

TICK ENCEPHALITIS and CENTRAL EUROPEAN ENCEPHALITIS (T.E.)

Acute, viral disease transmitted by ticks with the sub-sequent damage of the nervous system as a meningitis, meningoencephalitis or myeloencephalitis with possible development of flaccid paralyses and pareses mainly of muscles of a shoulder girdle and neck.

Historic reference

1932 - in the Far East was registered flashout of disease among the visitants with a damage of the nervous system with a high lethality and paralyses for survived

1934 - A.G.Panov - has determined etiological independence of disease

1937- L.A. Zilber etc. - have detected of the infectious agent of the illness

Е.А. Павловский, А. А. Смородинцев, И.И. Рогозин - **have allocated** 29 serovars of a virus, **have described** variants of illness, **have developed** of the methods treatment and prophylaxis

ETIOLOGY (**F. Togaviridae, K. Flavivirus**)

It is small spherical virus by a size 35 - 50 nm. The a nucleocapsid contains one-filamentous RNA (+). It is covered with the lipoid envelope.

The **replication** of a virus occurs **in a cytoplasm** of the host's cells.

At pasteurizing is inactivated in 10 minutes. At boiling is perished in 2 minutes. Under effect disinfectants and UVL survives from 1 – to 10 minutes. **In 50 % glycerinum -some months** and at a **lyophilization - years** are saved.

Distinguish the **Central European** and the **Far East** variants of a viral tick encephalitis.

EPIDEMIOLOGY (natural, focal, transmissible zoonosis)

The main reservoir and carrier of viruses are 16 sorts ixodes ticks (viruses in them are saved from 2 – to 4 years, transmitting one transphase (larva- nymph- tick) and transovarial (via eggs).

The infection ticks can reach 20 - 40 %.

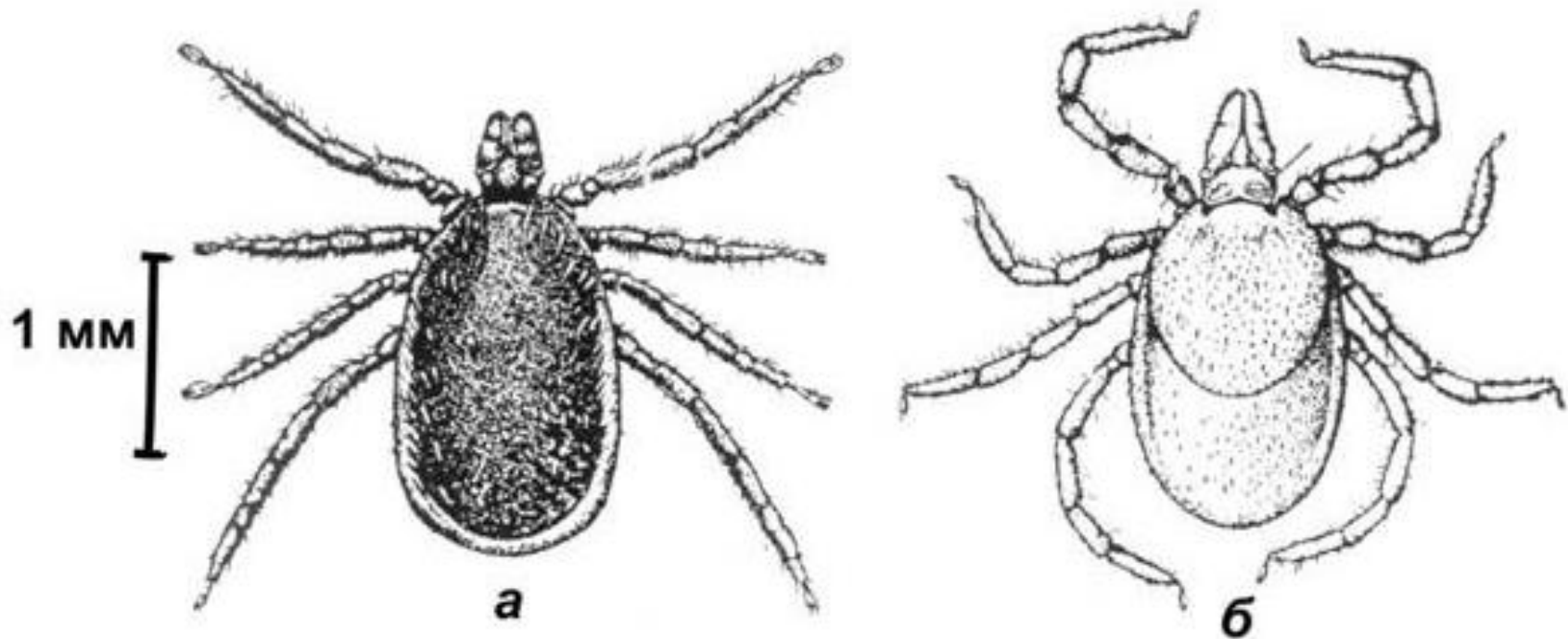
The main carriers of TE and them spreading:

Ixodes persulcatus - in Asia (from Sakhalin up to the Urals, Mongolia, China, Korea)

Ixodes ricinus – from the Urals up to Poland, in Czechia, Slovakia, Hungary, Bulgaria, Romania, Austria, Germany, Sweden, Finland)

Ixodes cookei - in USA and Canada

The auxiliary reservoir - more than 130 sorts both wild animals (hedgehogs, moles, ground-squirrels) the home mammals and birds – **carriers of the ticks.**



Ixodes ricinus:

а- самец, б- самка (по Б. И. Померанцеву)

Main mode of transmission - transmissible - 80 %

**Auxiliary mode of transmission – nutritional- via crude milk:
goats, cows, sheep - 20 %.**

**Seasonal prevalence –spring-summer months -maximal
activity ticks.**

**The men in the age of from 20 to 40 years, cattle - breeders
and working people in a wood are often sicken**

**In endemic sources - T.E. proceeds without clinical
manifestations with creation of proof immunity in 95 % of
the recovered.**

PATHOGENY

1. Implantation of a viruses through a **skin** (at a sting tick) or **mucous** (at nutritional mode of infection). Adapting and creating colony
2. Active **absorption** of viruses by cells of the system macrophagal phagocytes, intensive **replication** in them and output **of virus - descendants** in a blood
3. **Destruction** of a part of viruses- descendants in a blood with development of a syndrome **intoxication**

4. The **penetration** of the survived viruses- descendants in **all bodies** and systems of an organism with the subsequent fixing mainly in cells of the nervous system, but especial **in an oblong brain and anterior roots of a cervical portion of a spinal cord** (less often) in a cerebellum and pia mater membrane) with development of **inflammatory and degenerative processes** in them,
5. Development further of **exudative proliferative processes** in membranes of a brain, in motor roots of a spinal cord, peripheral nerves and vegetative ganglions
6. **Clinical** the illness **appears** by a **diffuse or focal** encephalitis, meningitis, myelitis, disorder of activity CVS, respiratory systems etc.

7. After **eliminated** of viruses - start the processes of convalescence resulting in restoring of broken functions, but for the **majority of the patients** both the muscle weakness and atrophy (**less often**) of the struck muscles, especially of **shoulder girdle** is saved. Sometimes process **becomes chronic**.

PATHOMORPHOLOGY:

- **degeneration and bloodfull** of the internal bodies
- **hemorrhages** in pericardium, stomach, intestine, mucous
URT
- **edema and bloodfull** of cerebral membranes
- substance of the brain and spinal cord is **edematousus with hemorrhages, flabby**.

CLINIC - considerable vary of clinical signs!

Incubation interval (from 1 – to 60 days) **7 - 14 days**

Prodromal stage – 3 - 7 days (**for some patients**)

- weakness and fast fatigue
- headache, paresthesia and radicular pains
- the disorder of sleep, psychosis (**is rare**)

The feverish form TE.

- acute starts, chill
- fast increase temperature of body up to 38 - 40 d.C
- strong headache, muscle and a articular pain
- nausea, vomiting, anorexia
- sleepiness or insomnia, photophobia and paresthesia

Objective:

- bright hyperemia of the face, neck, breast
- injection of vessels of scleras and conjunctivitis
- appearance of an erythema in a place of a sting tick
- hypotonia and relative bradycardia
- **WBC** – **neutrophilic leukocytosis**, moderate rise ESR.
At the Central European variant TE is often **normocytosis or leukopenia**,

Diagnosis confirms:

- **epidemiologic** (sting tick or the use of crude milk)
- **immunologic** (appearance in a blood of antibodies against viruses **TE**).

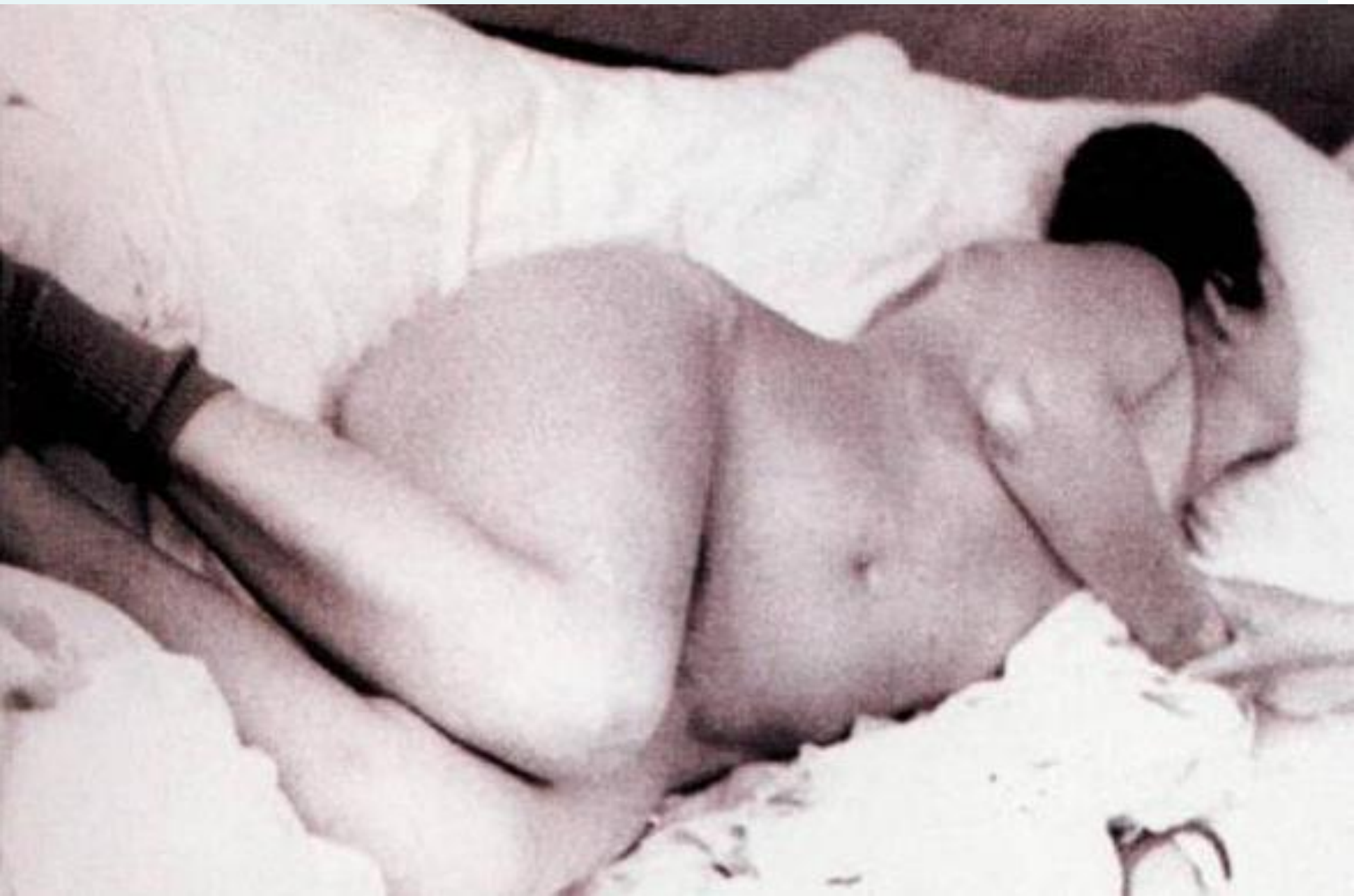
The feverish form TE is often ended convalescence with by creates of immunity, but **can be relapses**

Meningeal the form TE.

To the expressed intoxication and headache, **joins**
a meningeal syndrome:

- **the repeated vomiting** (does not bring facilitation to the patient)
 - **appearance** tension of muscles of a neck, s-ms: Kernig's, Brudzinsky's , Lesage's (**for children**)
 - **hyperacusia, photophobia**, paresthesia, weakening abdominal of reflexes
 - **In CSF - lymphocytosis** 100 - 200 cells
 - **increase** contents of a **protein**,
 - the level of a **glucose is not reduced**.
- Current favourable** and in 2 - 3 weeks - complete convalescence without complications

tension of muscles of a neck



Meningoencephalitic the form:

- **starts with intoxicational** and meningeal of syndromes, which in 3 - 4 days joins **a polyencephalomyelitic syndrome:**
- **oppression of consciousness**, hallucination, sometimes delirium, repeating epileptiform cramps
- **atrophic paralyses** of a muscles neck, shoulder girdle, proximal portion of upper extremities
- **the patient can not lift a head**, bend or unbend to arms
- spastic paralyses of muscles of lower extremities,
- **appearance of pathological reflexes - damage of pyramidal tract**

The bulbar syndrome can develop : an aphonia, dysarthria, dysphagia, paresis of muscles of a soft palate, deviation of the tongue and atrophy of its muscles, disorder ventilation of the lungs with the subsequent pneumonia

- for 25 % - damage of nuclei of the 7, 9, 11, 12 pairs of the cranial nervous.

For the majority of the survived patients through 10 - 12 days:

- are normalized temperature,
- the signs of an intoxication and meningitis disappear,
- the motor disorders are exposed to sluggish return development,
- but for many patients is saved atrophy of muscles causing them to disability. (lethality 25-30 %)

Chronic current of a tick meningoencephalitis:

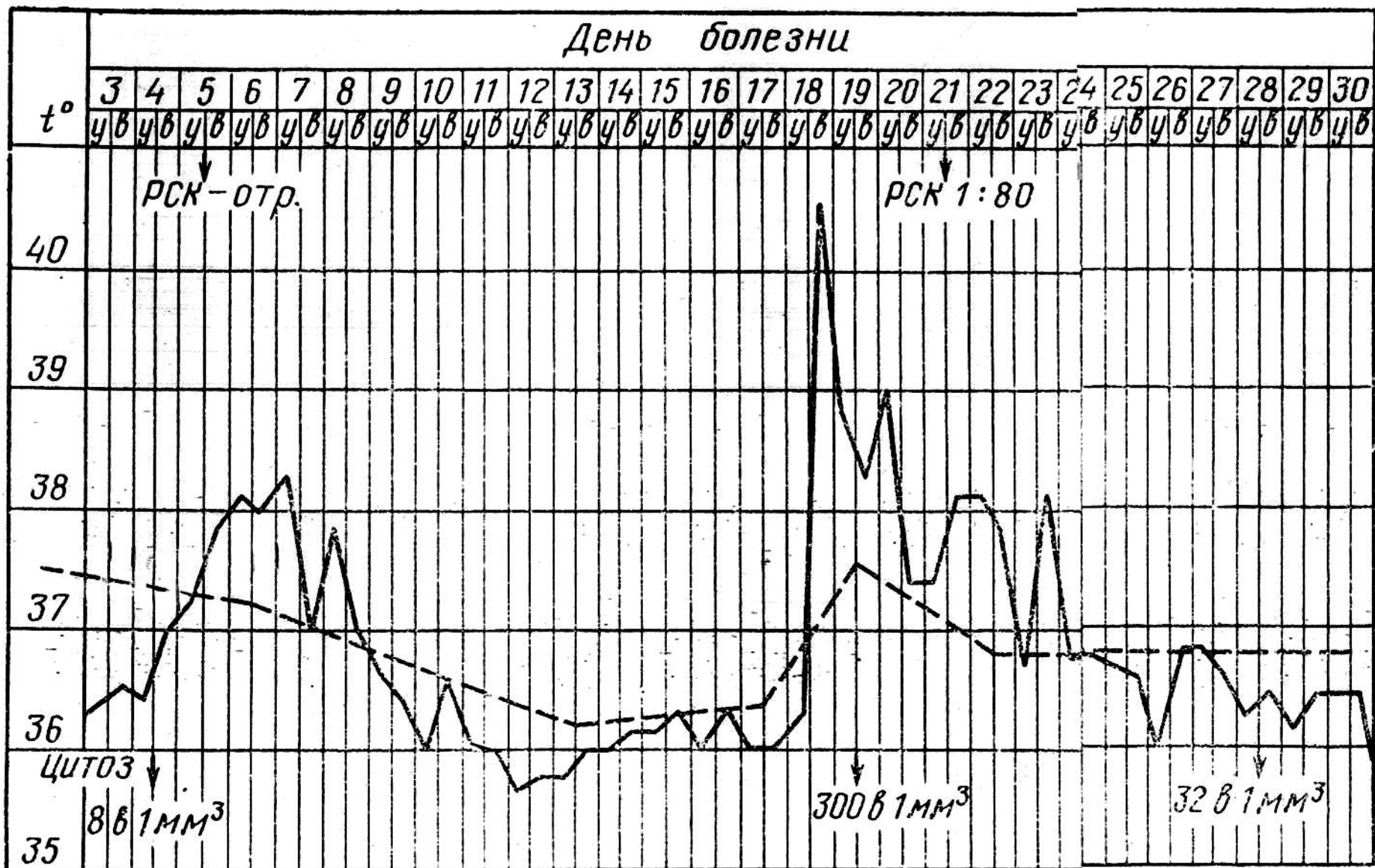
- develops of an aphrenia
- myoclonic hyperkinesias with epileptiform by attacks or epilepsy Кожевникова (simultaneous myoclonic hyperkinesias + epileptiform attacks with losses consciousness)
- syndrome of a chronic polyomyelitis
- syndrome of a side amyelothrophic sclerosis

Polyradiculoneuritic the form (2 - 4 %)

- pains on a course of nervous trunks
- paresthesia in **distal portions** of extremities
- disorder of sensitivity in distal portions of extremities (**s-ms "socks", "«gloves"**)

Tick encephalitis with two-wavy current:

- on an extent 3 - 7 days proceed **as the feverish form** with normalization of temperature
- in 7-12 days apyrexia again there is a fever and the illness starts to proceed **in to the meningial form.**
- the convalescence is more often complete, but sometimes passes in **chronic TE.**



Температурная кривая у больного клещевым энцефалитом с двухволновым течением.

Polyomyelolitic the form

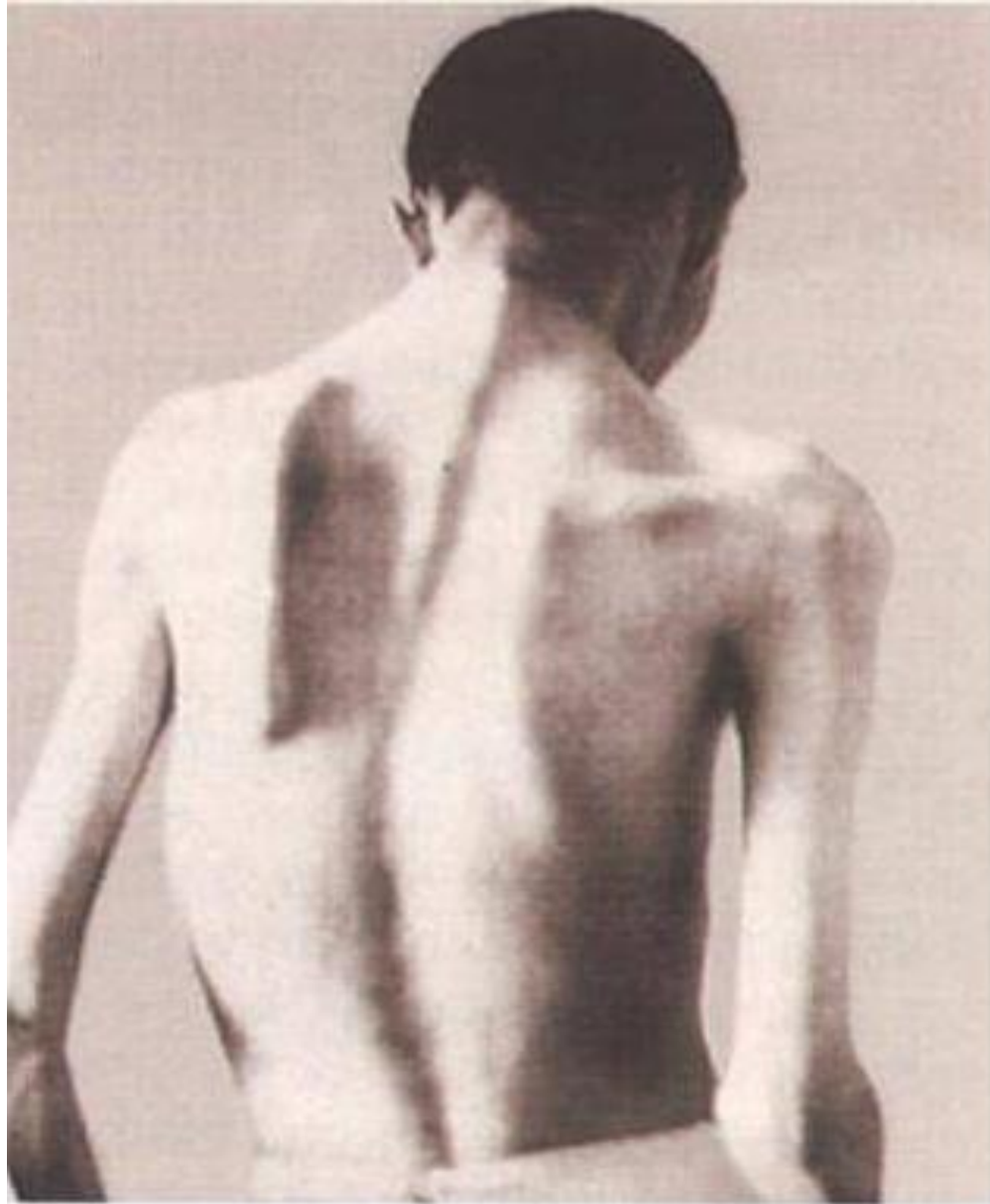
- appears by an intoxication and general cerebral signs on which background the early **SYMMETRIC, flaccid paralyzes** and pareses all muscles of a **neck, upper extremities and trunk** develop.
- after 3 weeks from a beginning of disease develops an atrophy of muscles the patient: does not **hold a head, can not move with shoulders and upper extremities.**
- the motor disorders of lower extremities more often **miss or inappreciable**

Tick encephalitis can proceed as:

Focal encephalitis

As a uprising Landry's paralysis

As the fulminant forms with a edema brain, coma, fast resulting in death of the patient

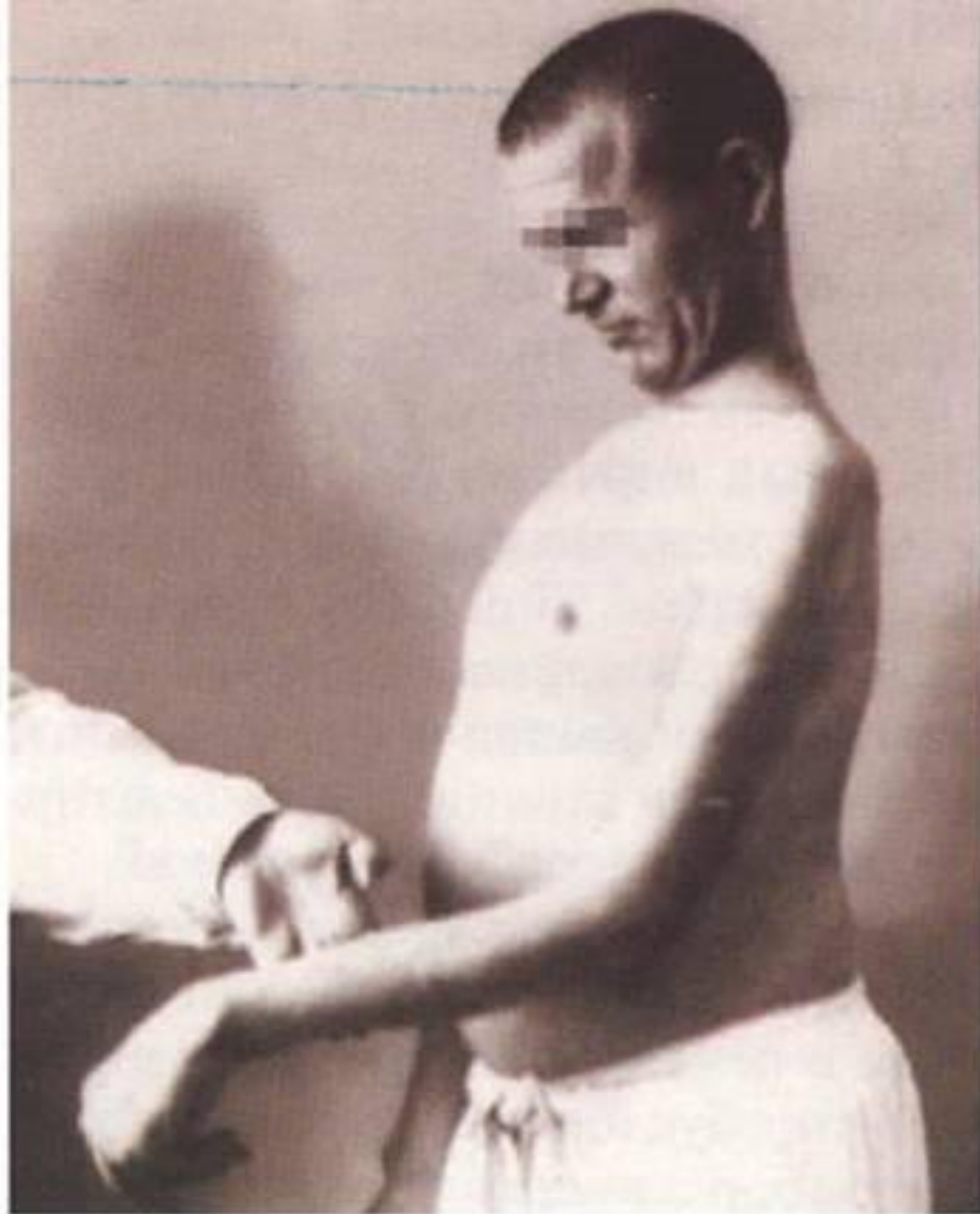


Атрофия мышц плечевого пояса и проксимальных отделов конечностей, «крыловидные лопатки».





Поражение лицевого нерва при
клещевом энцефалите.



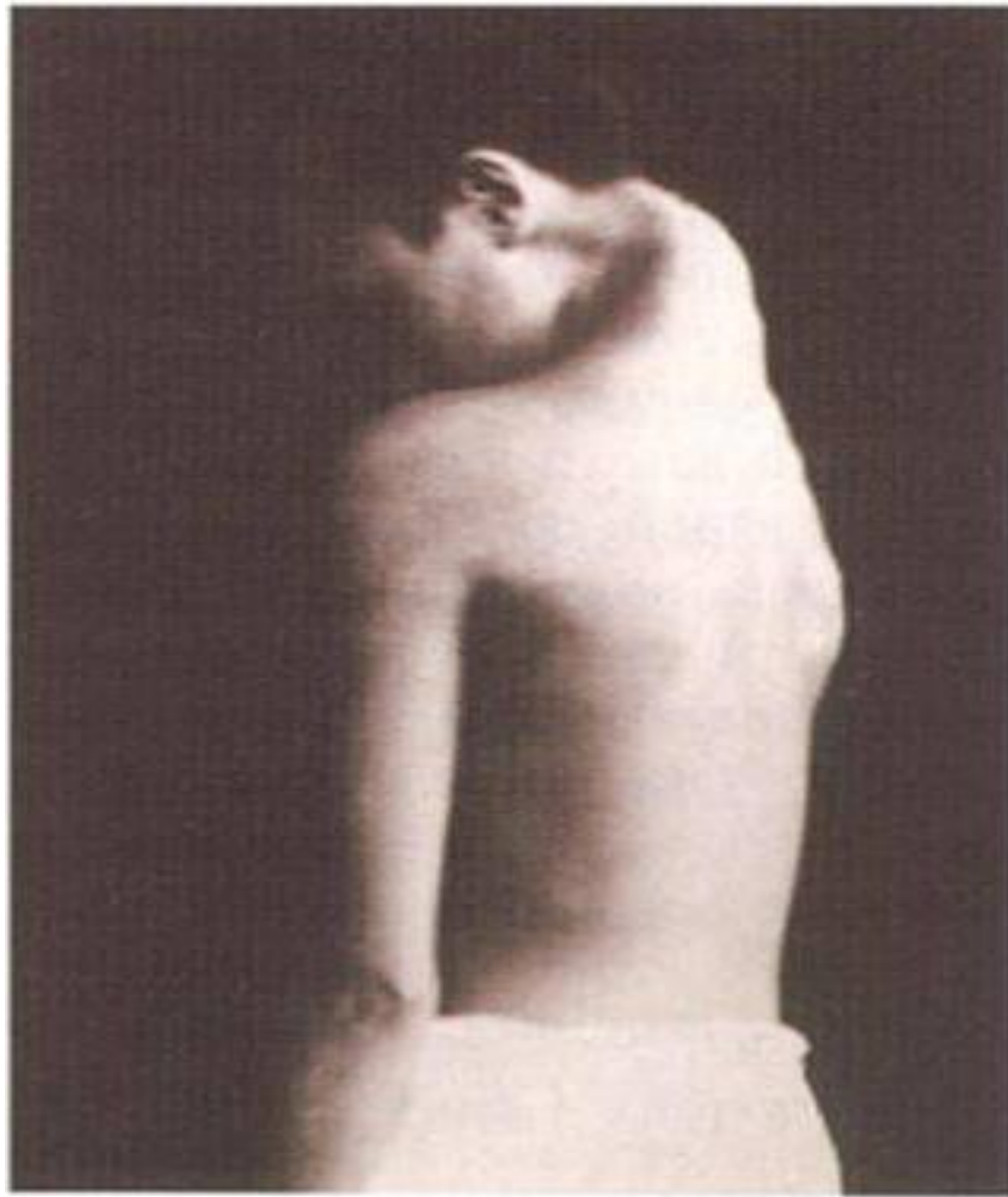
Вялый парез левой руки,
преимущественно проксимальных
отделов, атрофия мышц шеи.



Вялый парез и атрофия мышц
шеи и плечевого пояса.



Правосторонний монопарез руки
с односторонней атрофией мышц
шеи на той же стороне.



Симптом опущенной головы
после перенесённого клещевого
энцефалита.



Бо́льная ко́жевникопской
эпилепсией после клещевого энцефалита.

DIAGNOSIS:

1. **Clinico-epidemiological** : stay in endemic the source, spring-summer months seasonal prevalence, sting tick, use crude of milk
2. **Differential diagnosis** - with meningitises and encephalitis of **other** etiology, a damage of vessels of a brain, comas of a various genesis, tumours and abscesses of a brain, polyomyelitis
3. **Laboratory diagnosis**:
 - IFt** - search of a virus and its antigenes in **tissues tick**
 - virologic inspection** (intracerebral infection mouse) or usage of cellular cultures from kidneys of pigs
 - The immunological** inspection (HAt, CFt, Nt, ELISA) - since 7-th day of illness, is **repeated** through in 7 - 10 days and in 2-3 months (**the antibodies in a blood occur late**)

TREATMENT:

- all patient will carry out a **maintenance therapy**
- **the antiencephalitic immunoglobulin** is entered IM in a dose 3 - 12 ml / day within 3 days. At the serious forms a dose double. But duration of treatment also 3 days.

PROPHYLAXIS:

Decrease of a population ticks (disinfestation, rational support of a wood facilities (cutting down underbrush)

Prophylaxis of an attack ticks on the people and animals limitation free pasture of cattle, usage antickal of costumes and repellents)

The immunization of groups of hazard by killed cultural vaccine is three time (**efficiency 82 %**) with a revaccination in 1 year (**efficiency up to 92 % raises**)

Usage of immunoglobulins in a dose of 0,05 ml/ kg at a sting infection tick (**at + IFt**) is one time

System Tick Borreliosis (Lyme's illness)

Chronic or relapsing, zoonotic, transmissible disease starting with of a radiatic dermal erythema, fever with the subsequent damage nervous, CVS and locomotor apparatus

ETIOLOGY:

The infectious agents- *Borrellia burgdorferi* (1984), *Borrellia garinii*, *Borrellia afzelii* etc.

It has the spiraly form of a body of length 4 - 30 microns and width 0.3 - 1 microns with 4 - 11 flagella on each ends, which enlarge its mobility, Gram (-) is well coloured by aniline stains and silver.

In the external environment, at warming and at contact with disinfectants fast perishes.

It's cultivated only on mediums with a complete set of aminoacids.

EPIDEMIOLOGY:

The natural sources its are detected in **USA, Canada, Europe, Asia, Australia)**

The main host - wide circle animals (**deer, lambs, goats, sheep, cattle, cats, dogs, rodents and the birds**)

Animals can infect from each other contact way (**urine**)

Main carrier – ixodes ticks. The infection ticks in the sources changes in limits from **8 up to 61 %**, but only in **6 %** infectious ticks **Bor.** find out in a saliva - therefore the people even in the dangerous source **seldom** fall ill.

A case rate only sporadic.

Fall ill only people **frequently visiting sources** (tourism, fishing, hunting, working in a wood)

80 % infect in **June - July.**

Except for transmissible mode of transmission - exists also nutritional mode- **use crude milk - 20%**

PATHOGENY:

1. **Bor.** will penetrate into an organism through a skin (**sting of the tick**) or mucous GIT (**crude milk**) also adapt from 2 about 32 days
2. Migration in a skin and creation of a **ring erythema**,
3. Migration in all bodies (**CNS**, liver, kidneys, **myocardium**, **joints**, **eyes and etc**)
4. In the struck bodies can be saved 10 years and more, supporting in them an inflammation as independently and with involvement autoimmune responses

CLINIC (incubation interval from 2 about 30 days)
In clinic is observed 3 particular stages.

The 1st the stage is prolonged 7 - 10 days (3 - 32 days)

- fever, myalgia, arthralgia, pharyngitis, anorexia, nausea, vomiting
- appearance of **a ring erythema** for 60 % of the patients in a place of a sting tick which is gradually enlarged up to 16 sm on the average (**from 3 up to 68 sm**)
- saving bright edge, and the centre turns pale and will atrophy gaining sort **"of tissue paper"** in typical cases
- lymphadenitis and hepatosplenomegaly
- from the side NS - only paresthesia in a zone of a damage



Хроническая мигрирующая эритема на коже груди.



Хроническая мигрирующая эритема на коже передней поверхности бедра.



Хроническая мигрирующая эритема на коже ягодичной области.

The 2nd stage starts with 4 - 5 weeks (from 2 up to 21 weeks)
and proceeds with:

neurologic

or **cardiologic** by disorders

Neurologic as:

- of a serous meningitis with a **long-lived pleocytosis** both standard pressure and level of a glucose in CSF
- **in 30 % of cases** as an encephalitis (disorder of sleep, lowering of concentration of attention, memory defect, hyperexcitability)

- for 33 % occur poly and monoradiculoneurites, plexites, radicular disorders in cervical, thoracic and lumbar portions of a spinal cord, pareses of separate groups muscles, pareses of cerebral nervous (VII of a pair more often)

The duration of disorders is saved from 1 about 28 weeks, but after an encephalitis the headache, mental disorders, epileptiform by attacks from 1 to 8 years is saved

Cardiological (for 8 % of the patients):

- unpleasant sensations in the field of heart,
- brady- or tachycardia
- less often - clinic of a myocarditis or pericarditis
- complete or incomplete blockade of the carrying out system heart
- development of a thrombosis of its arterias
- the valval apparatus of heart **not damaged!**

The 3rd a stage (1 - 24 weeks of illness) - damage of joints:

- more often one **knee** joint (**60 %**) is damaged, less often others (humeral, ulnar), but sometimes a little joints is simultaneous.

Localization of an erythema and struck joint coincide only in 25 % of cases.

Duration of an arthritis from 8 days about 3 months.

More often arthritises arise in the autumn and are repeated from 1 up to 6 times with an interval from 1 about 10 weeks

Differential diagnosis:

- **At a ring erythema eliminate:** erysipelas erysipelotrix,, streptococcal cellulitis
- **At an erythema and damage of joints:** SLE, rheumatic disease

- **At damage a CNS:** all spirochetotic meningitises, tick encephalitis(**are combined in 20 % of cases**), tubercular and cryptococcal meningoencephalites, Behcet's illness, sarcoidosis.
- **Damage PNS** - Guillain-Barre's syndrome, disseminated encephalomyolitis

LABORATORY DIAGNOSIS:

Clinico-epidemiological method- a sting tick or use of crude milk, residing endemic districts, typical erythema)

ELISA- the antibodies Ig M occur in a blood through **3 - 6 weeks**, and Ig G - in some months after infection

Indirect immunofluorescence in pair serums - height of antibodies not less than 4 times

4. Immunoblotting assay and PCR

5. Acceleration ESR - 50 % of the patients, leukocytosis - 10 %, rise AST - 20 %, rise common Ig M - 30 %

6. Seldom- find out in the dermal center, blood, CSF

TREATMENT: in any stage will carry out anti-infectious therapy

In an acute stage - doxycycline 100 mg po bid

- amoxicilin 500 mg po tid

- cefuroxime axetil 500 mg po bid

- clarithromicine 500 mg po bid

(14 - 21 days)

In 2nd and 3rd of a stage - only ceftriaxonum on 1.0 g bid

IV or IM > (28 days)

Maintenance therapy

PROPHYLAXIS:

As well as at a tick encephalitis, but the methods of specific prophylaxis miss