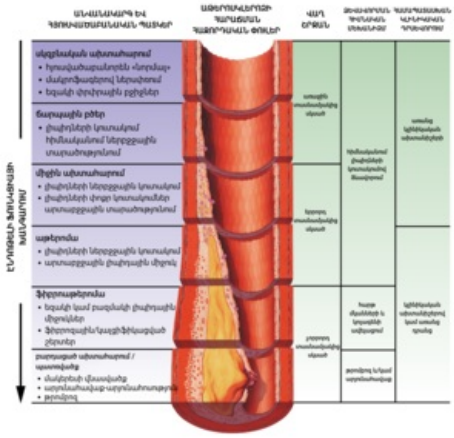
Chronic ischemic disease of the lower limbs

Chronic ischemic disease of the lower limbs[1] (chronic ICHDK; peripheral arterial disease, PAD) is a serious disease arising on the basis of atherosclerosis, possibly another pathological process affecting the pelvic arteries and/or the arteries of the lower extremities.

Approximately 3-6% of the population aged 60 in the Czech Republic suffer from chronic ICHDK. The incidence continues to increase with age. There are many more asymptomatic patients.

Causes

By far the most common cause of chronic ICHDK is atherosclerosis. It is responsible for approximately 90% of cases of chronic ICHDK. It leads to gradual narrowing and closure of the lumen of the artery, which results in muscle and skin ischemia.



Atherosclerotic disease of the artery

Other causes may be[1]:

- diabetic angiopathy;
- arteritis (morbus Bürger);
- cystic medionecrosis;
- cystic degeneration of the adventitia;
- compressive syndromes (e.g. entrapment syndrome);
- embolia inveterata (central or from popliteal aneurysm).

Risk factors

- **smoking**
- stress
- unhealthy lifestyle, diet (diet rich in saturated fatty acids, simple carbohydrates, high cholesterol)
- lack of movement
- age
- diabetes mellitus
- genetic factors
- arterial hypertension
- hyperlipoproteinemia
- hyperuricemia, hyperfibrinogenemia, hyperhomocysteinemia

Symptoms - clinical picture

There is a convenient mnemonic device here. This is the so-called 6P rule[1]:

1. **Pain**.
   - Typically, **cramping or cramping pain** occurs when **walking and quickly subsides after stopping**. The distance the patient walks is referred to as the **claudication interval**.
   - In more advanced stages, **resting pain** appears, more intense in a horizontal position.
2. **Pallor**.
3. **Paresthesias**.
4. **Paralysis** (stiffness, impossibility of movement).
5. **Pulselessness** (impossibility to feel the pulse or lateral asymmetry on the arteries of the lower limbs - a. femoralis, a. poplitea, a. tibialis posterios, a. dorsalis pedis).
6. **Polar**/cold.

In advanced ischemia, we observe **atrophy of the skin, hair loss, nails do not grow, they are brittle**, **onychomycosis** or **interdigital mycosis** is common. In the most severe stages, trophic defects occur - necrosis (dry gangrene), which often become secondarily infected and wet gangrene occurs.

⚠ **First definition of ecotoxicology (1969): René Truhaut: the study of the adverse effects of chemicals with the aim of protecting natural species and communities. Rachel Carson (1962): the memoir The Silent Spring** highlights the use of pesticides , especially DDT and other agrochemicals. The book led to the establishment of the US Environmental Protection Agency (EPA) in the USA. Introduction of methods describing the toxic effects of human-produced substances on the environment and the organisms contained therein. Systematic implementation of fish toxicity testing methods. In addition to direct toxic effects, the effects of bioconcentration and bioaccumulation are studied – increases in the concentration of foreign substances in the tissues of organisms as a result of exposure from the environment.

2004 EC ratification: Persistent Organic Pollutants Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution The aim of the protocol is to limit, reduce or eliminate the discharge, emissions and losses of persistent organic pollutants that have significant adverse effects on human health or the environment

due to long-range transboundary air transport.

In 2006 , Regulation No. 166/2006 of the European Parliament and the EC Council was issued, establishing the **European Register of Releases and Transfers of Pollutants** . It represents a publicly accessible database of pollutant releases into the air, water and soil, information on wastewater, information on pollutant releases from dispersed sources.

In 2003 , the proposal for a new framework for legislation covering the safety of chemicals REACH (Registration, Evaluation and Authorization of Chemicals) was accepted by the European Commission and approved by the European Parliament . Enterprises and firms that import more than 1 ton of a chemical compound per year will be forced to register this chemical in a central data bank. The aim is to improve the protection of the health of nature, including people, to increase the innovation capacity and the ability of the chemical industry to compete in the European Union. The new measures concern not only new chemical substances introduced to the market, but also substances that have been used for a long time. The program aims to ensure that by 2020 at the latest, only chemical substances with known properties and in a way that does not harm human health and the environment are used.

Diagnostics

Anamnesis

It is necessary to focus on a detailed analysis of the medical history, other atherosclerotic problems, risk factors (lifestyle, smoking, etc.), family history of cardiovascular diseases (atherosclerosis, heart attacks, CMP, etc.).

Physical exam

Examination of the **6P** symptoms and the overall clinical picture. Furthermore, it is necessary to focus on the palpation of popliteal aneurysms (embolization to the periphery) and abdominal aneurysms (mostly they do not embolize, but when an abdominal aneurysm occurs, a popliteal artery aneurysm is also present in 1/3; if an abdominal aneurysm is found, it is necessary to do a duplex sono of the popliteal artery).

Auxiliary examinations

- **Duplex ultrasonography** (**ABI** - ankle brachial index).
- **Intravascular ultrasonography**.
- **Treadmill test** (treadmill walking test; serves to objectify the claudication distance).
- **Angiography** (classical angiography or digital subtraction angiography).
- **CT-angiography**.
- **MR-angiography**.
- **Blood tests** (detection of risk factors).

ABI index rating	
normal value	**>0,9**
stenosis in the area between the aorta and the distal arteries	**<0,9**
critical ischemia (closure)	**<0,5**

Stages

IV. stage – ulceration on the back of the leg

To determine the ICHDK stage, the Fontaine classification (rather in Europe) or the Rutherford classification (rather in the USA) is used. Classification used in the Czech Republic (Fontain's extended by stage IIc, division of stage III into a and b, division of stage IV into a and b):

	Stages of chronic ICHDK[2]
stage I	**asymptomatic**
stage II	**claudication**
stage IIa	claudication above 200 m
stage IIb	claudication below 200 m
stage IIc	claudication below 50 m
stage III	**resting ischemic pain**
stage IIIa	resting pain, ankle perfusion pressure > 50 mm Hg, finger pressure > 30 mm Hg
stage IIIb	resting pain, ankle perfusion pressure ≤ 50 mm Hg, finger pressure ≤ 30 mm Hg
stage IV	**trophic changes (skin defects, necrosis, gangrene)**
stage IVa	the limb defect arose from stage II
stage IVb	the limb defect arose from stage III

Therapy

Treatment of patients with chronic ICHDK must be comprehensive and permanent. Since the most common cause is atherosclerosis (see above), it should be noted that with a high probability, not only the arteries of the lower extremities will be affected. The goal of treatment is therefore to preserve the best possible functionality of the lower limbs and reduce overall cardiovascular mortality.

It can be divided into conservative and invasive.

- **Conservative treatment**.
  - **Elimination of risk factors** (elimination of smoking, elimination of stress, weight reduction, modification of diet, **treatment of hypertension, hyperlipidemia and diabetes mellitus**).
  - **Pharmacotherapy**
    - **to reduce cardiovascular risk:**
      - antiaggregation − ASA (75-160mg), clopidogrel (75mg/day),
      - anticoagulants - warfarin (in patients with ICHDK based on embolization into peripheral arteries);
    - for the treatment of claudication: vasodilatation − cilostazol, pentoxifylline, naftidrofuryl;
    - prostaglandins - alprostadil (anti-aggregation, fibrinolytic and positive rheological effects).
  - **Physical therapy** (1-2 hours of walking per day; alternating plantoflexion and dorsoflexion of the leg; regular aerobic activity).
  - Compliance with hygiene rules (daily foot hygiene; comfortable, warm, waterproof shoes; treatment of yeast and fungal foot infections; prevention of foot skin injuries).
  - **Hyperbaric oxygen therapy.**
  - **Infusion vasodilation.**
- **Invazivní léčba**.

Starting invasive treatment is very individual. There is no strictly defined boundary when to start with invasive treatment and when not to. In this context, we usually talk about the so-called "lifestyle claudication". If claudication affects the patient's lifestyle (reduces his quality of life), endovascular and surgical methods can also be used.

- **Endovascular methods** (PTA + stent or stent graft implantation).
- **Surgical methods** (endarterectomy, plastic surgery, venous or prosthetic bypass, lumbar sympathectomy).

Links

Related articles

- Index of ankle pressures
- Atherosclerosis
- Ischemic heart disease
- Myocardial infarction
- Arterial reconstruction
- Angioinvasive treatment of arterial blockages and stenoses
- Critical limb ischemia
- Trombangiitis obliterans (morbus Bürger)

Reference

1.

2. ŠTEJFA, Miloš. *Kardiologie.* 3. edition. Grada, 2007. 722 pp. ISBN 978-80-247-1385-4.

Used literature

- ŠTEJFA, Miloš. *Kardiology.* 3. edition. Grada Publishing, 2007. 722 pp. pp. 677-683. ISBN 978-80-247-1385-4.
- KRAJÍČEK, Milan. *Chirurgická a intervenční léčba cévních onemocnění.* 1. edition. Grada Publishing, 2007. 436 pp. ISBN 978-80-247-0607-8.
- PUCHMAYER, Vladimír – ROZTOČIL, Karel. *Praktická angiologie.* 2. edition. TRITON, 2003. 226 pp. ISBN 80-7254-440-3.
- KLENER, Pavel. *Vnitřní lékařství.* 3. edition. 2006. 555 pp. vol. 1. pp. 335-337. ISBN 80-7262-431-8.
- ČEŠKA, Richard, ŠTULC, Tomáš, Vladimír TESAŘ a Milan LUKÁŠ. *Interna.* 3. edition. Stanislav Juhaňák - Triton, 2020. 964 pp. pp. 189-200. ISBN 978-80-7553-780-5.