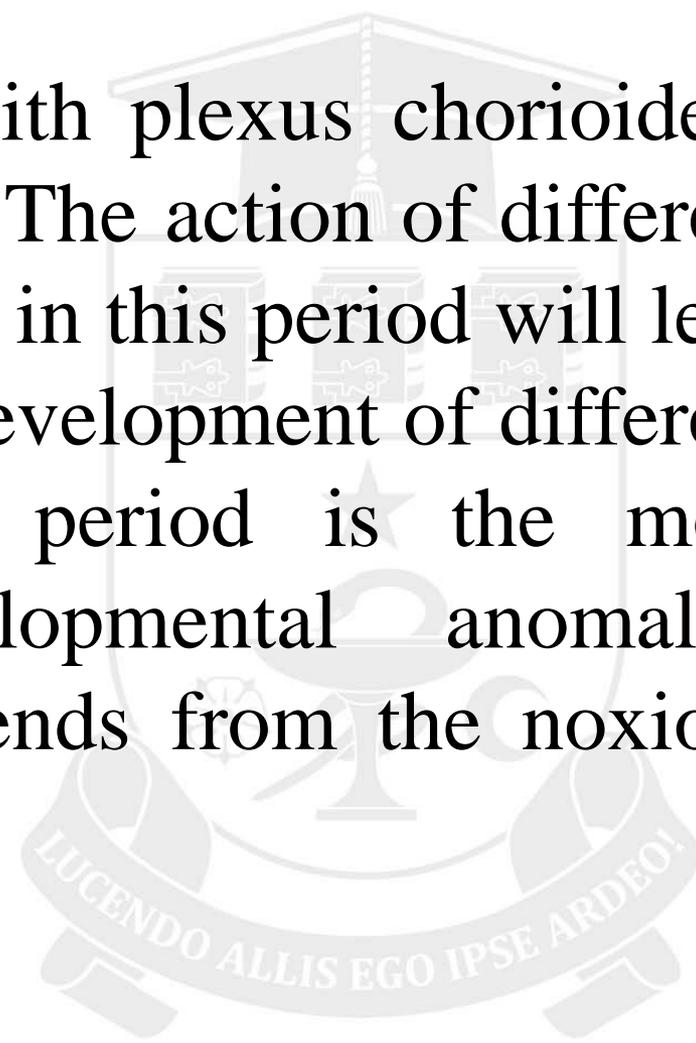
# The developmental ontogenesis of CNS

- The first vascular plexuses, which secrete cerebrospinal fluid (CSF), appear in the first month. During 2<sup>nd</sup> month the hemispheres and subcortical ganglions intensively grow. In the 3<sup>rd</sup> month the Vilisium circuit appears. So, in the first stage of intrauterine development the nervous tube appears, from which the brain hemispheres are intensively developing, the cortex and some circumvolutions appear, parallely the subcortical nuclei, internal capsula, thalamus opticus, cerebellum are developing.



# The developmental ontogenesis of CNS

- The vascular system with plexus chorioideus secreting CRL appears. The action of different noxious factors on fetus in this period will lead to the retention in the development of different brain sectors. This period is the most dangerous for developmental anomalies appearance, but it depends from the noxious factors intensity.





# The developmental ontogenesis of CNS

- *The second stage* includes the II trimester of intrauterine life (4-6 months), and is naming fetal precocious period (12-28 weeks). It is characterizing by intensification of further differentiation of brain sectors. Due to CSF which is abundantly secreted by plexus chorioideus the brain vesicles are dilating, provoking the appearance of physiological hydrocephaly. At the 4th month the sulcus Sylvium appears (sulcus cerebry lateralis), at the 5th month - sulcus Rollandi (sulcus centralis).



# The developmental ontogenesis of CNS

- The cortex circumvolutions are intensively differentiating . At the 5th month in the place of IV vesicle the IV ventricle with foramen Majandi and two lateral foramen Lushca appear. Through these orifices the CSF gets of the brain surface. In this period the brain cortex is intensively differentiating: the layers of cortical cells and functional fields appear. The vascular system has more importance in the brain alimentation.



# The developmental ontogenesis of CNS

- *The third stage*- fetal tardive – the formed brain continues to grow in the dimensions. The process of myelination continues, but the myelination occurs ununiformly. First of all the spinal cord is myelinating in the 4th month of intrauterine life. At birth the myelination is rising until the mesencephalon. So, at birth the baby is a “truncular” being.



# The developmental ontogenesis of CNS

- The hemispheres are myelinating after birth and stop at 2-3 years of life, and this is important in practice (most often the cerebral trunk is affecting and the treatment must be intensively continued until 3 years). The cerebellum is myelinating most slowly. Stratification of cerebellar cortex is finishing at the 9-11 month of postnatal life. The cells of cerebellum continue to multiply also after birth, and the children begin to walk only at 1 year age.



# The developmental ontogenesis of CNS

- In the first trimester the brain is alimented preponderantly through diffusion from vesicles and CSF, and in the third trimester the brain is alimenting by vascular system. The most intense vascularization of brain has place in the 8 month of intrauterine life, that has importance in practice. The children born in this month make frequent cerebral hemorrhages, because the vessels without argintophil elastic fibers are fragile. In newborns the brain mass (370-390 gr) achieves 10-12% from corporal mass.



## General characteristic of CNS pathology in newborn in dependence of periods of intrauterine development

- The pathology of NS in newborn is diverse and often depends by noxious factors action in certain periods of intrauterine development.
- **Period of progenesis** – the sexual cells are affecting until the first stages of zigota, until the first day of conception, in the clinic are named gametopathies.
- **Prenatal period**, which occurs from first day until 28 week of intrauterine life. This period is dividing into 2 subperiods:
  - *embryonal period*– when the malformations appear both from the part of NS, and from the parts of other organs – embryopathies. Duration: 1 day – 12 weeks.
  - *precocious fetal period*– the 12-28 week, the affection of fetus
- In this period leads to appearance of precocious fetopathies.



## General characteristic of CNS pathology in newborn in dependence of periods of intrauterine development

**The perinatal period** is dividing into 3 subperiods:

- *tardive fetal* – from the 28 week until the birth of fetus,
- and his affection in this period will lead to the appearance of tardive fetopathies,
- *intranatal period* – includes the period of parturition, in this time the fetus asphyxia and trauma can appear,
- *neonatal precocious period* includes the 7 days after birth
- **So, perinatal period occurs from the 28 week of intrauterine life until the 7 day of extrauterine life. In this period the perinatal encephalopathies appear.**



# Periods of functional development of nervous system in children

- The human baby has the most long evolution period from the birth until maturation. From incapable being with poor package of reactions, until all-powerful human, endowed with the most high intellect – this is the age evolution of brain. The first 2 – 3 years of life are the most important stages of this period both in functional development, and anatomical.



# Periods of functional development of nervous system in children

- The first year of life is the period when the motility in children is developing most intensively. Also in this time the bases of psychical development are putted and the knowledge of principal stages of psychomotory development makes possible the correct and timely diagnosis of different deviations. In the first year of child's life some periods of neuropsychic functions forming periods can be conditionally distinguished.



# Periods of functional development of nervous system in children

- *In newborns* the chaotic movements are observed; without precise effect, subordinated to primitive tonic reflexes, having symmetrical posture with the flexors tonus predominance; in ventral decubitus they keep the flexion position; can turn the head aside.
- *1 month* – in dorsal decubitus they keep the flexion position, but the flexion degree at the level of inferior members is reduced; from dorsal decubitus he partially turns aside; the members will be positioned in the function of head posture due to the presence of tonic cervical reflexes; from the ventral decubitus he raises for a few moments the head and can turn it laterally; the shanks make crawling movements; in orthostatic position the walking reflex is present; he watches an object from a side of median position; he reacts on the sound of hand bell, fixes the face of adult, ceases to cry when is speaking to him.



# Periods of functional development of nervous system in children

- **2 months** – keeps the hands predominantly in fist; being raised from bed he maintains himself the head; catches with hands short time; from ventral decubitus raises the head a few seconds; the better extension of inferior members; watches with the eyes and the head in angle of 90°; smiles as response, begins to vocalize.
- **3 months** – keeps occasionally the hands in fist; catches an object placed in hand short time; turns the head to objects; fixes them and watches their direction; in ventral position is propping up on the forearms for maintain the head raised (“position of doll”); analyses his hands; smiles and vocalizes when is speaking to him; looks the face, laugh, prattles.
- **4 months** – keeps good the raised head when is in sitting position; from ventral decubitus is propping on palms, raising the head and trunk; turns the head in both directions and in direction of sound (disappearance of tonic cervical reflexes); holds the arm to object, catches it and brings it at mouth, laugh spontaneously.



# Periods of functional development of nervous system in children

- **5 months** – raises the head from dorsal decubit position, is turning from one part to other; begins to sit with support; the symmetrical controlled movements are developing.
- **6 months** – is rolling on the belly and back; is crawling in all senses; keeps sitting position with the head moving in all directions; transfers the objects from one hand in other, recognizes his mother; distinguishes the family faces from the unknowns, prattles.
- **7 months** – is raising from dorsal decubit in sitting position; is propping on inferior members, holds his legs to mouth, examines with interest a toy, vocalizes syllables.
- **8 months** – stands short time in orthostatic position with support, after that flexes his inferior members (astasia, abasia); appearance of parachute reflex; holds to mouth all objects; strikes the objects at table; beginning of lalalization (da-da, ma-ma).



# Periods of functional development of nervous system in children

- **9 months** – raises on four members; raises on the legs with support; drinks from cup with assistance, makes “tai-tai”; makes angry if is reproved.
- **10 months** – crawling, walking in four members with the abdomen nearly to floor; can walk with the hand support; the first three fingers of the arm have more importance; is displacing to the toys.
- **11 months** – stands alone a few seconds; takes for a walk with support; uses two words with sense.
- **1 year** – can walk alone; makes digital forceps; helps to dressing; understands a few simple commands; says 2-4 words with sense.



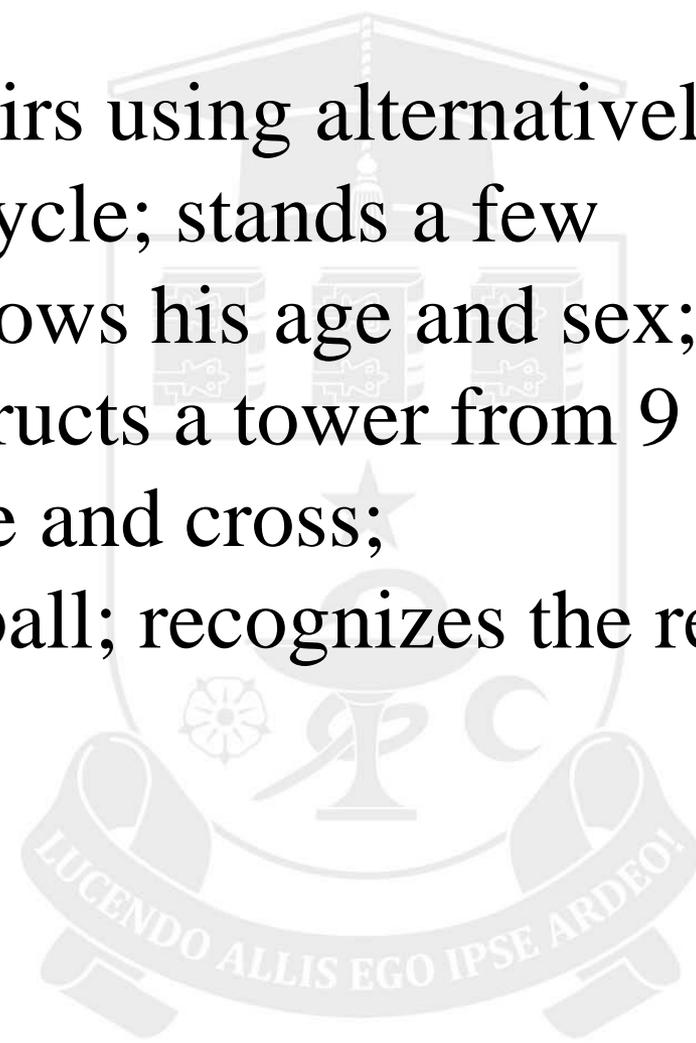
# Periods of functional development of nervous system in children

- *2 years* – good runs; mounts and moves downwards the stairs himself, with both legs on one stair; kicks the ball with the foot; climbs up on the furniture; opens the door; speaks in propositions by 2-3 words; uses the personal pronoun; helps to undressing; turns one page from a book; constructs a tower of 4-6 cubes; copies an horizontal line with pencil; listens tales from books with poses.



# Periods of functional development of nervous system in children

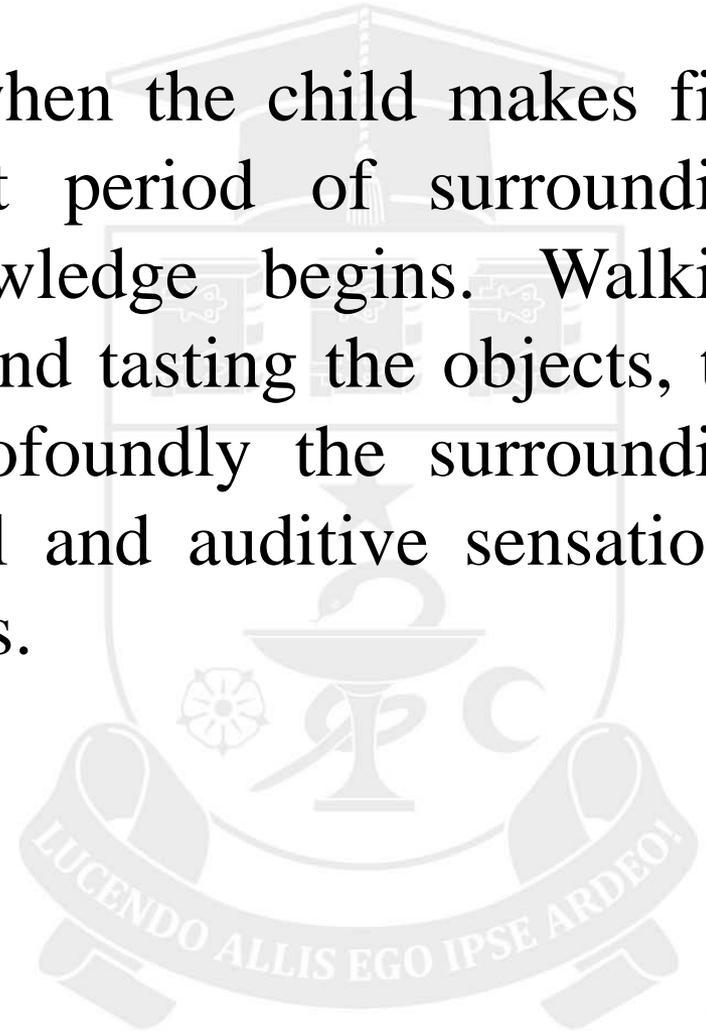
- *3 years* – mounts the stairs using alternatively the legs; drives with bicycle; stands a few moments on one leg; knows his age and sex; washes his hands; constructs a tower from 9 cubes; imitates the circle and cross; spontaneously draws a ball; recognizes the red color.





# Developing Psychic Ability

- At the end of first year, when the child makes first steps, a very important period of surrounding medium study and knowledge begins. Walking himself, falling, touching and tasting the objects, the child perceives more profoundly the surrounding space, enriching the visual and auditive sensations, assimilating important skills.





# Developing Psychic Ability

- In the second year of life the motor development is closely connected with the speaking development, the sooner the child moves better, the sooner the child possesses the speaking, because the motor retardation often leads to psychoverbal retardation. The direct contact with the surrounding objects helps the child to be distinguished from surrounding world, at last the sensation of “Myself” can lead to marked egoism, sometimes to egocentrism and appearance of neurotic states.



# Developing Psychic Ability

- Until 2-3 years the child as a rule easily enters in contact with the unknowns, between 2-4 years the child's behavior is changing. The children become more agitate, neuroendocrine and vegetovascular disturbances can appear. These children tend to the personal sovereignty, therefore they are capricious, often have conflicts with parents. Different neurotic reactions with psychosomatic character are observing very frequently in children in this period.



# Developing Psychic Ability

- The age of 6-8 years for children is a new critical period of development. They are more sensible, quickly get tired, instead the motility and speaking are good developed, they can good analyse the situation, they outdistance from matures, but in the same time these children are limited in autocontrol, have not capacity to be concentrated long time.



# Developing Psychic Ability

- The beginning of school learning aggravates more severely in this period the neuropsychical disturbances. Some children are not quiet, attentive at lections, due to attention absence the children study badly and the control at psychoneurologist is necessary for differentiation of neuropsychical disorders.



# Developing Psychic Ability

- In the puberty period (10-15 yrs) the most profound neuroendocrine and psychovegetative disorders are producing. The behavior of these children is also uncommon, the movements are awkward, impulsive. The impulsivity is observing also in psychologic processes, the conflict between “Myself” and surrounding medium, between “y want much” but “y can little” appears. These children imitates the adults, but their behavior leads to conflicts with anothers. Therefore the neurotic and psychovegetative disturbances appear on the first plane.



# Developing Psychic Ability

- The complete forming of nervous system is ending, as a rule, at the age of 18-20 years. After data of electroencephalography (EEG) the picture of cortex electric activity is appropriating to the picture of mature approximatively at the age of 18 yrs. The complicity and a lot of stages having place in the development of neuropsychical functions in ontogenesis have a great clinical value.



## The basic anatomo-physiological peculiarities of central nervous system in suckling babies

- Spiking about the nervous system pathology in children, it must to understand not the disease in general, but a concret age period of the child. The frequency of a lot of nervous system diseases is not the same in the different age periods. Besides this the same disease can have different clinical signs in dependence of the patient's age. The methods of neurologic investigation also must be adapted to the age peculiarities.



# The basic anatomico-physiological peculiarities of central nervous system in suckling babies

- The nervous system of little age infants is characterizing by some peculiarities:
- 1) immaturity of cellular elements and of nervous fibers, which determines a diffuse brain affection,
- 2) increased sensibility to different noxious factors and decreased threshold of excitability, which can provoke the convulsive state, 3) increased hydrophilia of nervous tissue that contributes to rapid development of cerebral edema,
- 4) intolerance of SNC to the immune system, which conditions the appearance of anticerebral autoantibodies in the case of hematoencephalic barrier affection,
- 5) plasticity and great compensatory possibilities of the brain, 6) the brain even at newborn is sitting in relatively rigid box—the skull



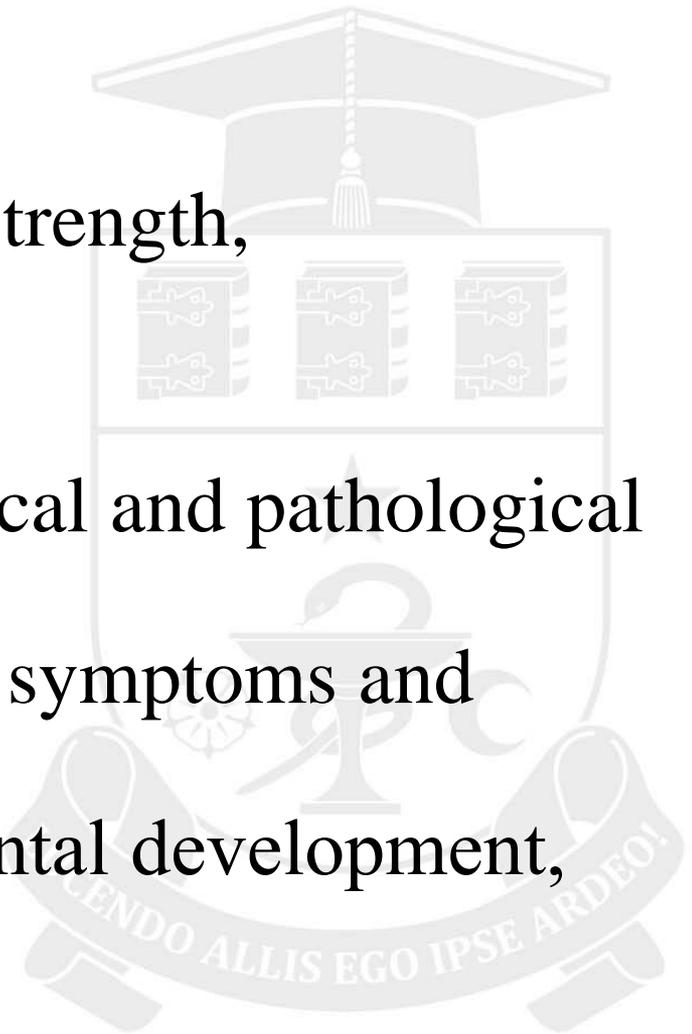
# The investigation of nervous system in children

- The neurologic examination in children depends directly from the peculiarities of CNS age in children, which are different in prematures, termly newborn, suckling baby and infant (until 3 years). In older children the neurologic examination resembles to that in adult.
- The neurologic examination in infants (0-3 years) consists from 2 principal parts:
  - Appreciation of NS anatomic and functional maturation degree corresponding to age;
  - Appreciation of neurologic symptoms and syndromes in dependence of etiology and pathologic focus localization, which will assessing in the more or less formed preventive diagnosis.



# Clinical methods of examination of Central Nervous System

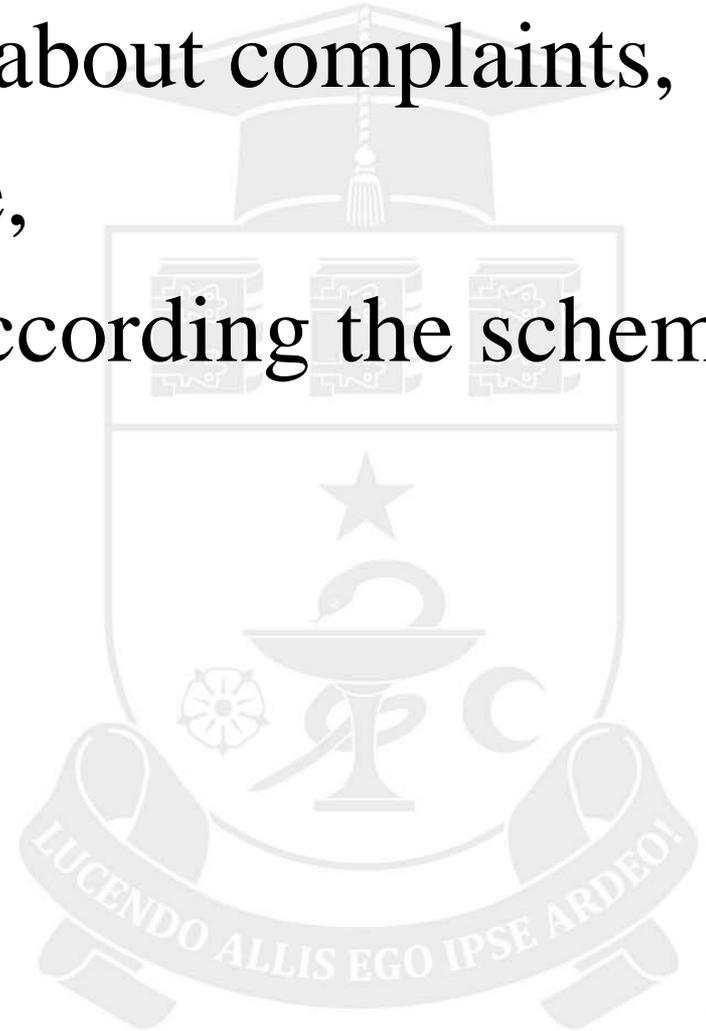
- include interrogation,
- observation,
- examination of muscular strength,
- tonocity,
- coordination,
- examination of physiological and pathological reflexes,
- diagnostic of pathological symptoms and syndromes,
- examination of child's mental development, behavior disturbances.





# The interrogation

- includes information about complaints,
- history of the disease,
- anamnesis of vitae according the schema of the case history.





# History

- The history is the most important component of the evaluation of the child with neurology problem. It should carefully document in chronological order the onset of symptoms. A comprehensive review of systems also is essential.
- It is important to start with concise description of the chief complaint within its developmental context. A comprehensive understanding of developmental milestones is essential in order to ascertain the relative importance of the parents' observations.



# History

- Following the chief complaint and history of present illness, a review of pregnancy, labor, and delivery is indicated, particularly if a congenital disorder is suspected. Maternal exposure of infections, drugs, cigarettes and alcohol during the pregnancy is important associated with the congenital myopathies and other neuromuscular disorders.
- The history of birth weight, length and head circumference are particularly important.



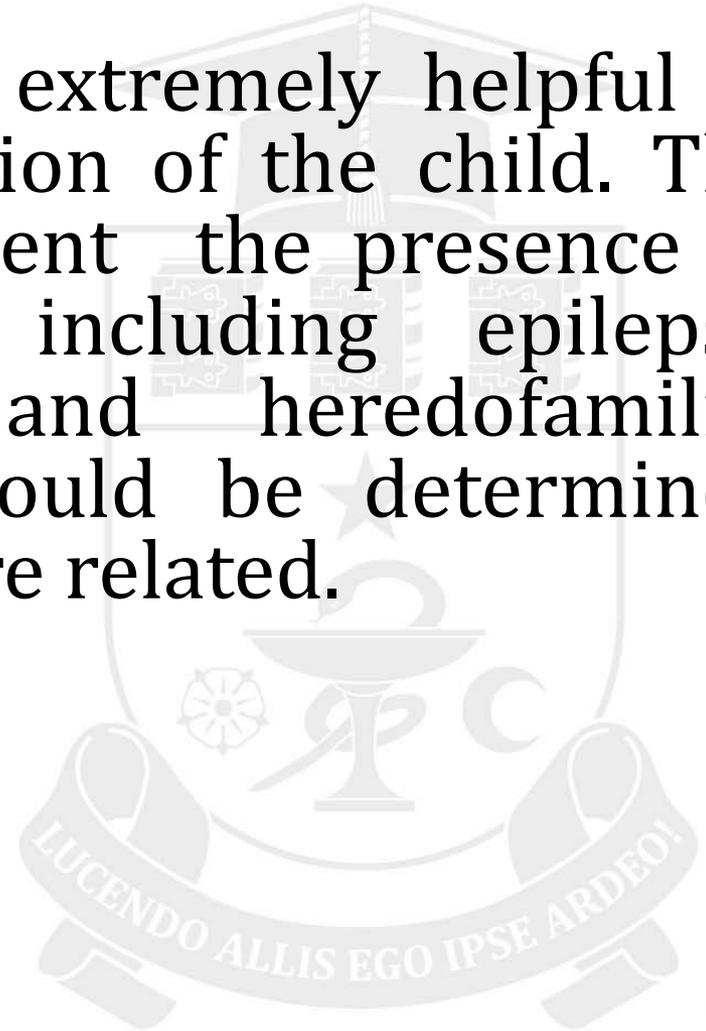
# History

- Apgar scores, need for ventilator assistance, and history of feeding difficulties should be noted.
- The most important component of the neurology history is the child's developmental assessment. An abnormality in development from birth suggests an intrauterine or perinatal cause. A slowing of the rate of acquisition of skills later in infancy or childhood suggests an acquired abnormality of the nervous system. A loss of skills over time strongly suggests an underlying degenerative disease of the central nervous system.



# History

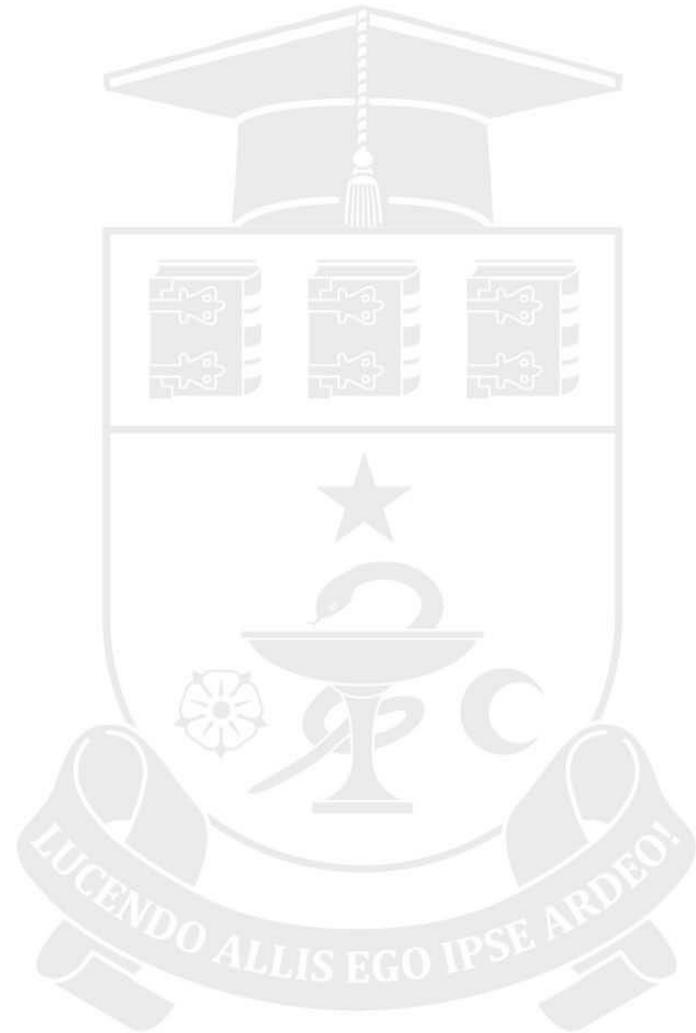
- The family history is extremely helpful in the neurology evaluation of the child. The history should document the presence of neurologic disease, including epilepsy, migraine, strokes and hereditary disorders. It also should be determined whether the parents are related.





# Observation

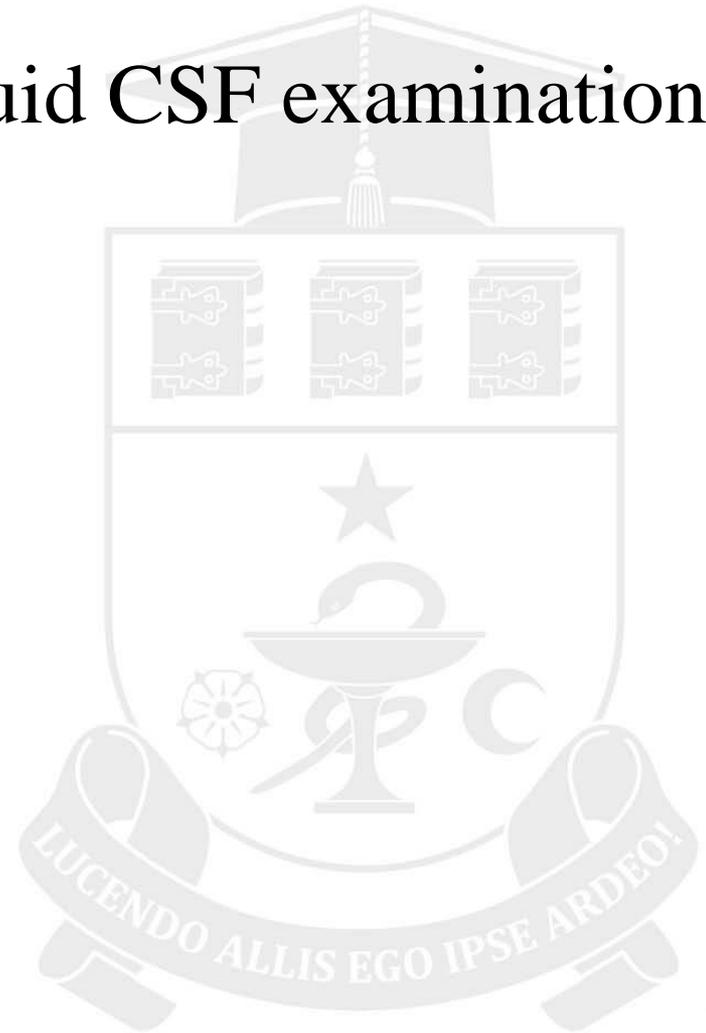
- includes details of
- head shape, size,
- posture,
- locomotion activity,
- child behavior,
- muscle bulk,
- pathological symptoms.





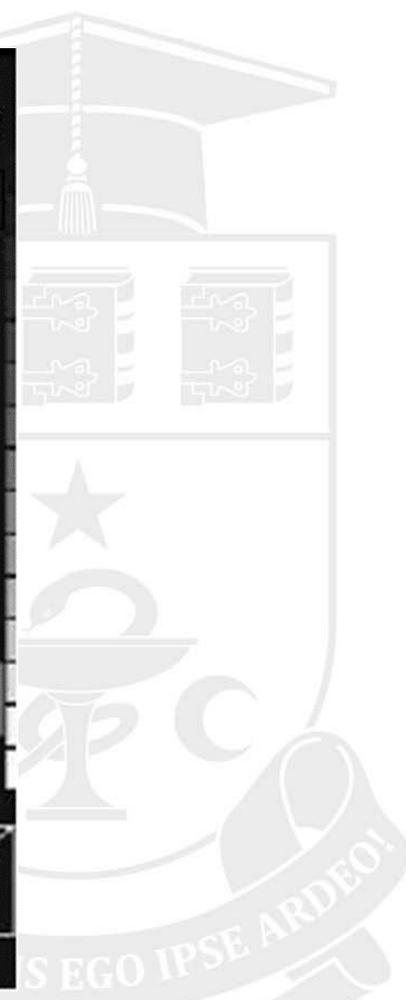
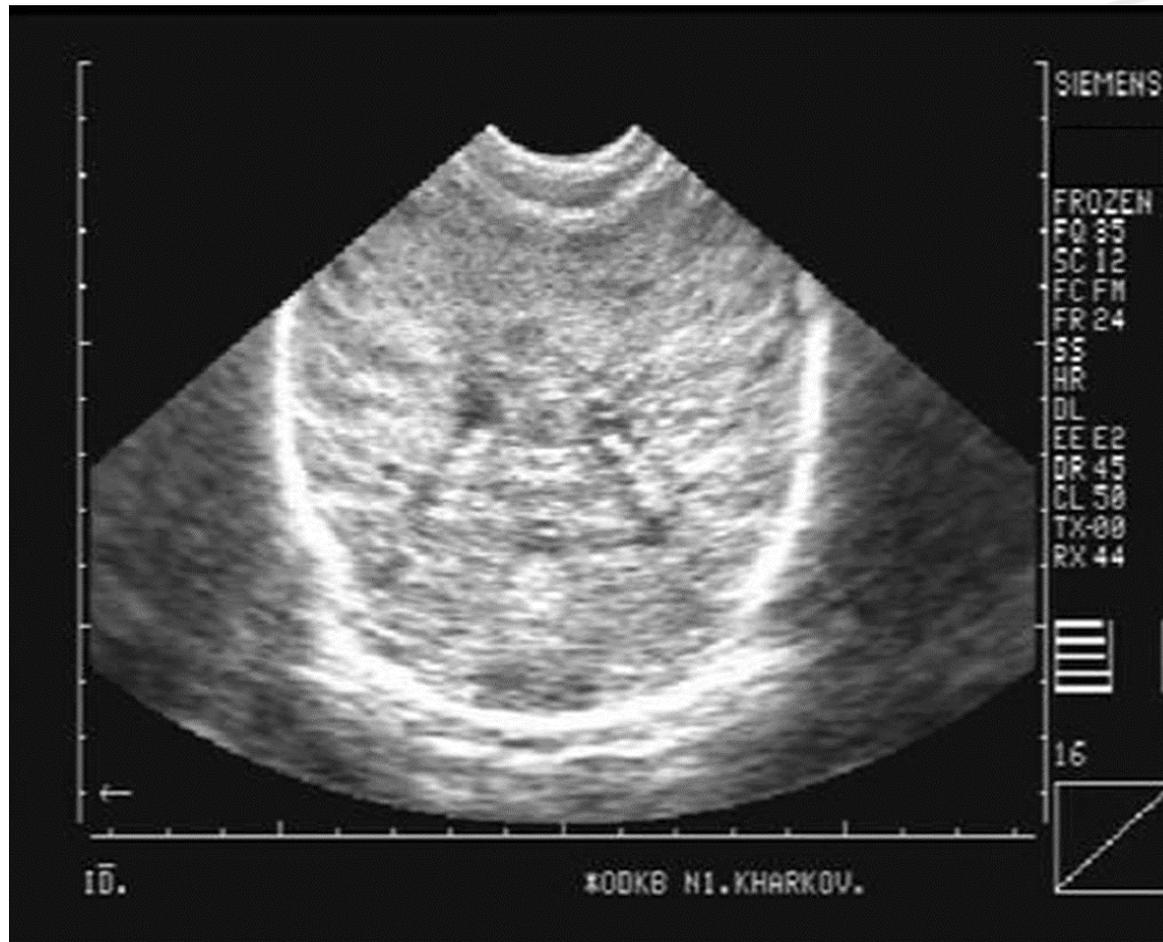
# Paraclinical methods of investigation

- Include central spinal fluid CSF examination,
- skull roentgenography,
- Computer tomography,
- MRI,
- cerebral angiography,
- cranial ultrasound,
- electroencephalography.





# “Light- brain” – is a sign of meningitis





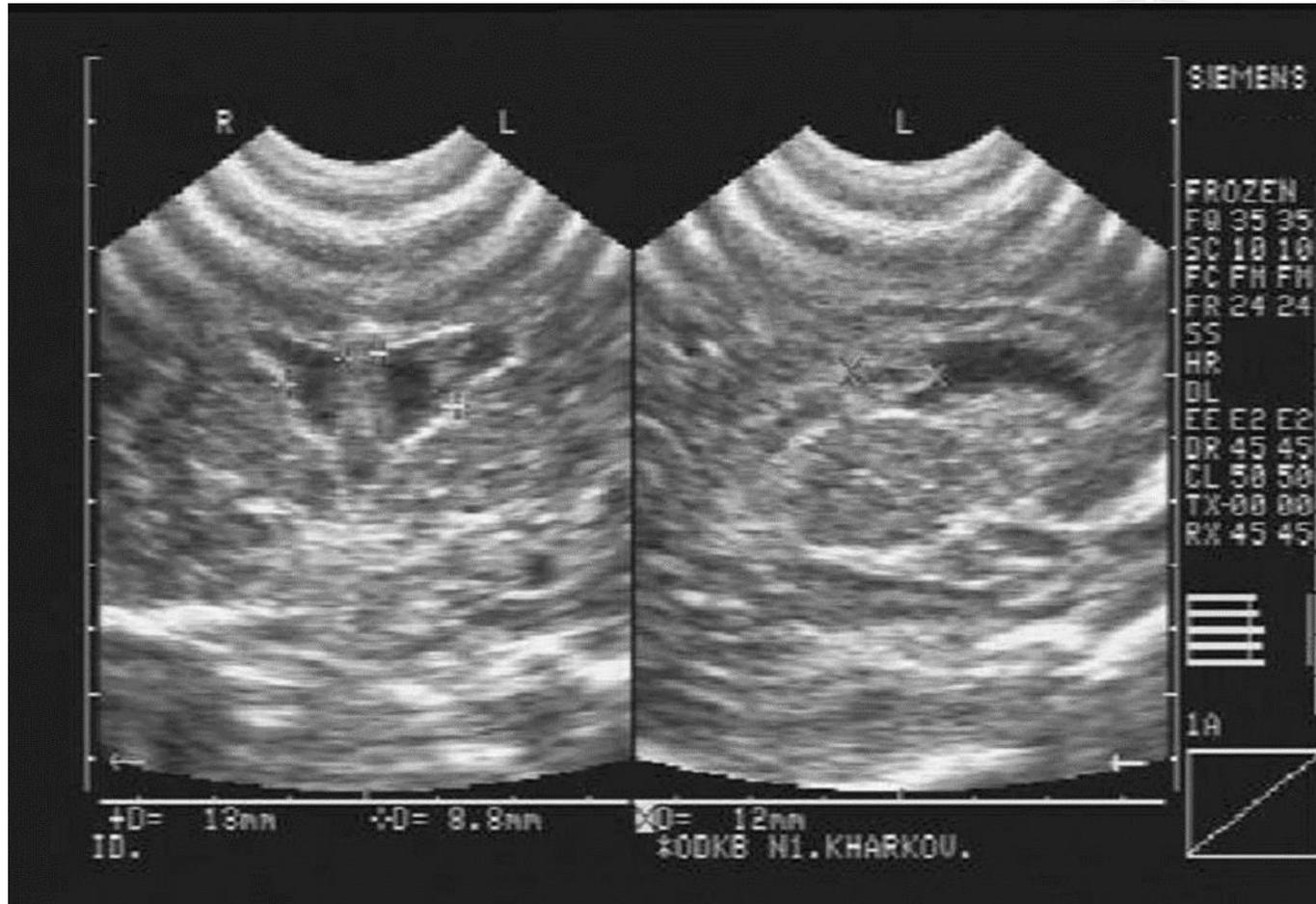
# Focus of necrosis of brain





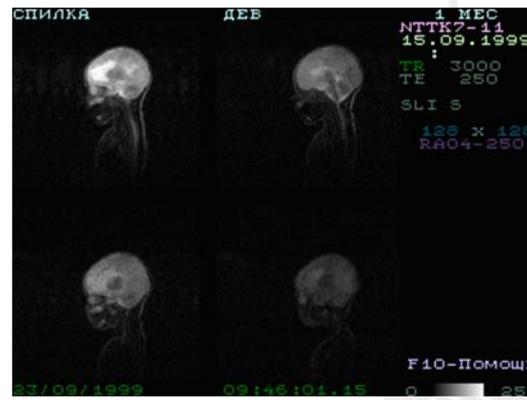
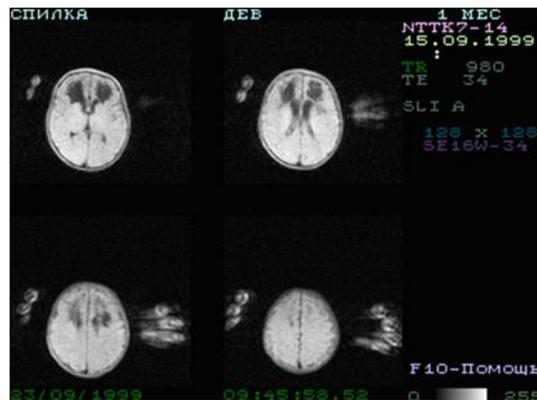
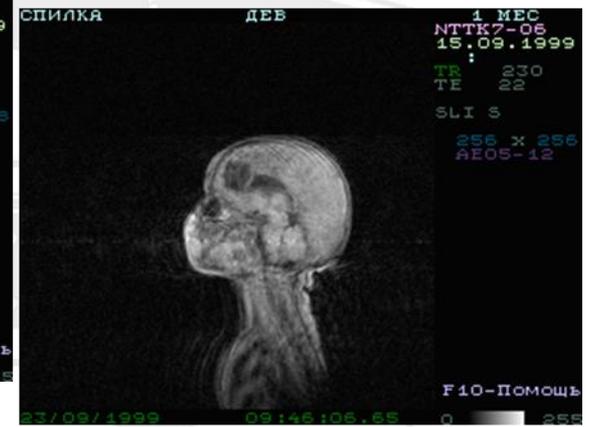
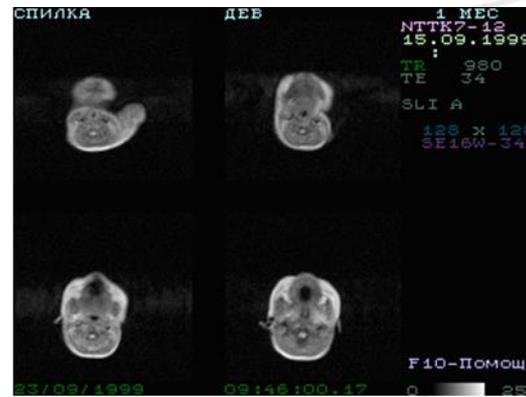
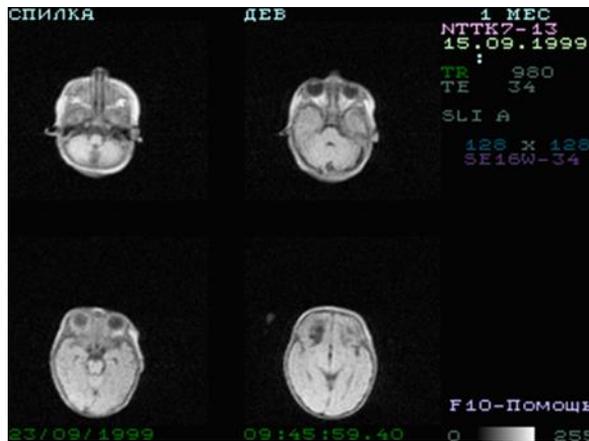


# Ultrasound investigation – intracranial left-side hemorrhage



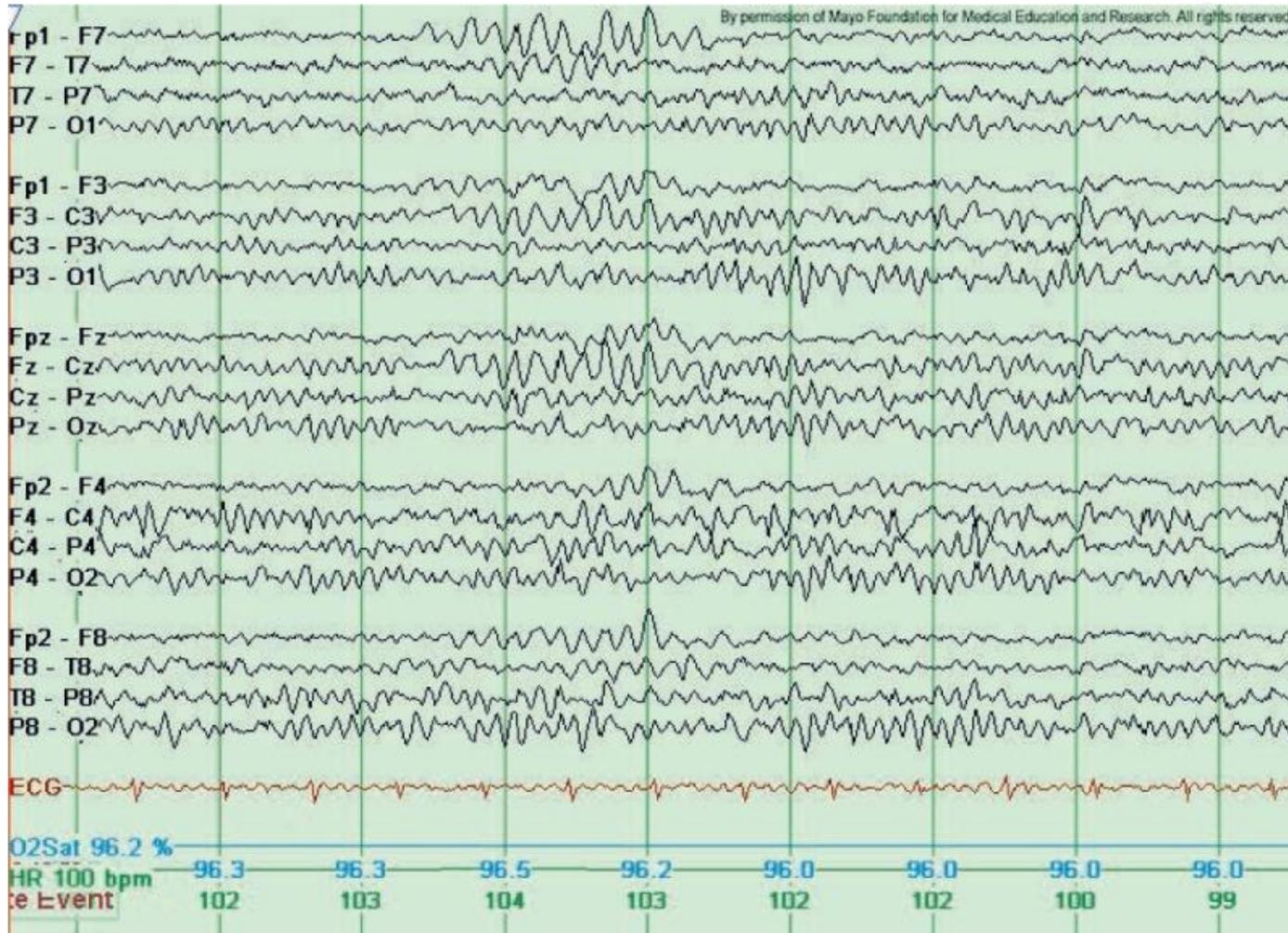


# Computer tomography - intracranial hemorrhage





# Electroencephalography





# The symptoms of neurological disorders of different diseases can be

- apathy,
- somnolence,
- unconsciousness,
- excitation,
- convulsions,
- defects of speech,
- defects of hearing,
- defects of reading or writing,
- extremely large head in hydrocephaly





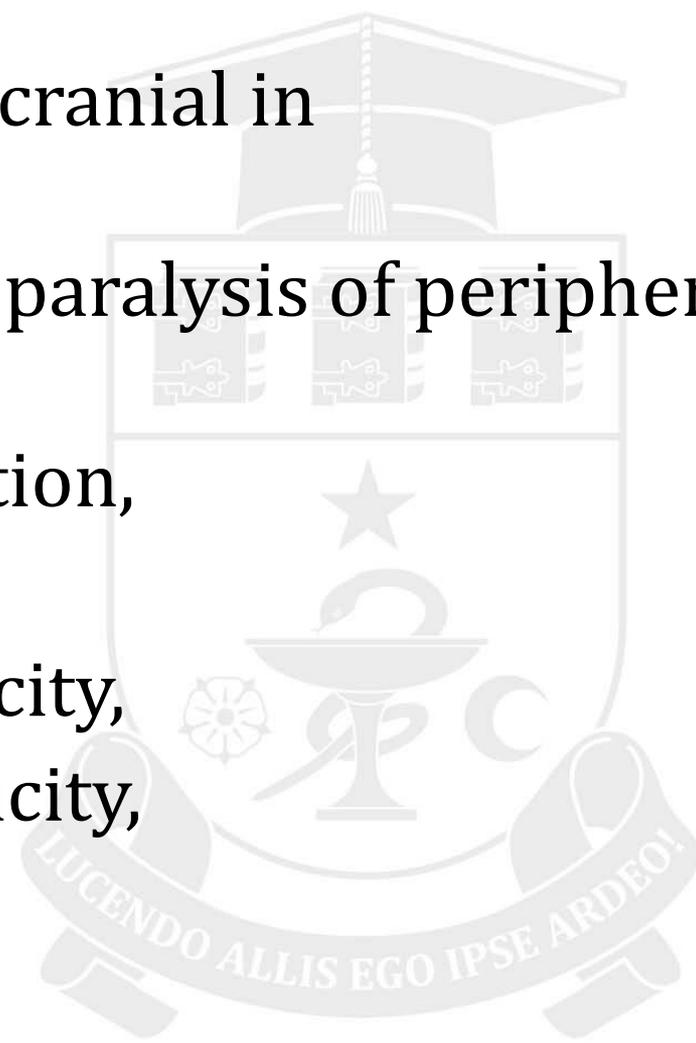
# Congenital hydrocephaly





# The symptoms of neurological disorders of different diseases can be

- the small dimensions of cranial in microcephaly
- paralysis of facial nerve, paralysis of peripheral nerve,
- disturbance of coordination,
- motor ataxia,
- increased muscular tonicity,
- decreased muscular tonicity,
- pathologic reflexes.





# Appreciation of neurologic symptoms and syndromes

- The appreciation of neurologic symptoms and syndromes will begin with the supervision of the child. The examination of the child gives us a precious information.
- First of all we must attract attention on the state of conscience and muscular tonus, the pose of newborn (opisthotonus, frog - like), active movements of members, head position, form, dimensions, sutures and fontanelles, asymmetry of face; also the meningeal signs have a great value for physician.



# Important transitory reflexes

## **a) oral automatism (at the level of cerebral trunk)**

- **The most important reflexes of oral automatism are:**
- ***palm-oral reflex (Babkin)*** persists until 3 months (palmar pressing in child leads to the mouth opening, hand raising and turning to the excitation side);
- ***tube-*** until 2-3 months, holding the lips forward at the drawing near of neurologic hammer;
- ***Looking for*** (3-4 months) - touching of mouth angle leads to head turning and mouth opening like to breast looking for;
- ***Sucking*** (disappears around 1 year) - the lips touching provokes the mouth opening and rhythmic sucking movements;



# Important transitory reflexes

- **b) spinal automatism (at the level of spinal marrow)**
- **Defence reflex**- the putting of newborn on abdomen leads to turning of the head aside;
- **reflex of support and automat gait** (1-1,5 months) – being kept of the trunk, and suspended, the baby is slowly let down until the bed touching. The extension of inferior members and step movements are producing;
- **crawling (Bauer)** (4 months)
- **Seizing (Robinson)** – sometimes he is raising by the hands;
- **Babinski reflex** – touching the lateral part of plant with an object by pen form, the big finger is retroflexing, and another fingers are distended in the form of fan;
- **Moro reflex** – changing of head position towards to the trunk in position of dorsal decubit. When the examiner raises the head from the table and lets it to fall suddenly in his hand, approximatively with 30° towards the position of extended trunk, the extension and abduction of superior members and extension, spreading out of fingers followed by flexion, adduction of superior members and emission of sound have place. The reflex disappears at 4-5 months.



# Investigation

- **Tendon reflexes:**
- 1. Patellar; 2. Achilian –their amplitude diminishes until 3-4 months, they can be exaggerated due to pyramidal tract immaturity.
- **The superficial sensibility** is present in newborns, the profound sensibility is developing at 2 years. The sensibility gives us less information for diagnosis in little age children.



# Investigation

- **Vegetative system:** the main guide mark signs, which indicate the vegetative system affection at suprasegmental or segmental level:
- **Thermoregulation;**
- Sleeping – wakefulness rhythm;
- Accesses of asphyxia;
- Arlekin syndrome (vegetative NS tonus in prematures)
- Hypertrophy, paratrophy, dystrophy;
- Atopic state;
- **Affection of limbico-reticular system** – emotional disorders, excitations, superficial, unquiet sleeping, screaming during sleeping.



# The basic clinical syndromes in neuropediatrics

- **Headache** (cephalalgia) is the most frequent clinical sign in neuropediatrics. It is met in vegetative dystonias, infections, psychogenic (stress) states, disorders of hemo- and CSF dynamics, in the case of intracranial volume processes, internal organs, eyes, nose, ears, tooth diseases; headache as migrainous disease or cluster syndrome is met more rarely in children.



# The basic clinical syndromes in neuropediatrics

- In dependence from etiology the headache can have acute (in the form of access) or slow character, dull or sharp, constant or periodic, pulsative or constrictive, etc. After localization the most common form in children is the frontooccipital headache, after that bitemporal and supraorbital. More frequently the headache in children appears in the second half of day, but can be after sleeping and on an empty stomach.



# The basic clinical syndromes in neuropediatrics

- **The vomit** is an important cerebral sign and the most met in children. It is important to know, that the “central” or “cerebral” vomit always is followed by headache and often by fever, in the case of infections, intoxications, etc it appears usually in morning on the empty stomach, but can appear when the child drinks or eats. As a rule the state of child after vomit improves temporarily.



# The basic clinical syndromes in neuropediatrix

- In newborns and suckling babies it is necessary to differentiate the “central” vomit from “peripheral” in the case of pylorostenosis or pylorospasm. In children with pylorostenosis the vomit appears after each meal, “fontan”, children become hypotrophic, need surgical treatment. The children with pylorospasm no vomit after each alimentation and their state is improving after some drugs administration (atropin, tincture of valerian, pipolfen).



# The basic clinical syndromes in neuropediatrics

- **The dizziness** often appears in children in the case of brain hypoxia and hypoglycemia. They are frequent in brain blood circulation disorders, in the case of swoon, syncopal states, different anemias. The dizziness is characteristic also for vestibular apparatus affection. However, in this case the rotation of surrounding objects is more pronounced, vegetative disturbances and child's state are more severe.



# The basic clinical syndromes in neuropsychiatry

- **Disorders of consciousness:** at the beginning of each child examination we are obliged to determine the state of patient consciousness. The determining of child's consciousness state has a primordial significance in the just appreciation of affection degree and disease severity.
- The most easy form of consciousness disorder is the psychomotoric excitation, which in school age children in the case of infectious hyperthermia, can keep the form of delirium and even hallucinations (infectious delirium).



# The basic clinical syndromes in neuropediatrics

- The medium form of consciousness disorder is characterized by psychomotor inhibition from somnolence to sopor. The child is apathic, somnolent, disoriented in surrounding medium. In the case of sopor the reaction to pain and auditory excitations is preserving.
- The most severe and dangerous form of consciousness disturbance is the state of coma—complete loss of consciousness, sensibility, reflexes, with appearance of respiratory and cardiovascular disorders.



# Meningeal syndrome

- **Meningeal syndrome** appears in the case of meningeal leaflets affection due to some inflammatory process, tumor or hemorrhage and is characterized by triad: 1) fever, 2) meningeal signs, 3) pathologic changes of CSF. In children the meningeal syndrome must be differentiated from meningism – not affection, but only excitation of meningeal leaflets by toxins or intracranial hypertension as a consequence of acute infections, acute traumas (natal or acquired), intoxications, volume processes. In the case of meningism the pathologic changes of CSF will not be observed.



# Meningeal syndrome

- The meningeal syndrome is followed by general cerebral signs (headache, nausea, vomit), total hypertension, hyperacusia, photophobia and meningeal characteristic pose for meningitis –retroflexed head, “hollow” abdomen, flexed and pulled at chest hands, legs pulled at belly. The meningeal pose appears due to tonic muscular contraction and has reflex character, not voluntary and not analgesic.



# Meningeal syndrome

- Due to tonic reflex from meningeal leaflets another meningeal symptoms appear: neck or occipital muscles stiffness, Kernig, superior, medium and inferior Brudzinski symptoms. In suckling babies the Lesaj symptom, tensioning and even big fontanelle bulging, enlargement of skull sutures, rapid increasing of skull perimeter are often observing.



# Meningean syndrome

- **Kernig symptom**– the child is in dorsal decubitus, first of all one inferior member is flexing, after that try to reduce the shank in extension, but it is not possible because the muscular resistance.
- **Neck stiffness** – is observing most often in children and is controlling in the following order: we try easily to flex the child's head and in the same time feel the occipital muscles resistance, which not allows to the chin to touch the manubrium sterni. In newborns and prematures for observing the resistance of exhausted neck muscles the head will be raised very attentively with 2 fingers without forcing.



# Meningeal syndrome

- **Brudzinski symptom** – indicates also the muscular contraction. The child is in dorsal decubitus. At head flexing (Brudzinski superior) or at pressing of pubian symphysis (Brudzinski medium) the inferior members are flexing. The flexing of one inferior member leads concomitantly to contraction in flexion also of inferior member on the opposite part (Brudzinski inferior).



# Meningeal syndrome

- **Lesaj sign (of suspending)** – if the baby is raised under one's arms, then he reflectorly flexes the legs and pulls them to the belly.
- Both the tensioning or bulging of fontanelles, enlargement of sutures and growing of skull perimeter show the intracranial tension increasing in the case of meningites. It's necessary to memorize that the most often met meningeal signs are: headaches, nausea, vomit, neck stiffness, Kernig, Brudzinski, Lesaj symptoms. In children until 2-3 yrs the meningeal syndrome never is complete, and in prematures and newborns the t<sup>o</sup> reaction can be absent. In such children only vomit before or after meal and severe and unclear state indicate to perform lombar puncture or of big fontanelle. Even in the absence of meningeal signs we can find purulent CSF. So, these peculiarities in newborns and suckling babies are necessary to memorize.



# Estimation of the neuropsychological development of children

- **Mental retardation.** This is one of the most common chronic illnesses of childhood and is characterized by limitations in performance that results from significant impairments in measured intellectual and adaptive behaviour. It is the prototype of developmental disability. Others include cerebral palsy, specific learning disabilities, autism, and visual or hearing impairments.



# Levels of severity of mental retardation

- Strictly speaking, children with IQ scores above 69 do not meet the criteria for mental retardation, but they are vulnerable to educational problems. Many such children are able to function adequately with special help in regular classes. Most achieve independent social and vocational adjustment.
- This group includes almost 90 % of children formally classified as mentally retarded. Most need at least some special class placement, although mainstreaming should be considered, and some can achieve the 4th-6th grade reading levels. Those, who have well-developed adaptive skills, may be able to function independently as adults.



# Psychosocial problems.

- Psychiatric sequelae of the central nervous system injury. Children with brain damage, epilepsy, and mental retardation have an increased frequency of behavioural disorders.
- Those with hydrocephalus, motor deficits, and encephalitis also have a greater than average incidence of psychiatric disorders. Low intelligence, language disorders, and bilaterality of motor handicaps increase the incidence of psychiatric disturbances. No specific type of disturbance is encountered, and, when problems of impulse or anger control, aggressiveness, hyperactivity, or other emotional reactions occur, they do not differ in quality from those of children with the intact nervous system who have the same disturbances.



# Psychosomatic disorders.

- In these disorders psychological conflict significantly alters the somatic function. Any kind of emotional distress may be associated with any kind of disorder.
- Psychomotor disorders are characterized by chronic and acute processes that produce functional abnormalities within the autonomic nervous system, leading to structural changes with organ systems (e.g., some cases of eczema, asthma, ulcer, colitis, and peptic ulcer).



# Rumination

- Repeated regurgitation of food without nausea or gastrointestinal illness may rarely lead to weight loss or figure to gain weight. The disorder appears between the 3rd and 4th months, is potentially fatal, and often, but not invariably, associated with a disturbed parent-child relationship.



# Pica

- This refers to chronic ingestion of innutrient substances (e.g., plastic, paint, earth) usually at 1-2 years of age. It can be a symptom of family disorganization, poor supervision and affection neglect. There is an increased risk of poisoning and parasitic infection.



# Enuresis

- The involuntary discharge of urine after the age at which the bladder control should have been established is a common problem, more frequent in boys than girls. When the child has never been dry at night, bedwetting is often related to inadequate or inappropriate toilet training. When bedwetting occurs in a child who had previously been dry at night, it is often precipitated by stressful environmental events; such cases are intermittent, transitory, and easier to manage. Very infrequently there is organic pathology.



# Encopresis.

- This refers to defaecation in inappropriate places at any age after bowel control should have been established. Organic defects are rarely found. Chronic soiling is often associated with chronic constipation, faecal impaction, and overflow incontinence. It may progress to psychogenic megacolon. This symptom often represents the child's unconscious anger and defiance.



# Sleep disorders

- These are common in childhood, and separation anxiety often contributes to the problem. They are usually adequately managed by parental support, reassurance, encouragement, and the adoption of a calm, understanding, but firm attitude. A quiet period before bedtime and regular bedtime hours are important.
- Night terrors, consisting of an acute arousal with confusion, anxiety, disorientation, and autonomic activity, may occur in the preschool years. They are usually self-limited and respond to parental reassurance.



# Anxiety disorders

- When anxieties, which are a normal aspect of development, become detached from specific situations, or become socially disabling, they constitute disorders requiring treatment.
- School phobias, in which, for various reasons, a child will not attend school, occur in 1-2 % of children and are often associated with depression as well as anxiety. Management involves treatment of underlying psychiatric problems, family therapy, and liaison work with the child's school.



# Anxiety disorders

- Separation anxiety disorders are characterized by unrealistic and persistent worries of possible harm befalling primary caregivers, reluctance to go to school or to sleep without being near the parents, avoidance of being alone, nightmares involving separation themes, somatic symptoms, and complaints of subjective distress. Supportive child and family psychotherapy, and parent training are usually effective.



# Affective disorders

- In school-age children, this disorder develops over a period of days or weeks and presents with a variety of symptoms, including sad facial expression, easy tears, irritability, withdrawal, and eating and sleeping disturbances. Adolescents typically present with impulsivity, fatigue, depression, and suicidal ideation. They may develop hallucinations.



# Suicide and attempted suicide

- This is a major problem in adolescence, and the incidence is rising in children under 15 years. Completed suicides are associated with preceding suicide attempts, depression, general psychopathologic factors, family history of suicidal behaviour or depression or drug use, suicidal ideation, preoccupation with death and dying, wish to die, feelings of hopelessness or worthlessness, hostility and the notion of revenge, and substance abuse.



# Psychosis.

- Infantile autism is characterized by qualitative impairment in verbal and nonverbal communication, in imaginative activity, and in reciprocal social interactions. It occurs before 30 months. Psychotherapy and psychopharmacology are of limited benefit.
- Children may have pervasive developmental disorders involving social interaction and communication not qualifying for the diagnosis of autism. The psychotic reactions of older children require management by paediatric psychiatrists.



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