AUTONOMIC NERVOUS SYSTEM PATHOLOGY

Lecture

for 4th year student of the Faculty of Dentistry

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Lecture plan

1. **Anatomy and physiology of suprasegmental and segmental divisions of ANS**

2. **Clinical examination of vegetative functions**

3. **Main neurostomatologocal autonomic syndromes and diseases**

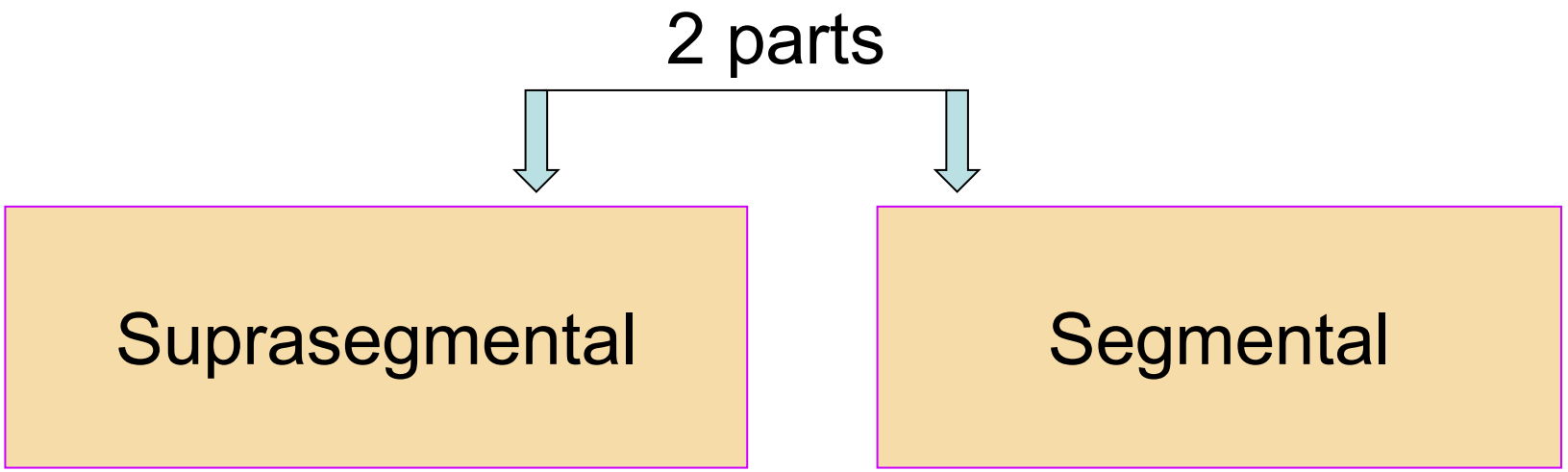
The autonomic nervous system plays a significant role in the development of almost all diseases.

In some cases, it is an essential factor in the pathogenesis, in some cases it is involved in response to damage of any systems and tissues.

It should be noted that all vegetative disorders typically are secondary, and occur against the background of many mental, neurological and somatic diseases.

Therefore, a doctor of any practice faced with clinical manifestations of the pathology of the autonomic nervous system

ANS anatomy



Suprasegmental

Consists of:

- Cortical,
- Subcortical
- Brain stem structures.

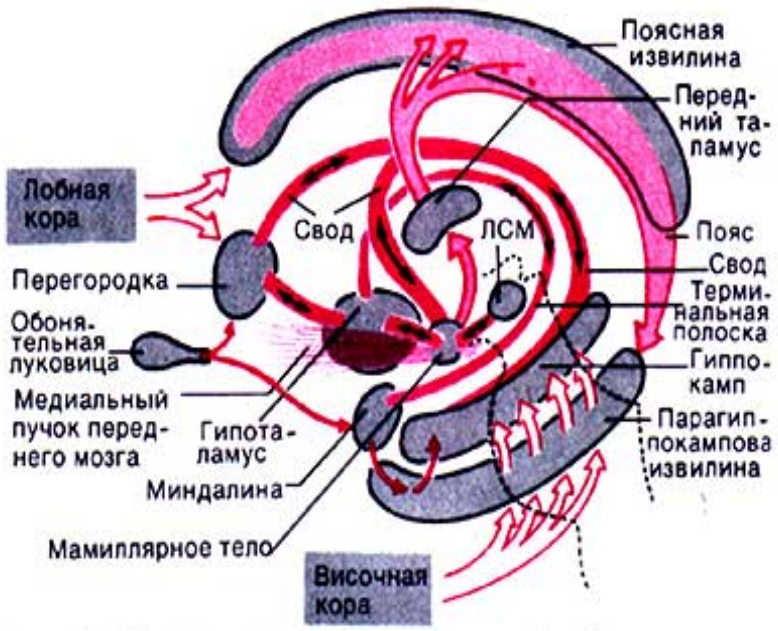
Regulation provides:

- memory
- emotions
- autonomic functions

suprasegmental

Limbic system

LS is the center of emotion, it is responsible for sexual, eating behavior and survival of the species.



Both positive and negative emotions affect the activity of VNS

By means of psychotherapy patient can be relaxed and calmed. The course of any pathology can be normalized or turned in a positive direction.

80% of the therapeutic effect of a doctor's visit is not related to the acquisition of the list of drugs, but it may cause a positive attitude to recovery.

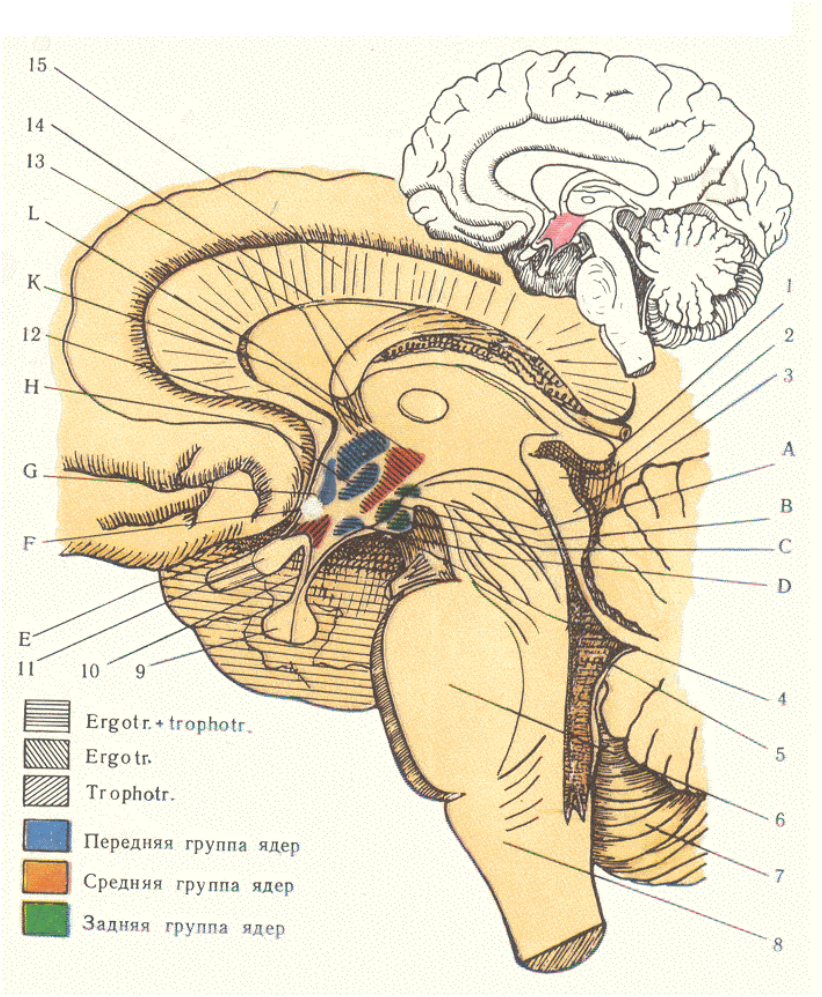
suprasegmental

The hypothalamus

It consists of the most important centers maintaining homeostasis constants:

- neuroendocrine
- thermal-regulating
- hunger and satiety
- maintaining blood pressure and heart rate.

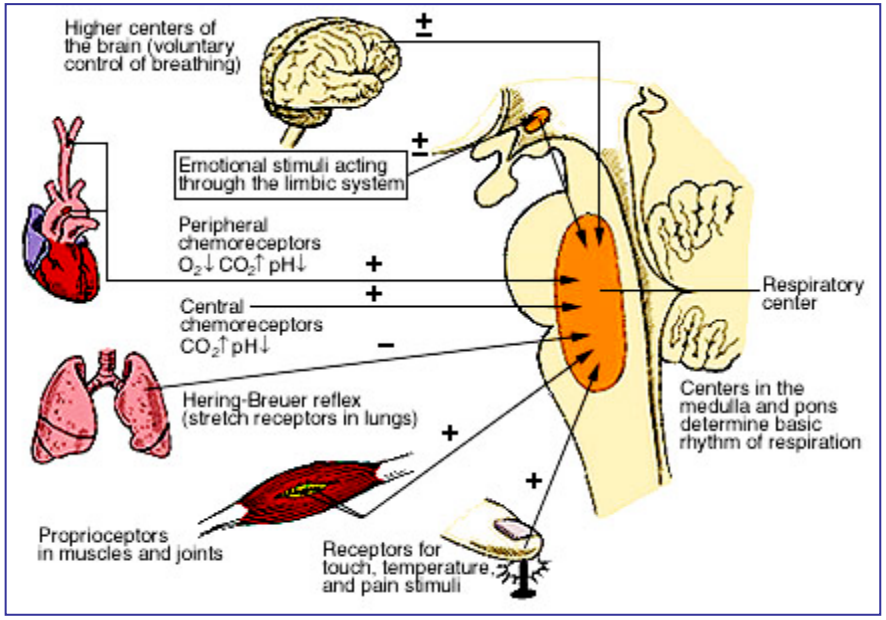
- Thus, the hypothalamus regulates the relationship between autonomic and somatic activity.

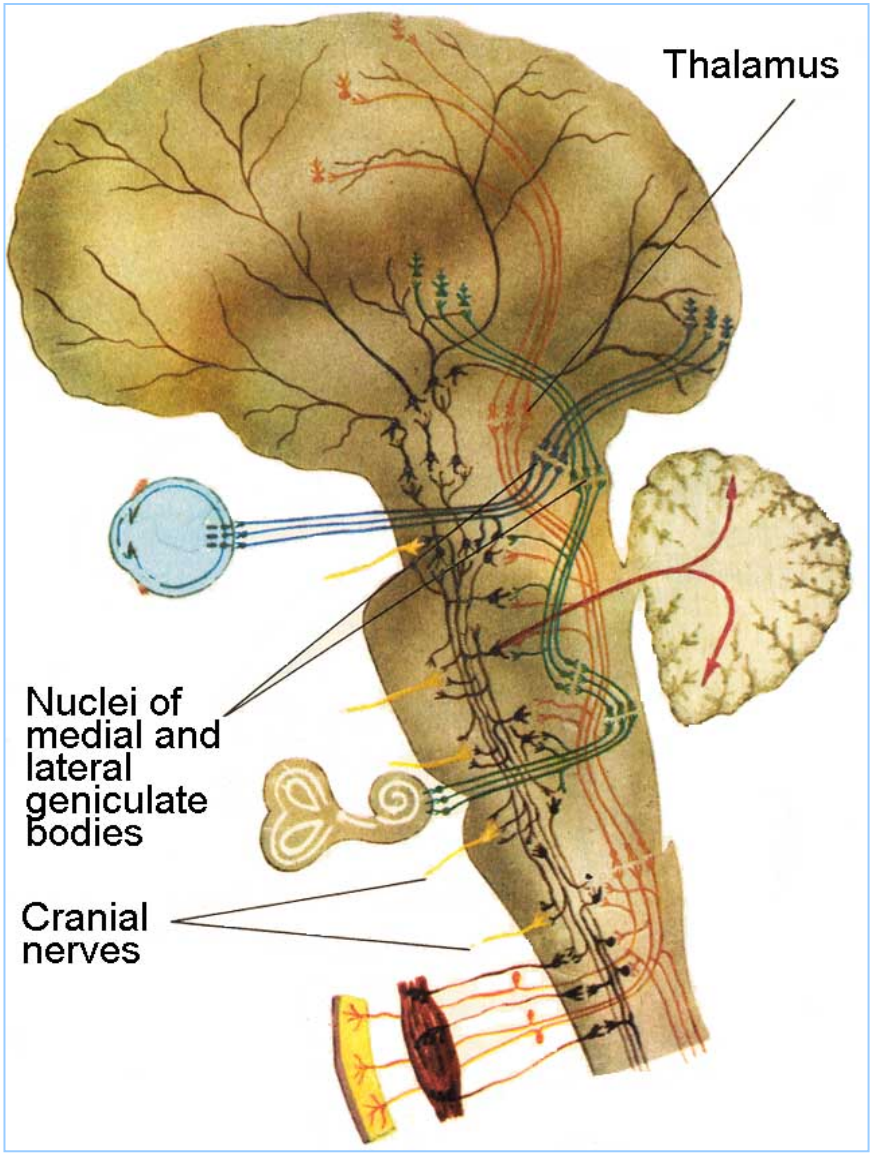


suprasegmental

Reticular formation

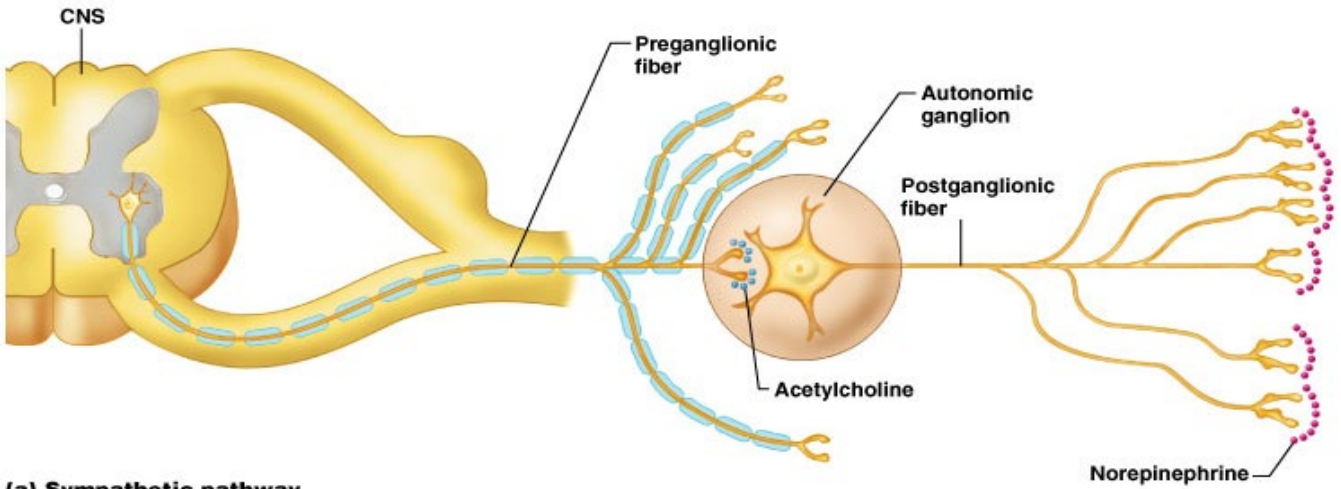
- RF is a kind of sieve, controlling the flow of impulses in the brain, especially during sleep (control of sleep and wakefulness).
- It controls vital functions (breathing, heart activity)



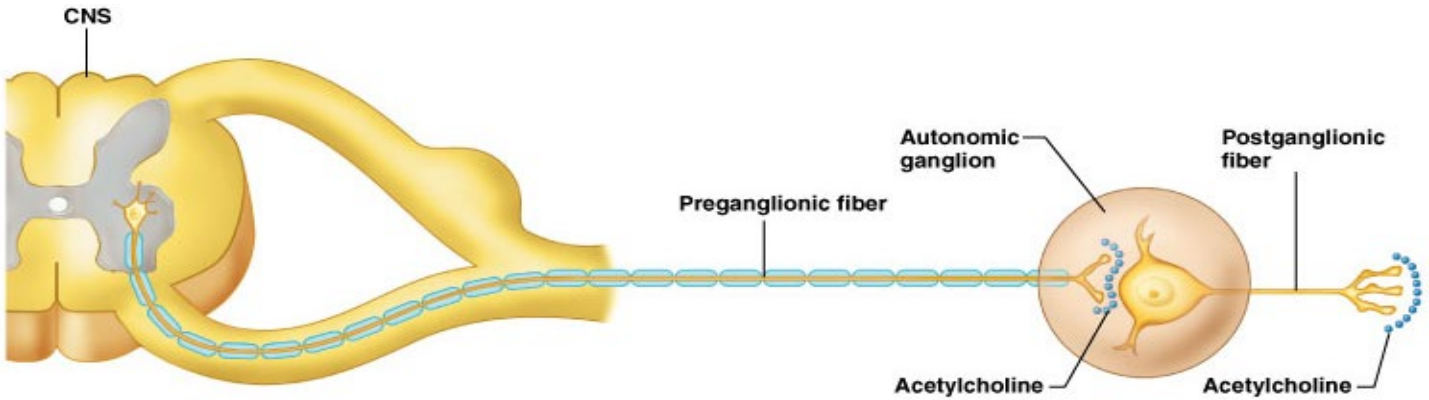


Segmental

It consists of segments of the spinal cord and brain stem and provides autonomic effects for organs

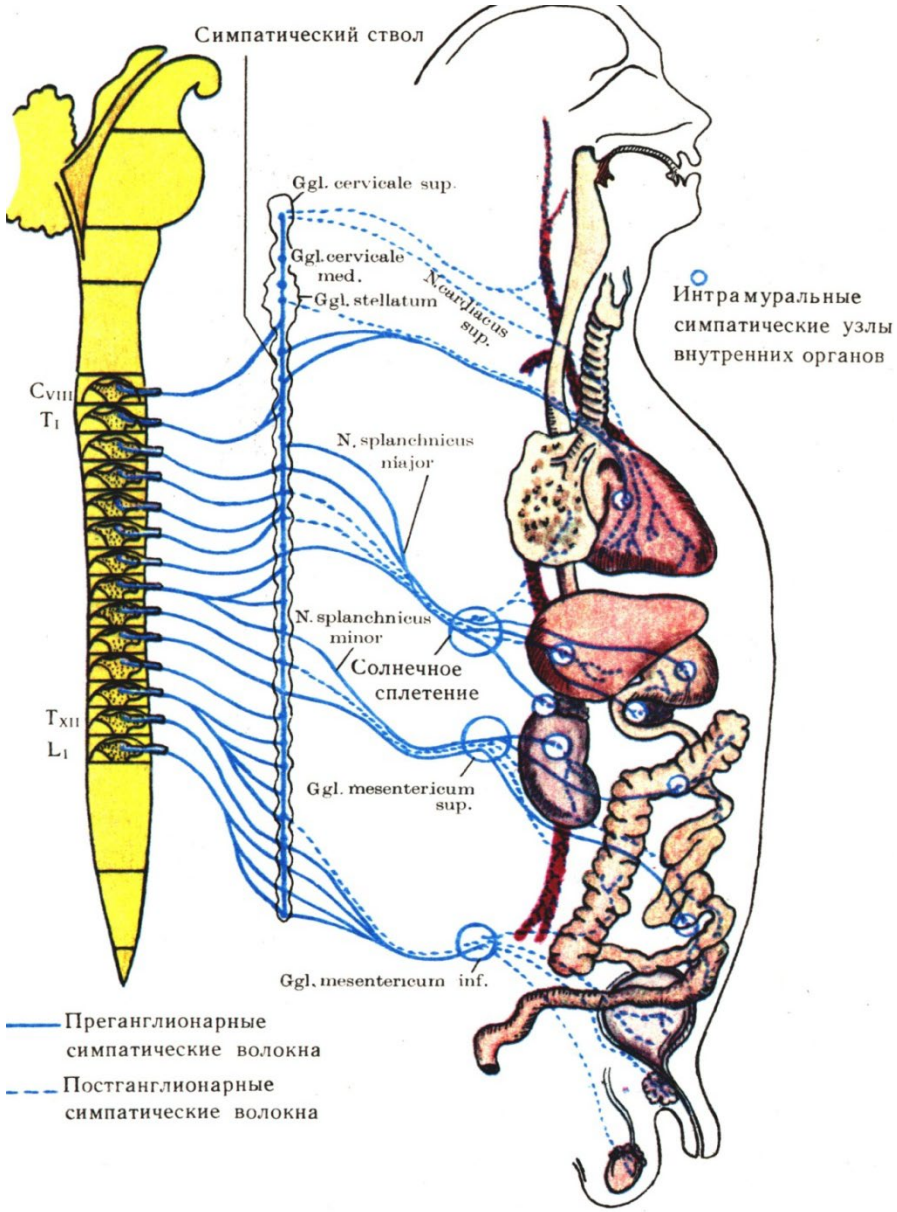


(a) Sympathetic pathway



(b) Parasympathetic pathway

segmental



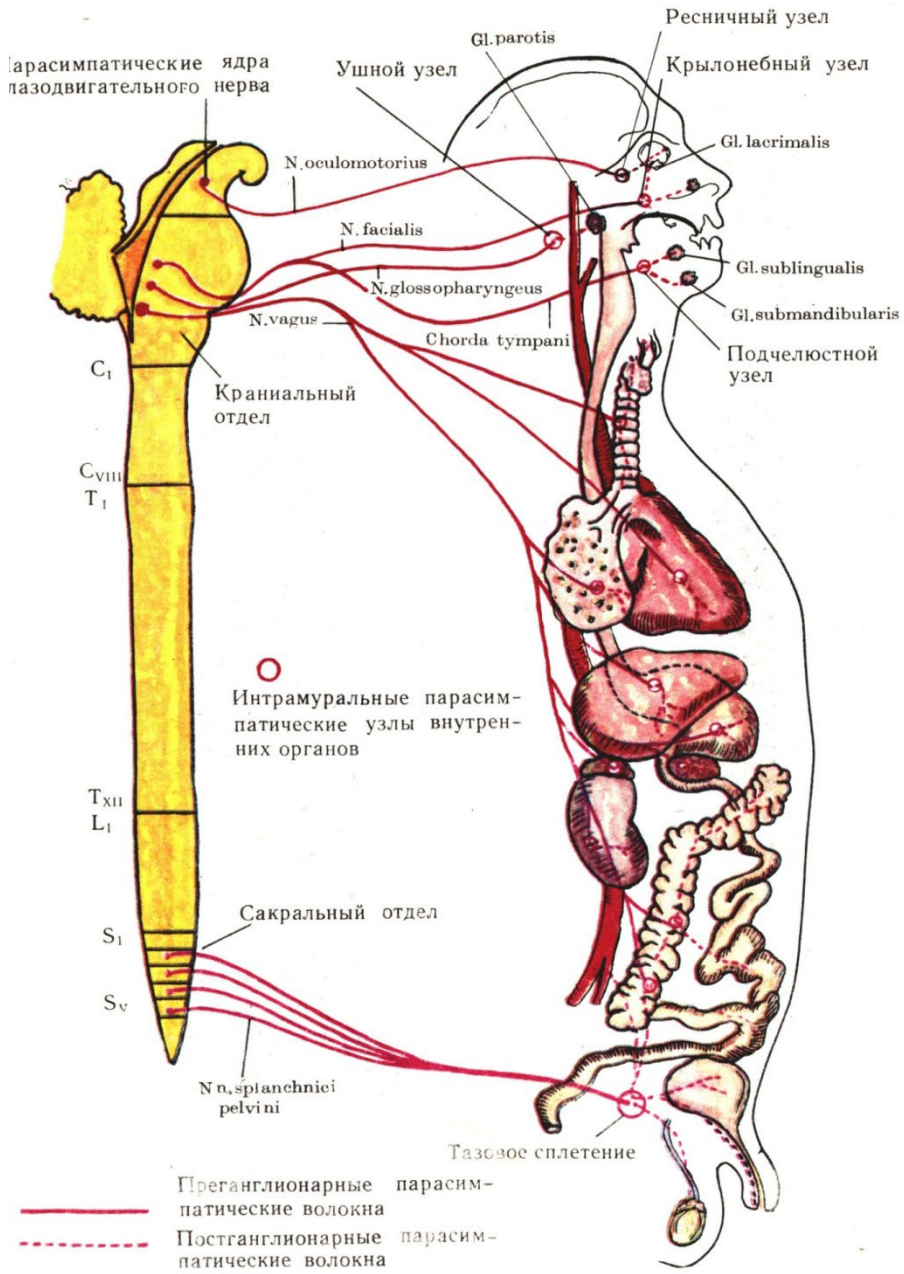
The sympathetic part:

1. Spinal segments C8 - L2

2. Paravertebral sympathetic ganglia (truncus sympathicus)

3. Sympathetic ganglia inside and around the internal organs

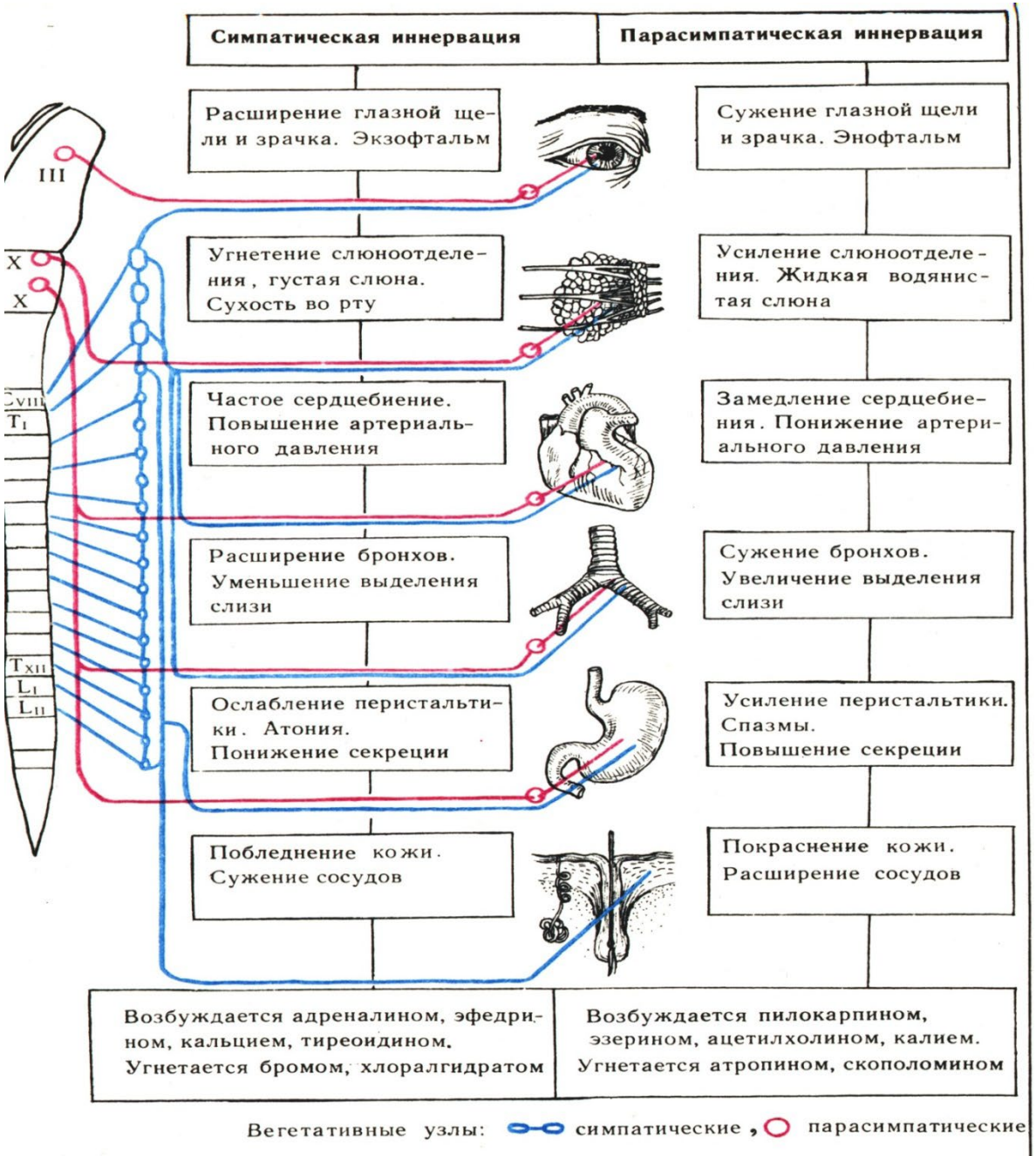
segmental



Parasympathetic part:

1. Vegetative nuclei of cranial nerves
2. Sacred segments of the spinal cord
3. parasympathetic ganglia around the internal organs

The influence of the sympathetic and parasympathetic innervation on the body



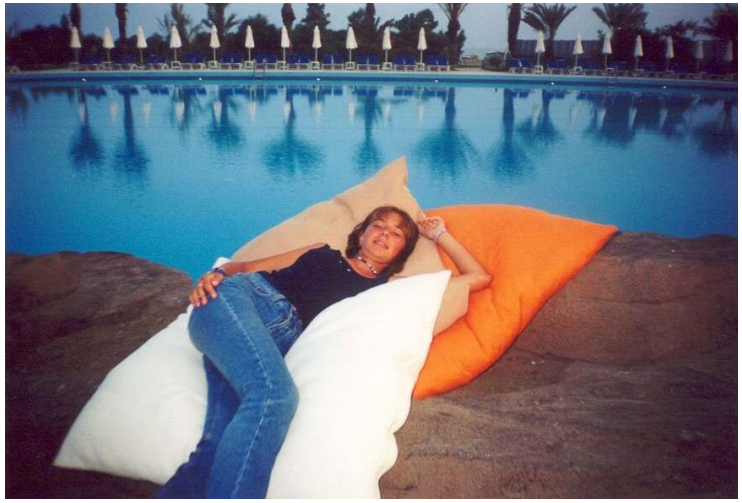
ANS functions

Ergotropic - providing various forms of mental and physical activity.

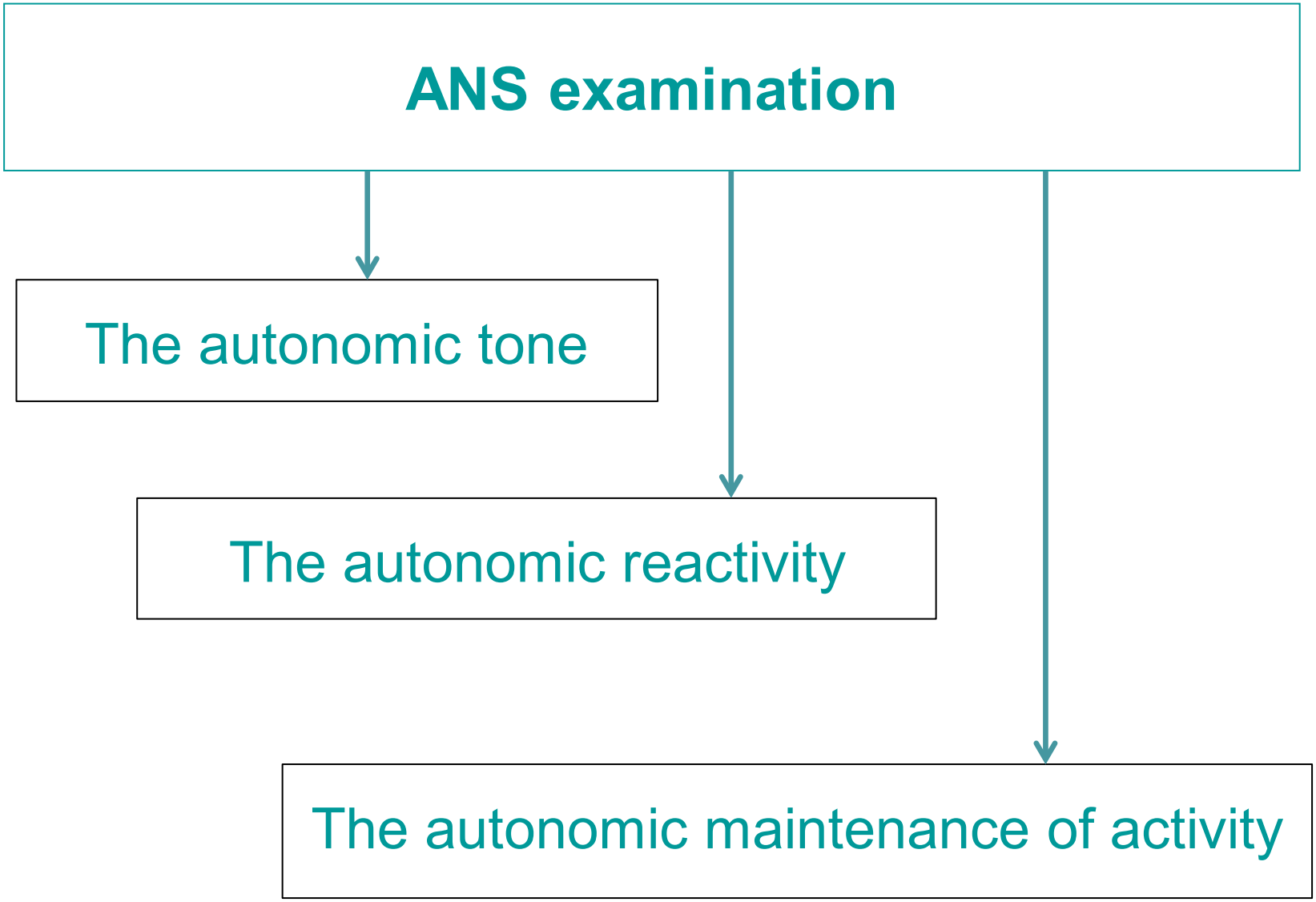
The main objective is to mobilize energy resources for the preservation of human life and in stressful emergency situations.

ANS functions

Trophotropic - maintaining a constant internal environment (homeostasis)



The main task is to maintain body constanti : brain and coronary blood flow, blood pH, ion concentration, blood pressure, body temperature, blood sugar, etc.


ANS examination
The autonomic tone
The autonomic reactivity
The autonomic maintenance of activity

ANS examination

The Autonomic tone

а) Спеціальні опитувальники, в яких представлені симпатичні і парасимпатичні реакції з боку різних органів і систем з їх бальною оцінкою

«Опросник» и объективные данные для определения общего вегетативного тонуса.

Симптомы и показатели	Симпатические реакции	Парасимпатические реакции	Оценка в баллах
1	2	3	4
Глаза			
Блеск	усилен	нормальный, тусклый	2,4
Зрачки	расширены	нормальные; сужены	3,4
Глазные щели	расширены	в норме	1,9
Экзофтальм	характерен	отсутствует	2,4
Слезотечение	нормальное	усилено	1,2
Итого:			**11,3**
Кожа			
Цвет	бледный	склонность к покраснению	2,4
Сосудистый рисунок	не выражен	усилен, акроцианоз	2,4
Сальность	нормальная	повышена	1,8
Сухость	повышена	нормальная	1,8
Потоотделение	уменьшение или увеличение выделения вязкого пота	повышено выделение жидкого пота	3,1
Дермографизм	розовый, белый	интенсивно красный, возвышающийся	3,1
Температура кожи тела	снижена	повышена	2,9

ANS examination

The Autonomic tone

б) Реєстрація об'єктивних вегетативних показників

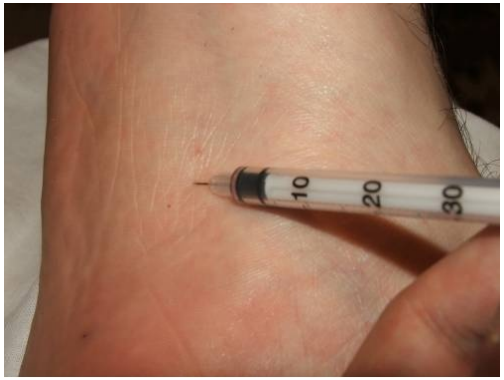
(наприклад, - пульс, артеріальний тиск, слиновиділення та ін.) з бальною оцінкою.

Оцінка вегетативних індексів (Кердо, Хільдебранта).

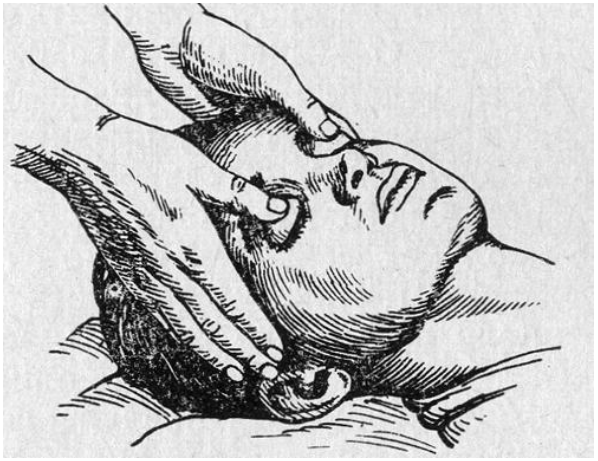
ANS examination

The autonomic reactivity

а) фармакологічні проби (адреналінова, інсулінова);



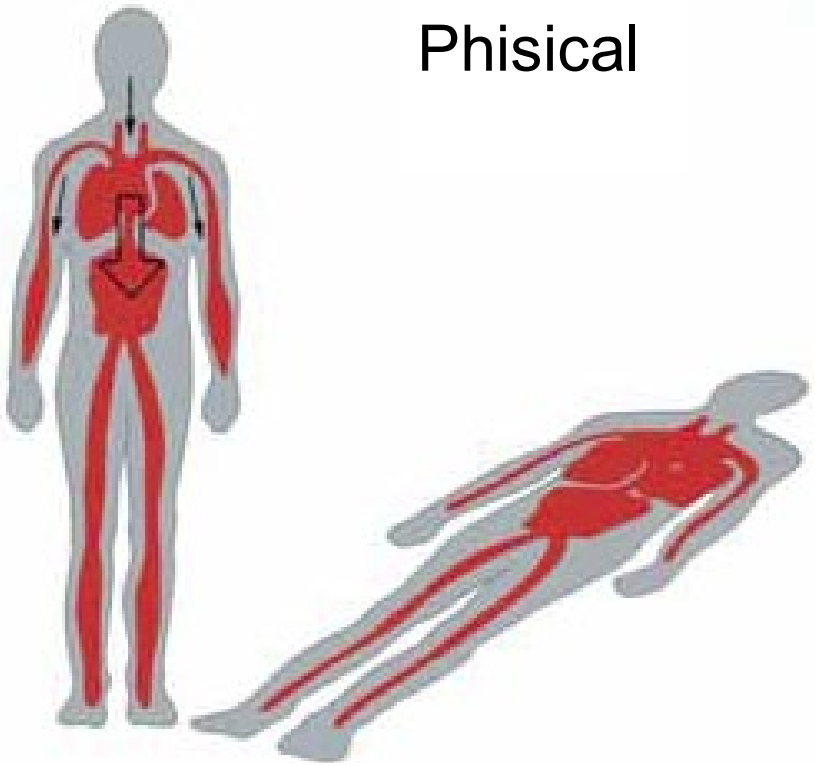
б) фізичні проби:
холодова проба;
очно-серцевий рефлекс Даньїні-Ашнера;
синокаротидний рефлекс Чермака;
солярний рефлекс Тома-Ру.



The autonomic maintenance of activity

veloergometer

Phisical



orthostatic test

The autonomic maintenance of activity

Emotional

Mental

The basic autonomic neuro-dental syndromes and diseases

MIGRAINE

- Migraine is a neurological disease of which the main symptom is occasional or regular headaches in one half of the head.

- Spreading in the population (10% of diagnosed patients and 5% undiagnosed or wrongly diagnosed). It is more common in women.

- The frequency of attacks varies from rare (a few times a year) to daily; but most migraine attacks are repeated at intervals of 2-8 times a month.

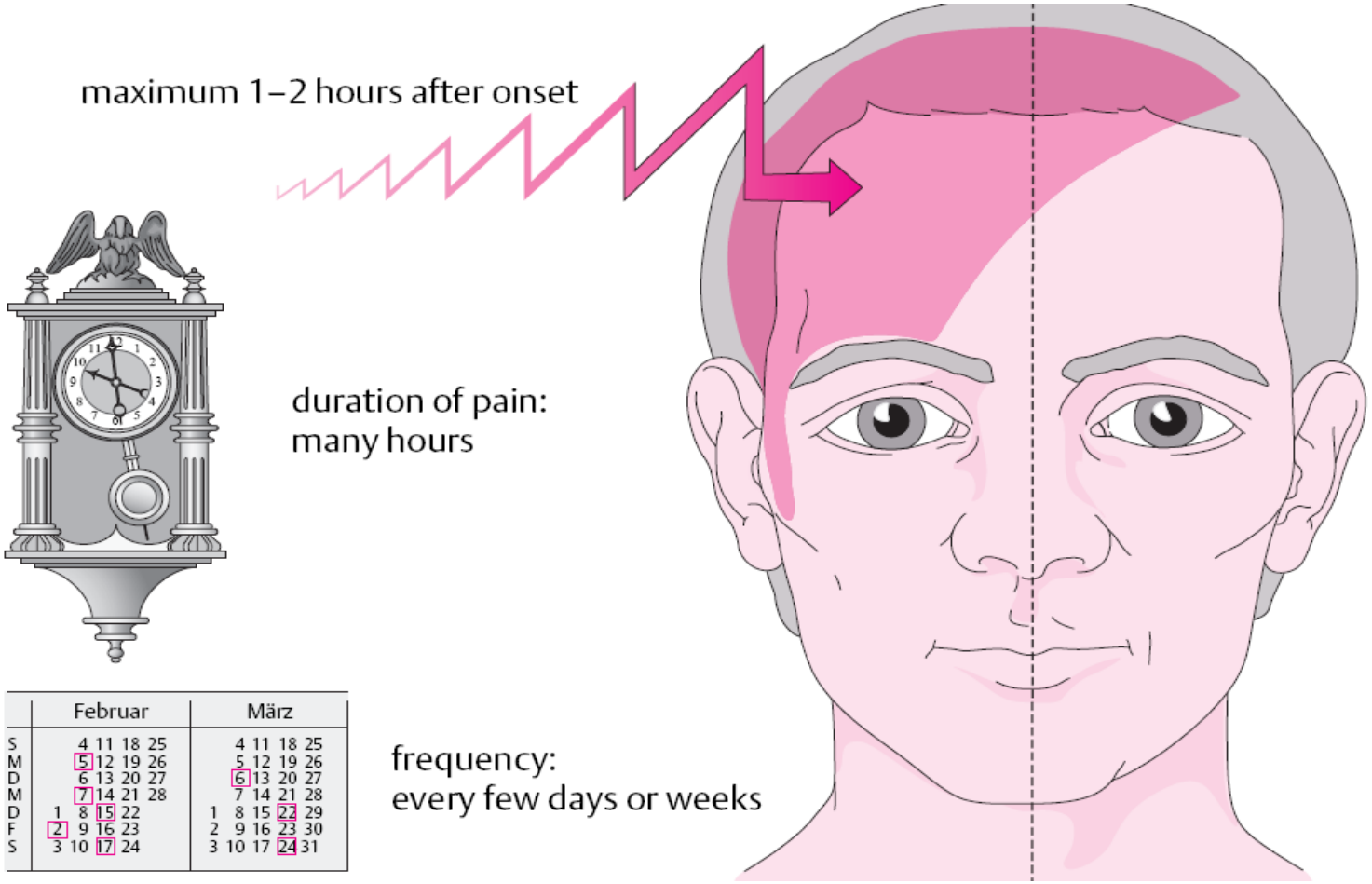
MIGRAINE

The cause: changes in autonomic-humoral regulation of brain vessels

Provoking factors:

- Stress, nervous and physical strain,
- Food products (cheese, chocolate, nuts, fish)
- Alcohol (mostly beer and red wine, champagne)
- Hormonal factors (menstrual cycle, oral contraceptives)
- Sleep (lack or excess)
- Weather factors (weather changes, climate change).

MIGRAINE



- Headache in migraine is localized in one half of the head (sometimes covers both halves). It spreads to the eye, upper jaw and neck. It has constant throbbing character

MIGRAINE

Pain increases at any irritation (noise, light, smells).

A typical migraine attack lasts from tens of minutes to several hours.

Severe migraine attacks lasting several days are called migraine status.

Migraine attacks are often accompanied by nausea, vomiting, dizziness.
Irritability, agitation or depressed mood, lethargy often observed

2 basic forms

MIGRAINE

Migraine without aura

Pain has a pulsating character, average or high intensity.
Pain increases with physical and mental activity and is often accompanied by nausea, vomiting, sensitivity to light and sounds

Migraine with aura

The aura occurs before the headache attack or along with its beginning: blurred vision, auditory, visual, gustatory, olfactory or tactile hallucinations, dizziness, problems with concentration and with speech.

Treatment of migraine

Relieve an attack

NSAIDs (acetaminophen, aspirin combined with caffeine - Askofen)

Serotonin antagonists (sumatriptan, imihran)

Ergot alkaloids (dihydroergotamine, kofetamin)

Hot tub with a head

Sleep

Preventing attacks

Compliance sleep, avoidance of physical and mental fatigue, stress, timely regular meals.

Avoid foods with tyramine (cheese, chocolate, nuts, fish).

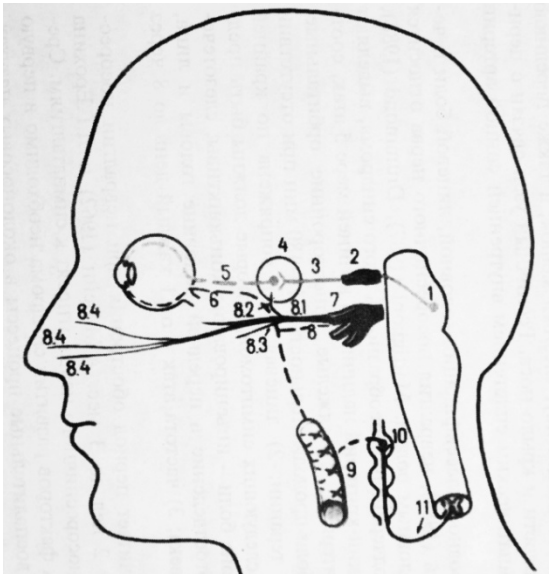
Antiepileptic drugs (topiramate, valproic acid).

Antidepressants (amitriptyline)

Beta-blockers (metoprolol, propranolol)

Calcium blockers (verapamil)

Cluster headache



Ciliary ganglion:

- is located inside the orbit associated with the 1st branch of the trigeminal nerve.
- provides autonomic (mainly parasympathetic) innervation in the area of tissue innervation 1st branch, lacrimal glands, the glands of the nasal cavity, eyes.

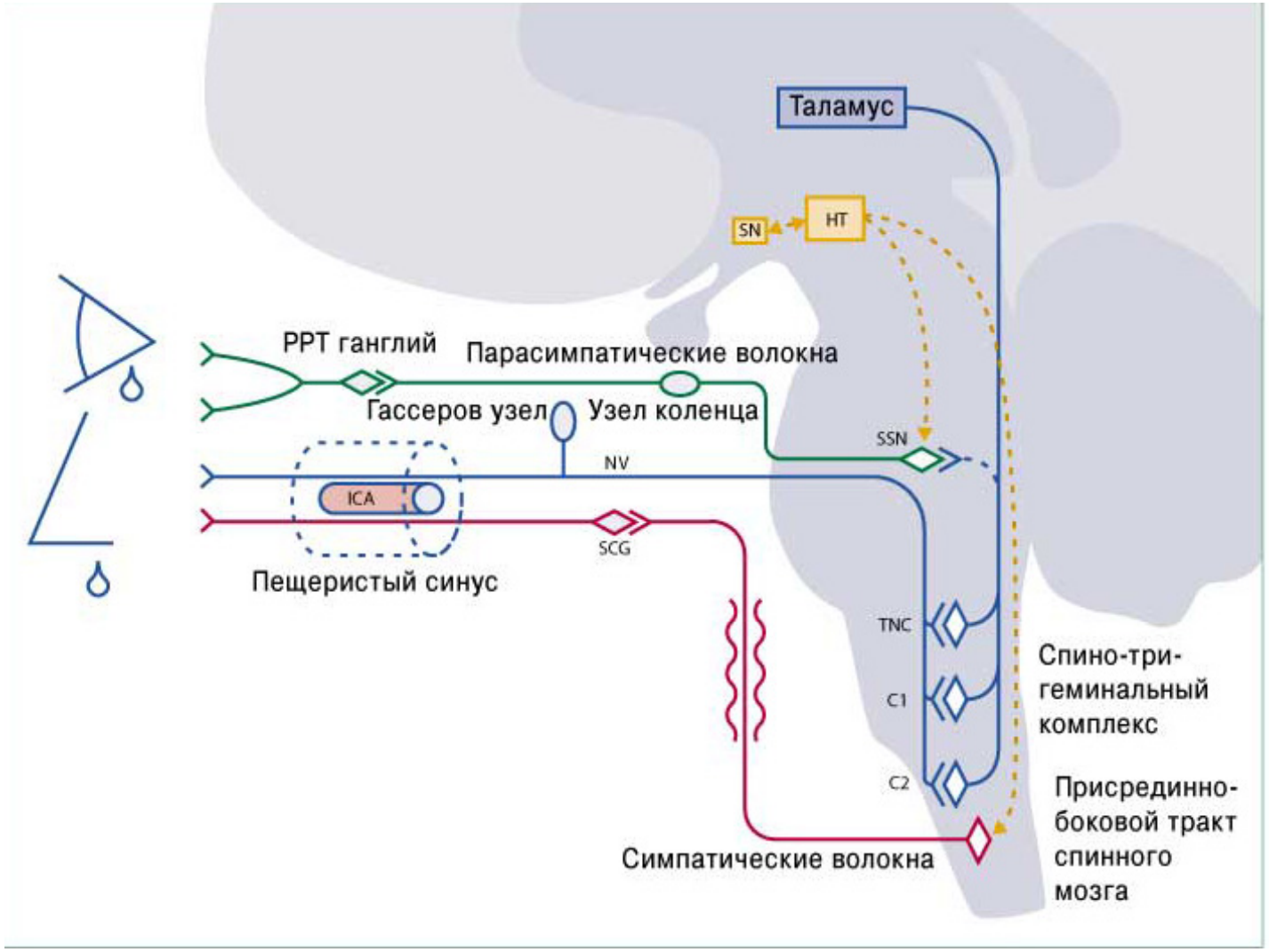
Cluster headache

Etiology

- Chr. Local inflammation
- Diseases of upper respiratory tract (sinusitis)
- Herpetic infections (CMV, EBV)
- Pathology of cervical spine

These factors trigger irritation of the ciliary ganglion

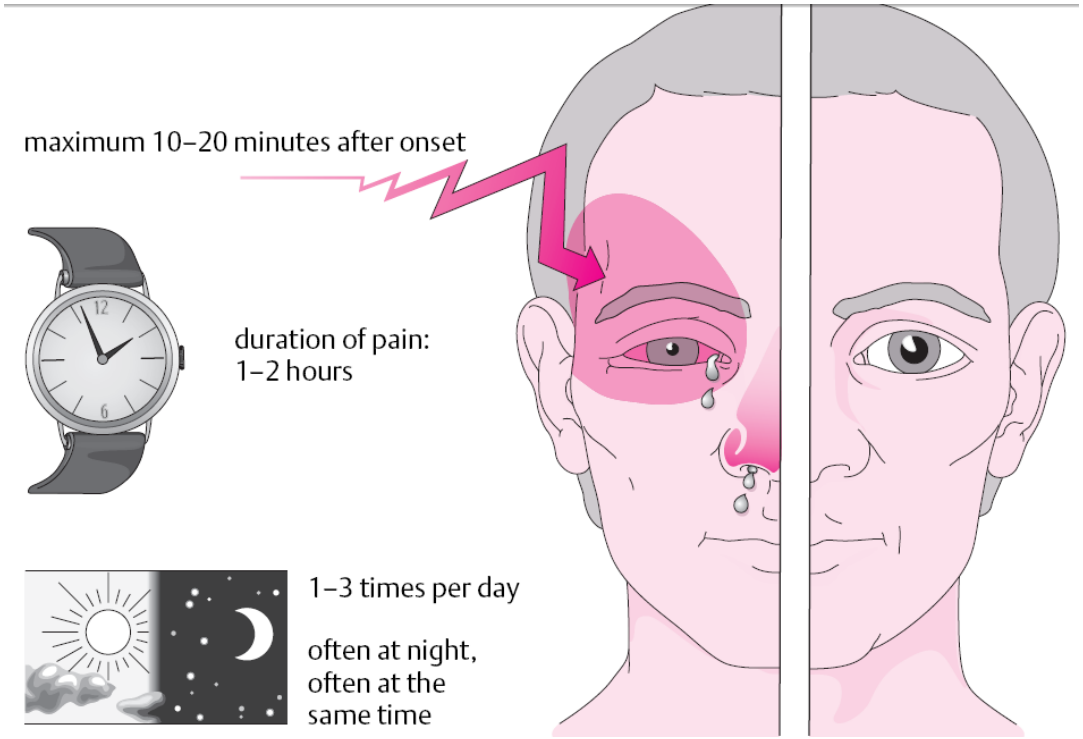
Cluster headache pathogenesis



Cluster headache

- CH is the pain in one side of the head
- Men with a genetic deficiency of the sympathetic nervous system are suffer more often (male migraine)
- There is typical frequency of attacks: they occur every day for months to the period subsequent complete remission for several years (cluster)

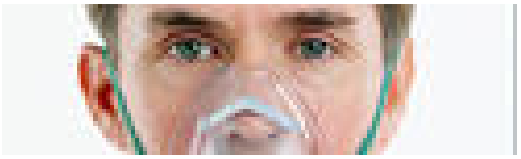
Cluster headache



- The pain is mostly in the eye, high intensity - "hot nail in the eye"
- During the attack the patient is agitated, trying to find a comfortable position of the head
- Pain often occurs at night, in the same time - «alarm pain" (parasympathetic nature)
- The pain is accompanied by severe parasympathetic response
- (eye redness, tearing, swelling of the nasal mucosa)

CH treatment

- Normalization of rhythms
- Quitting smoking and alcohol
- The optimal Nutrition, eliminate foods containing tyramine (cheese, pickles, meats, red wine, chocolate, bananas, MSG, nitrites, caffeine, sweetener (all chewing gum, Coca-Cola, desserts)
- Remediation of foci of chronic infection in the tooth - jaw system.
- Anticonvulsants: finlepsin every 2 hours
- B vitamins
- Inhalation of oxygen



- Receiving drugs for the treatment of migraine

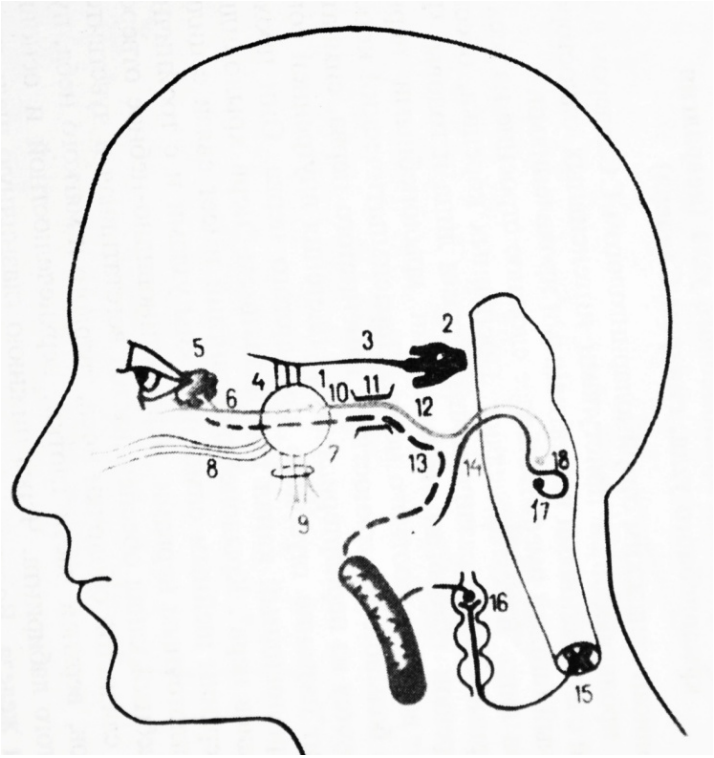
Sluder syndrome (damage of pterygopalatine ganglion)

It has 3 root:

Somatic (sensory) with 2-nd V nerve branches

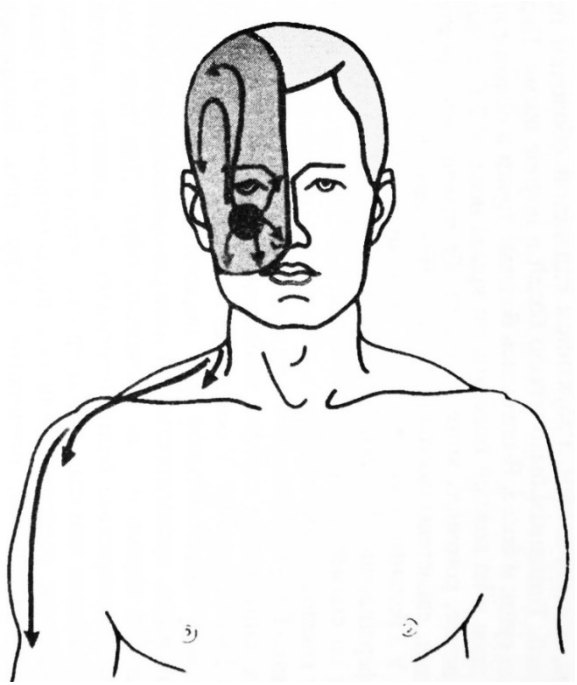
Parasympathetic - the facial nerve

Sympathetic - with plexus internal carotid artery (cell axons of the upper cervical sympathetic node



pterygopalatine ganglion

Sluder syndrome



Etiology:

inflammation of the sinuses and teeth

Clinic:

Acute pain attacks around the eye, the root of the nose, the upper jaw lasting from a few minutes to hours. Pain sometimes irradiats for ½ head, shoulder and arm.

Pain paroxysms accompanied by "autonomic storm“ in half of face - redness and swelling, tearing and rhinorrhea.

Diagnostic criteria: stopping attacks after lubrication posterior nasal cavity with dicaine and adrenaline.

Treatment

Relieve an attack - lubricate the rear nasal cavity of the middle turbinate with 3-5% cocaine.

In severe cases – blockade of ganglion by injection of local anesthetic.

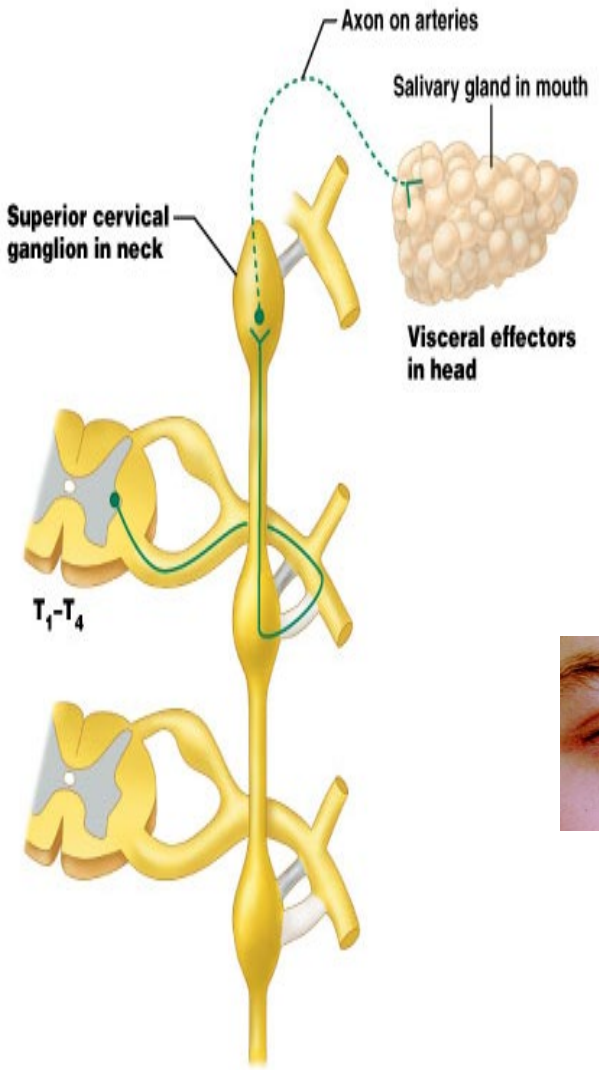
Antihistamines (diphenhydramine, suprastin, Promethazine, tavegil, Claritin)

Glucocorticoids (prednisone, hydrocortisone inside or phonophoresis)

Anticholinergic (platifillin 1-2 ml of 0.2% p / k, 3-4 spazmolitin 0.1 g per day after meals

Sedatives (extreme. Valerian, motherwort, valokordin)

Syndrome of the cervical sympathetic trunk



Etiology:

infection

intoxication

injury

Clinic: attacks of searing pain in the face and even ½ body lasting 0.5 - 3 hours. On the side of pain there may be hypersensitivity and hyperreflexia.

Horner's or Purfyur du Petit syndromes

Syndrome of the cervical sympathetic trunk

Treatment:

NSAIDs (diclofenac sodium)

Tranquilizers (sibazon, gidazepam)

Antidepressants (amitriptyline)

Blockers (phentolamine, pyrroxan)

Antipsychotics (chlorpromazine, eglonil)

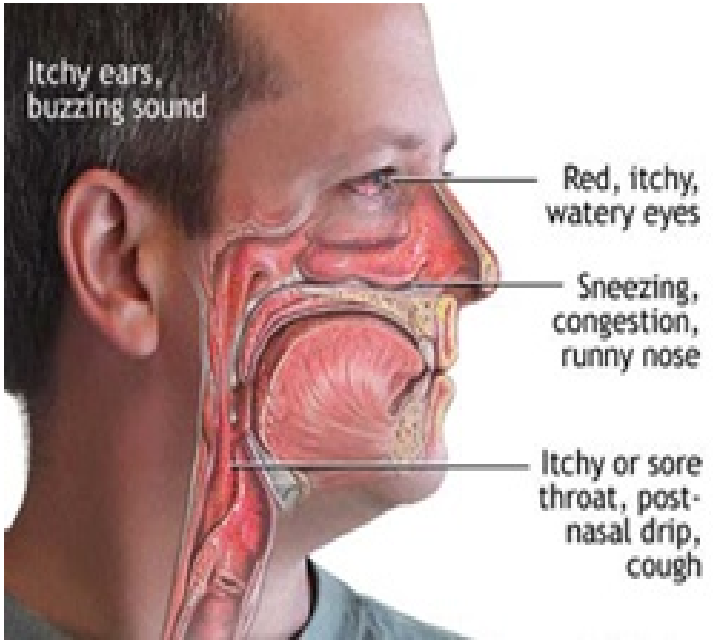
Antiepileptic (diphenine, carbamazepine)

Large doses of vitamin B12 (1000 mcg number 10)

In sharp pain syndrome - preganglionic novocaine blockade

X - irradiation cervical sympathetic nodes

Swelling of angioedema



- Swelling is named after the German physician Heinrich Quincke (described it in 1882).
- Swelling of Quincke is limited swelling of the skin and subcutaneous tissue of the mucous membranes.
- This swelling is more typical for women
- In children and the elderly it is observed rarely.

Swelling of Quincke divided into two forms:

- allergic
- pseudo-allergic (hereditary)

- SQ occurs in people with parasympathetic constitution
- SQ is immediate type of allergic reaction
- SQ manifests with indurative swelling of the soft tissues of head and neck with severe itching
- Swelling often spreads to the throat and trachea, which can lead to death of the patient

Treatment of SQ

Immediate treatment for laryngeal edema:

- Immediately subcutaneous epinephrine solution 0.1% (0.3 - 0.5 - 0.8 ml)
- Antihistamines (diprazyn, dimedrol, suprastin etc.)
- Corticosteroids (hydrocortisone 75-125 mg or prednisolone 30-60 mg).

Hospitalized in intensive care or resuscitation.

- Moist oxygen inhalation
- Diuretics: Furosemide 1% 1-2 ml mannitol 30% w / w (1 g / kg body weight)
- Calcium

In case of further deterioration tracheostomy is performed.

In pseudo-allergic angioedema:

- Anti-enzymes (aminocaproic acid 100 ml kontrikal 30,000 IU / v)
- Transfusion of plasma.

Angioedema Prevention

- Strict adherence to elimination diet

- Prevention of contact with a specific patient
- allergen

- Treatment of chronic infection foci

- Periodic application of of antihistamines (especially during flowering plants with pollen allergy).

Melkerson- Rosenthal Syndrome

There is a distinctive triad of clinical manifestations:

Swelling of the face. The characteristic swelling of the lips

Facial neuropathy. Peripheral paralyzes of facial muscles is associated with edema

Folded tongue. Usually this malformation is granulomatous glossitis. Sometimes speech and eating are difficult.

Melkerson- Rosenthal Syndrome

- Swelling resistant (months, years).
- Depression and irritability are often
- Hypothalamic disorders (polydipsia, polyuria)
- Chronic infections (tonsillitis, oral disease), food allergy, hypothermia, solar radiation, strong odors provoke exacerbation.
- The patient is concerned about headaches, body temperature rises.

Diagnosis is based on clinical data.

Treatment:

In the acute phase - rest, bed rest.

Canatsiya foci of chronic infection, antibiotic, oxytetracycline, sodium fuzidin-

Corticosteroids (prednisone 20-30 mg / day dexamethasone 4 mg / day).

Synthetic antimalarial agents (delagil, plakvinil - 0.25 g 2 times a day

Antiholinerhichni drugs: atropine

Antihistamines: Diphenhydramine, suprastin, Promethazine, tavegil, Claritin.

Desensitizing and detoxifying agents (sodium thiosulfate, calcium supplements, etc.).

Immunocorrection (pirogenal, prodigiozan, levamisole, theophylline);

Dehydration: furosemide, glycerol

B vitamins (B, B12, B6)

Locally - heparin ointment combined with dimexide or electrophoresis, ultrasounds, dynamic currents.

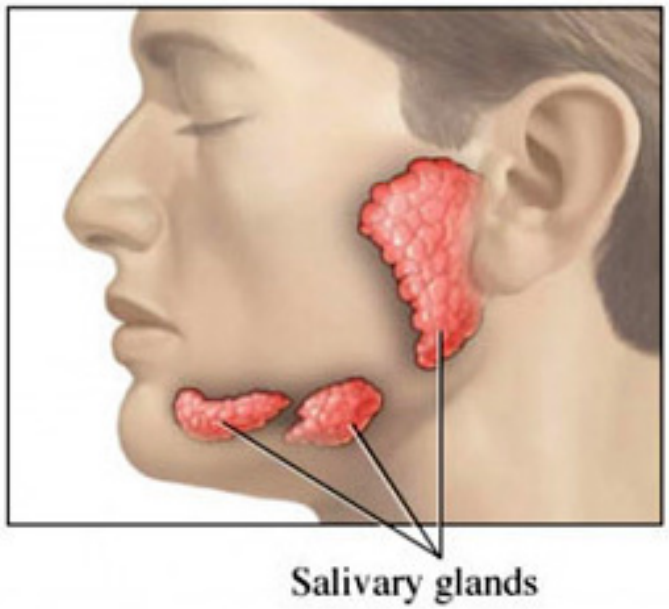
Disease (syndrome) Sjögren

- Sjogren's disease - a systemic autoimmune disease characterized by chronic inflammation of the glands, especially salivary and lacrimal from postepennno development of secretory failure in combination with various systemic manifestations. It is described by the Swedish ophthalmologist Sjogren in 1933

- Also secondary Sjogren's syndrome) can be identified - the defeat of lacrimal glands to the development of dry keratoconjunctivitis and salivary glands with chronic xerostomia sialoadenit and in autoimmune diseases (rheumatoid arthritis, systemic lupus erythematosus, scleroderma, chronic active hepatitis and others.

- Disease and Sjogren's syndrome in women is 20-25 times more frequently than in men, usually aged 20-50 years.

Sjögren disease



The defeat of the salivary glands occurs on the background of the sympathetic nervous system pathology.

Mumps is accompanied by a decrease in the secretion of saliva, dry mouth (Xerostomia). Parotid, sub-jaw glsnds increas. Saliva is not enough, it becomes thick cheilitis, glossitis, dental caries, stomatitis develops.

Syalohramma in Sjogren disease

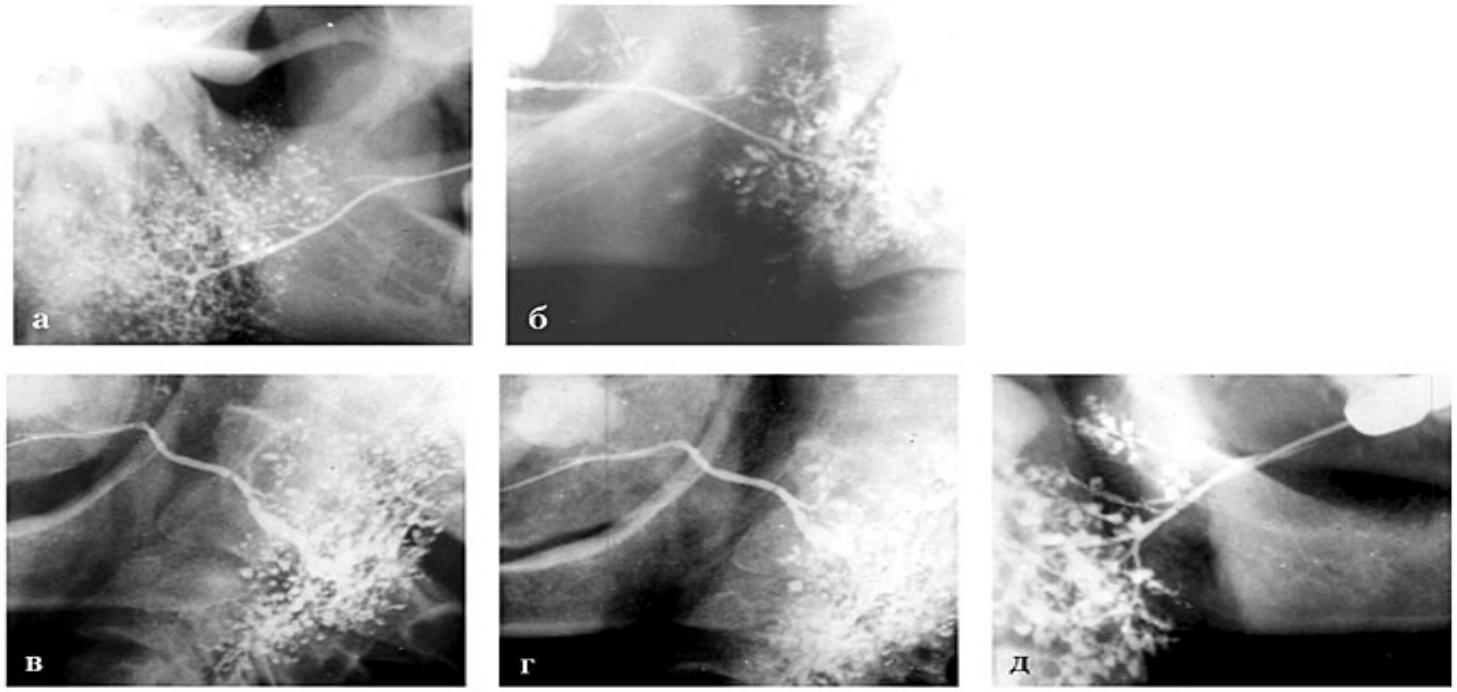


Рис. 18. Сиалограммы околоушных желез больных с синдромом Шегрена (а, б, в, г, д).

The accumulation in the parenchyma gland X-ray contrast agents as "clusters of grapes" (size of 1.2 mm or more).

Chief excretory ducts and gland's internally-ducts maintain the correct structure.

In the late stages of the disease the size of the cavities increases , ducts deformation appears

Sjögren disease

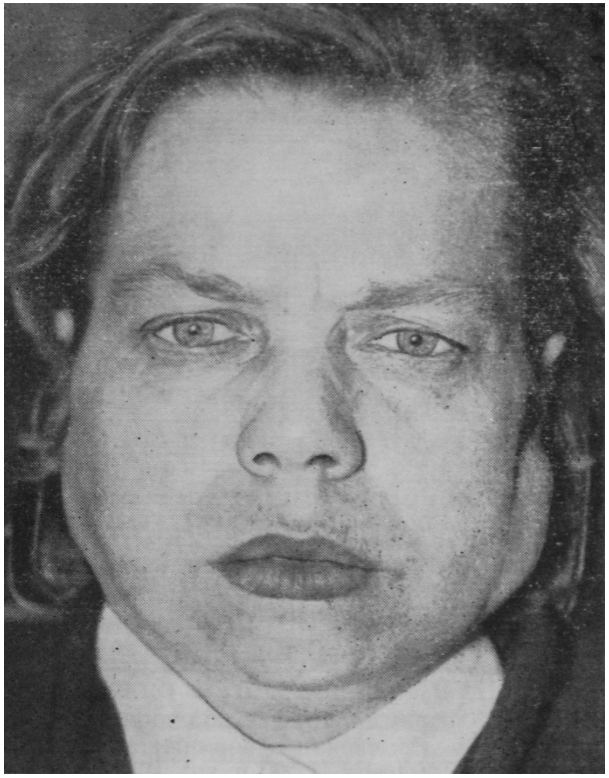
Defeat of other exocrine glands with decreased functions:

dry skin, vagina, esophagus, nose, eyes, throat;

tracheitis, bronchitis, dysphagia, rhinitis, conjunctivitis, gastritis with secretory insufficiency, pancreatitis hronichnyy with decreased secretory function

Systemic symptoms:

fever, lymphadenopathy, vasculitis, myositis, Polyarthralgias enlarged liver, spleen, kidney disease, Raynaud's syndrome.



Diagnosis

- ✓ **Dry kerato-conjunctivitis**
  - Reducing the tearing test using Szyrmer (<10 mm / 5 min)
  - Coloring epithelium conjunctiva and cornea Bengal pink and Fluor-stsein

- ✓ **Parenchymal mumps**
  - Identify cavities> 1 mm at sialohrafiyi
  - Decrease in saliva secretion after stimulation with ascorbic acid (less than 2.5 ml / 5 min)
  - Focal - diffuse infiltration of lymphocytes and plasma-tsytamy in salivary gland biopsies

- ✓ **Laboratory signs of systemic autoimmune diseases**
  - A positive rheumatoid factor (titer> 1:80)
  - Positive antinuclear factor (titer> 1: 100)

Treatment

In the initial stages of long-term treatment with prednisolone in small doses (5-10 mg / day).

In severe and late stages of prednisone (5-10 mg / day) and hlorbutin (2-4 mg / day) for several years.

In severe systemic manifestations:

puls- therapy with high doses of prednisolone methylprednisolone 1000 mg / in 3 consecutive days

and single intravenous cyclophosphamide 1000 mg

followed by transfer to prednisolone (30-40 mg / day) and cytostatics (hlorbutin 4-6 mg / day or cyclophosphamide 200 mg intramuscularly 1-2 times a week).

Extracorporeal methods:

hemosorbtion, plasmapheresis, in combination with therapy puls-

Local therapy: artificial tears.

To prevent secondary infection - furatsillina (1: 5000), 0.25% chloramphenicol, ciprofloxacin, and others.

THANK YOU!