

A complex approach to the recovery of patients with peripheral arteriopathy, using the potential of the natural factors of the Covasna resort

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Disclosure statement

I have no actual or potential conflict of interest in relation to this program/presentation.

Peripheral arterial diseases (PAD) are highly prevalent and significantly increase cardiovascular mortality and morbidity in the general population. Intensive preventive strategies are needed. Patients with PAD are generally underdiagnosed and undertreated compared with patients with coronary artery disease (CAD). In PAD and CAD often common risk factors coexist. For effective management is necessary a multidisciplinary team. Early diagnosis is very important for better outcomes. New guidelines offer guidance on diagnosis, surveillance and treatment



ESC

European Society
of Cardiology

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<https://doi.org/10.1093/eurheartj/ehae179>

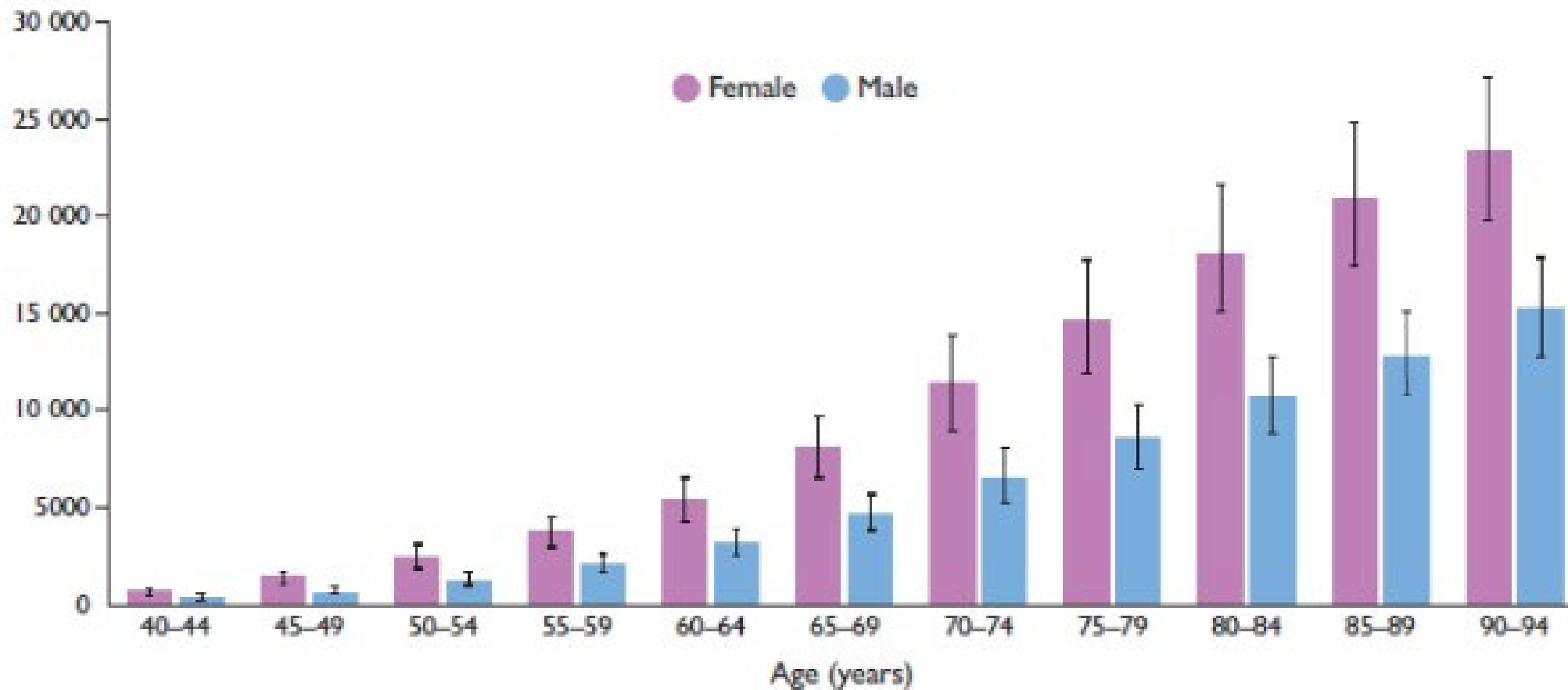
ESC GUIDELINES

2024 ESC Guidelines for the management of peripheral arterial and aortic diseases

**Developed by the task force on the management of peripheral arterial
and aortic diseases of the European Society of Cardiology (ESC)**

***Endorsed by the European Association for Cardio-Thoracic Surgery
(EACTS), the European Reference Network on Rare Multisystemic
Vascular Diseases (VASCERN), and the European Society of Vascular
Medicine (ESVM)***

Prevalence rate (per 100 000 population)

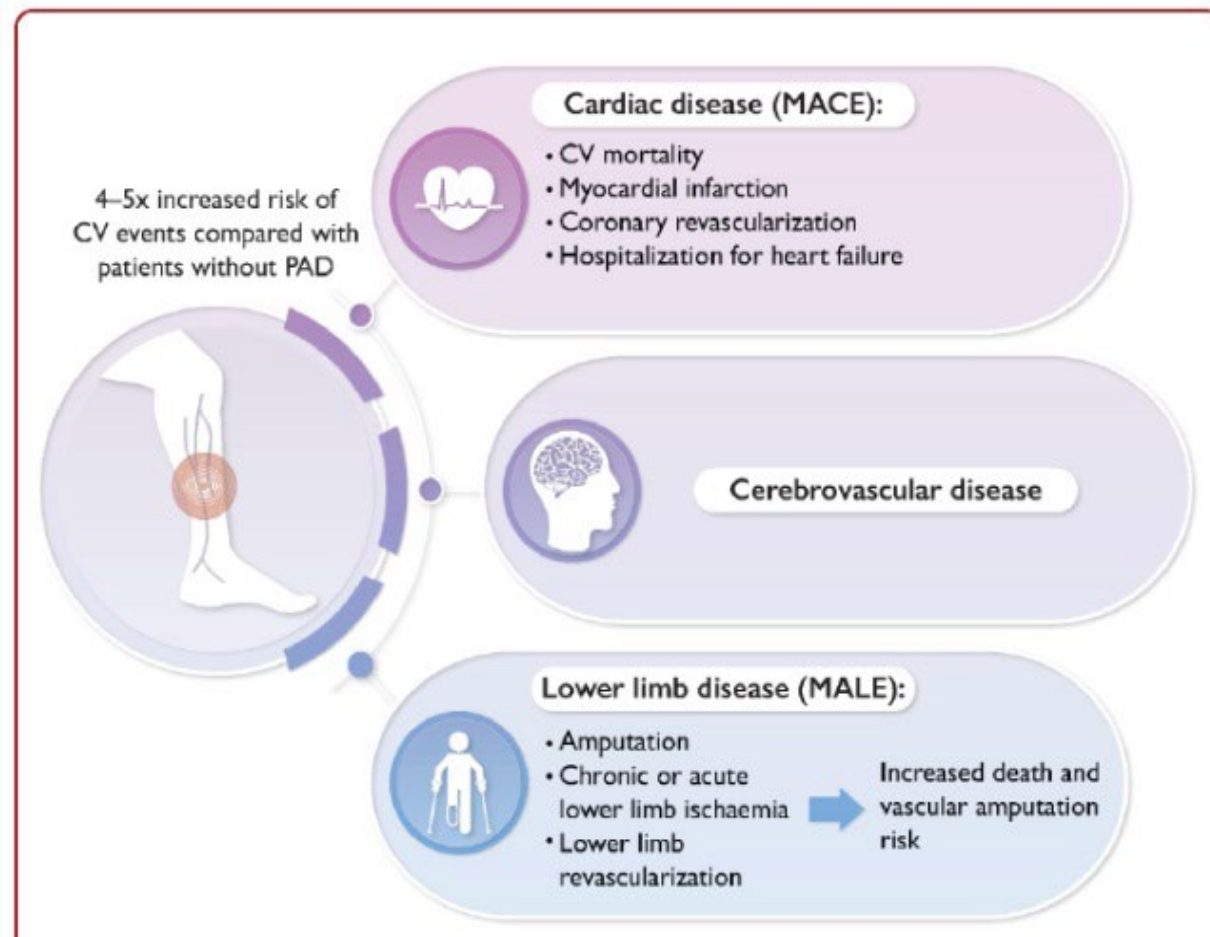


Central therapeutic aims:

- To reduce the risk of **MACE**
- To reduce the risk of **MALE**
- To improve **Quality of Life**

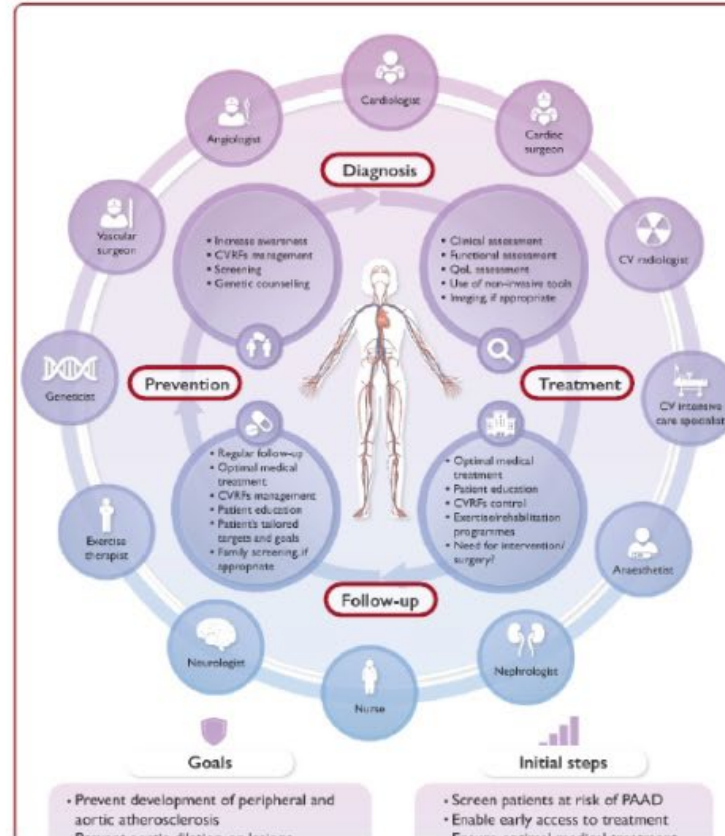
MACE and MALE

Cardiovascular risk in peripheral arterial disease



Central illustration

From diagnosis to treatment, a **holistic multidisciplinary** peripheral arterial and aortic diseases approach



Recommendations

When managing PAAD, it is recommended to adopt a comprehensive approach that addresses the entirety of arterial circulation.

Class Level

I

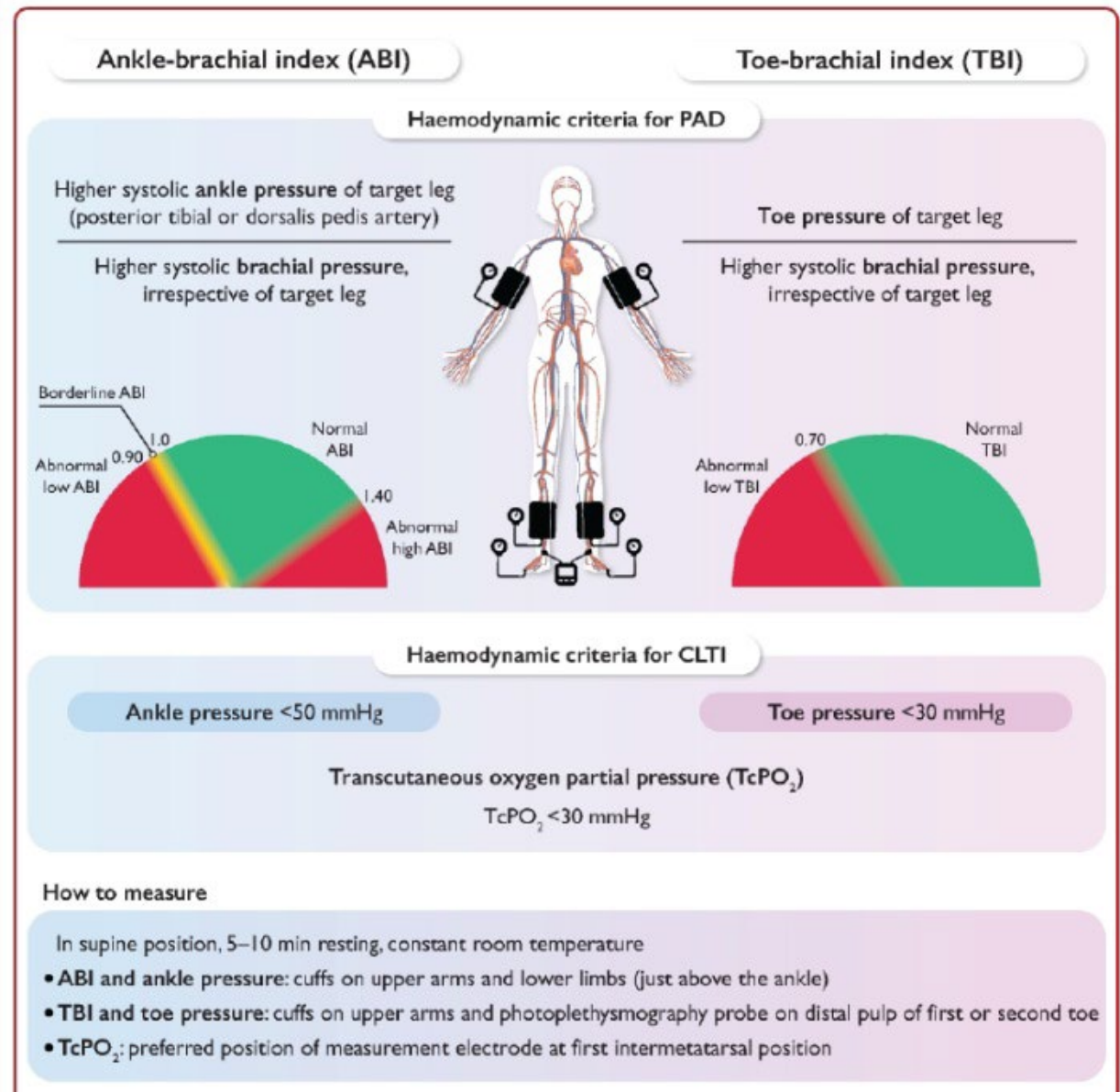
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ESC Congress 2024
London & Online

2024 ESC Guidelines for the management of peripheral arterial and aortic diseases
(European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae179)

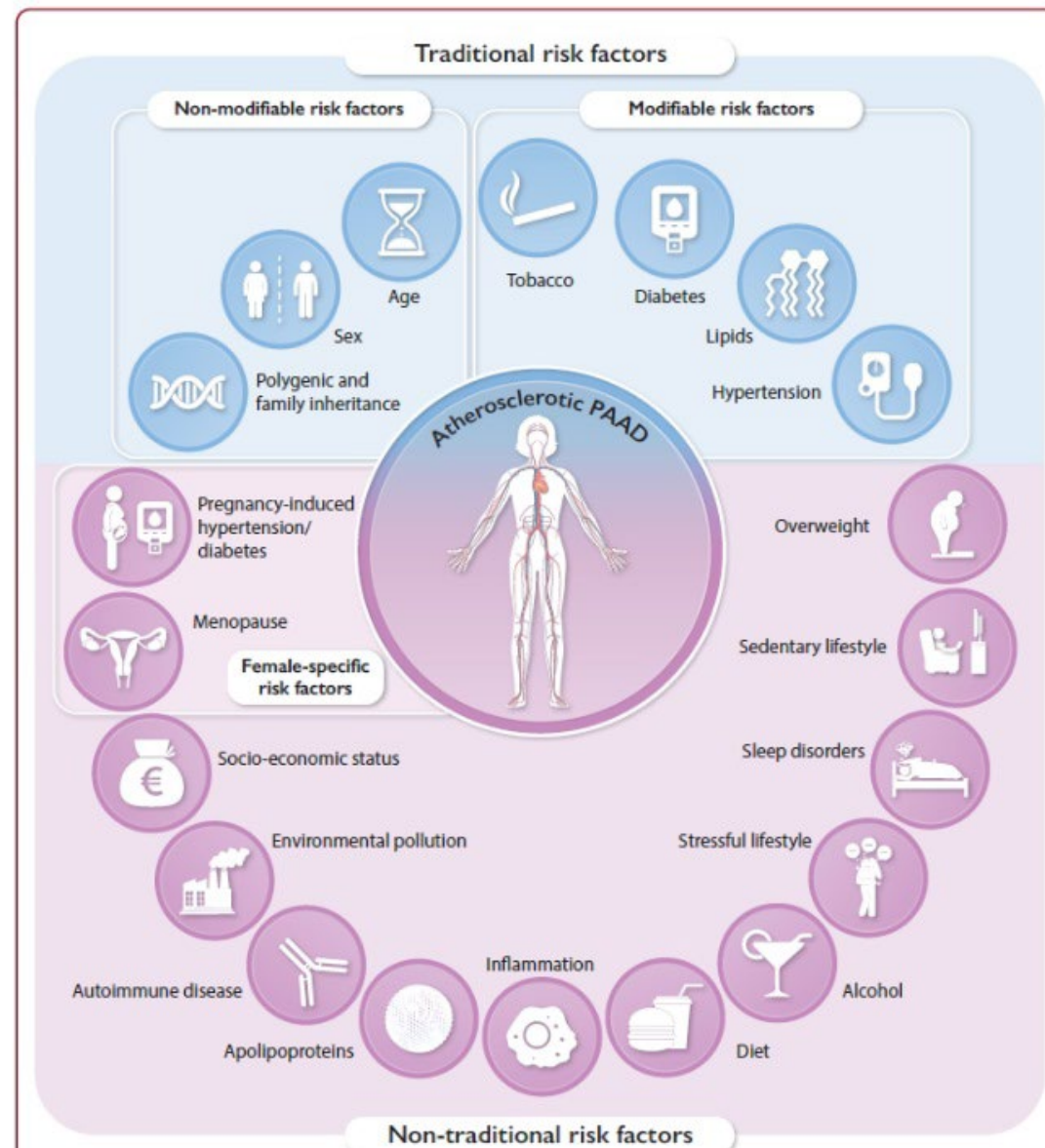
Screening for PAD

Haemodynamic assessment of peripheral artery disease



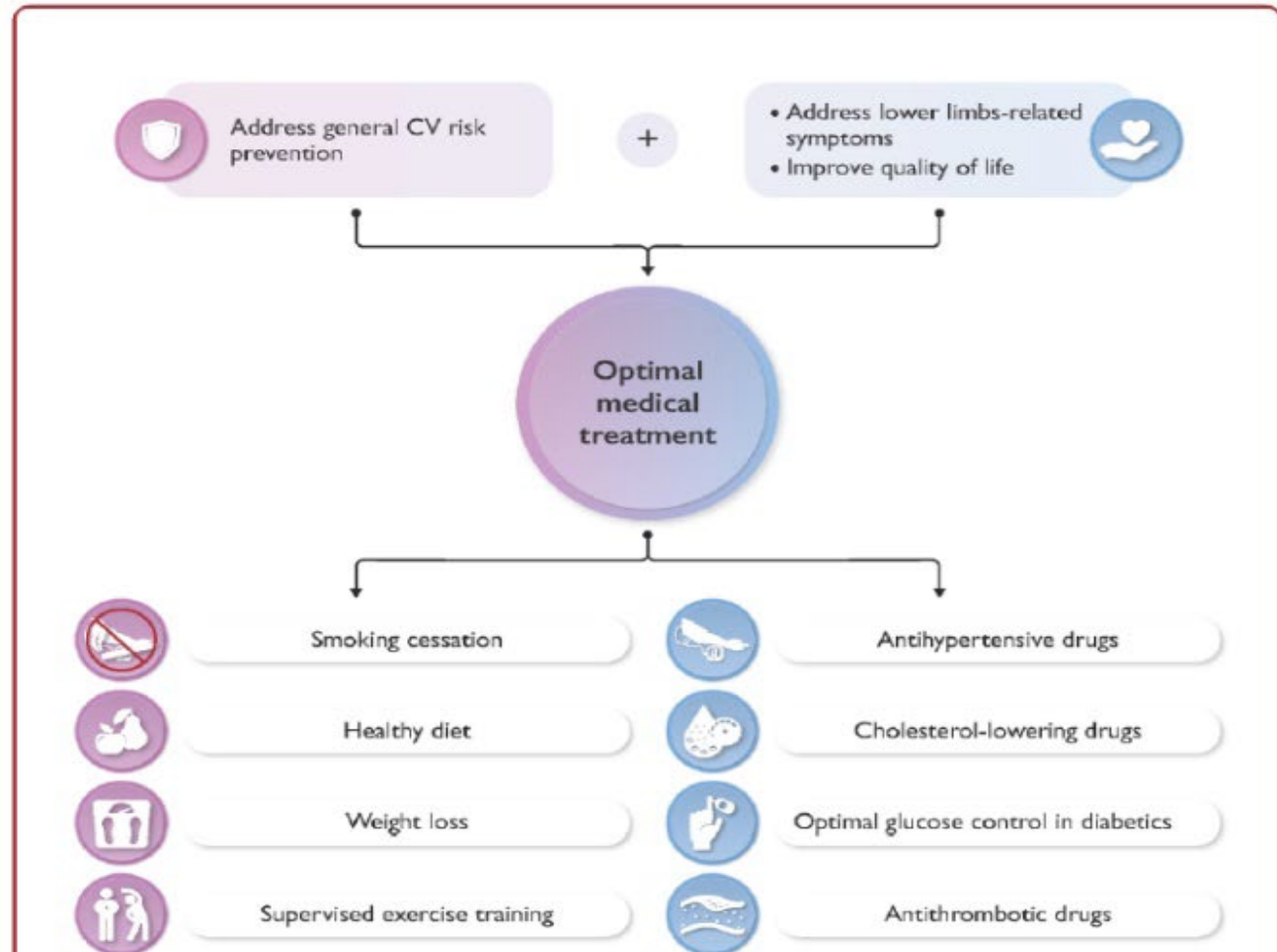
Recommendations for diagnostic tests in patients with peripheral arterial disease

Recommendations	Class	Level
Measurement of the ABI is recommended as the first-line non-invasive test for screening and diagnosis of PAD, using an ABI ≤ 0.90 as a diagnostic criterion.	I	B
In the case of non-compressible ankle arteries or ABI > 1.40 , additional methods such as TP, TBI or Doppler waveform analysis are recommended.	I	B

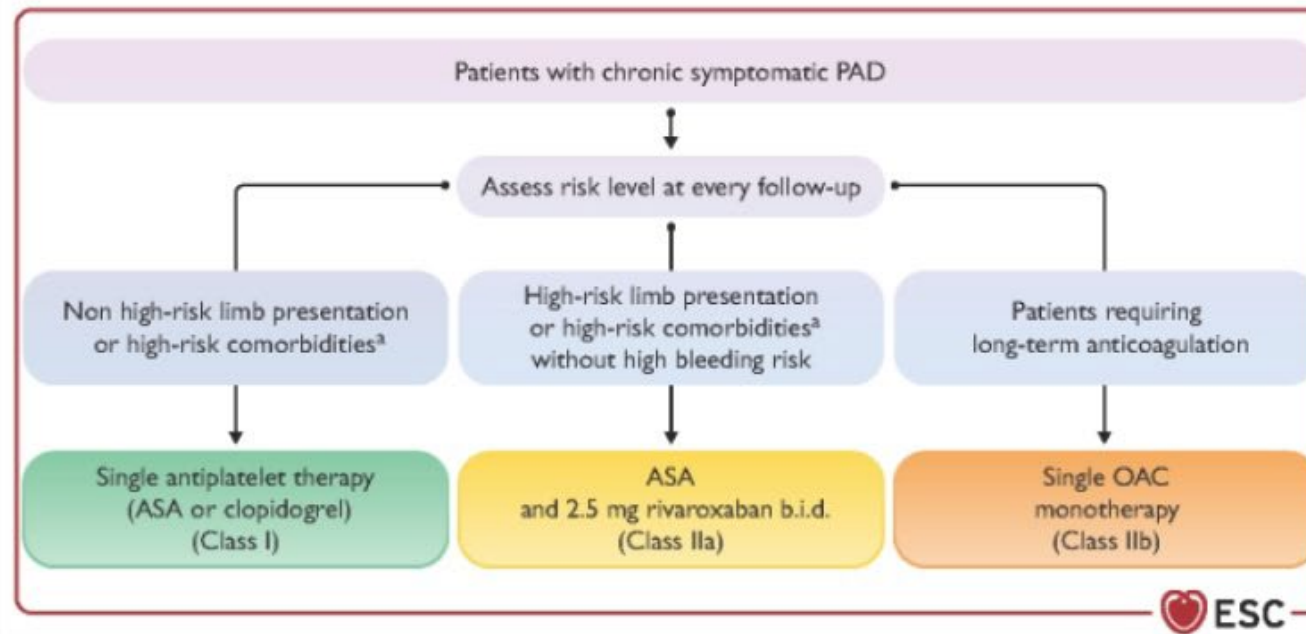


Multimodal treatment of PAD

Optimal medical treatment in patients with peripheral artery disease



New recommendations for antithrombotic treatment



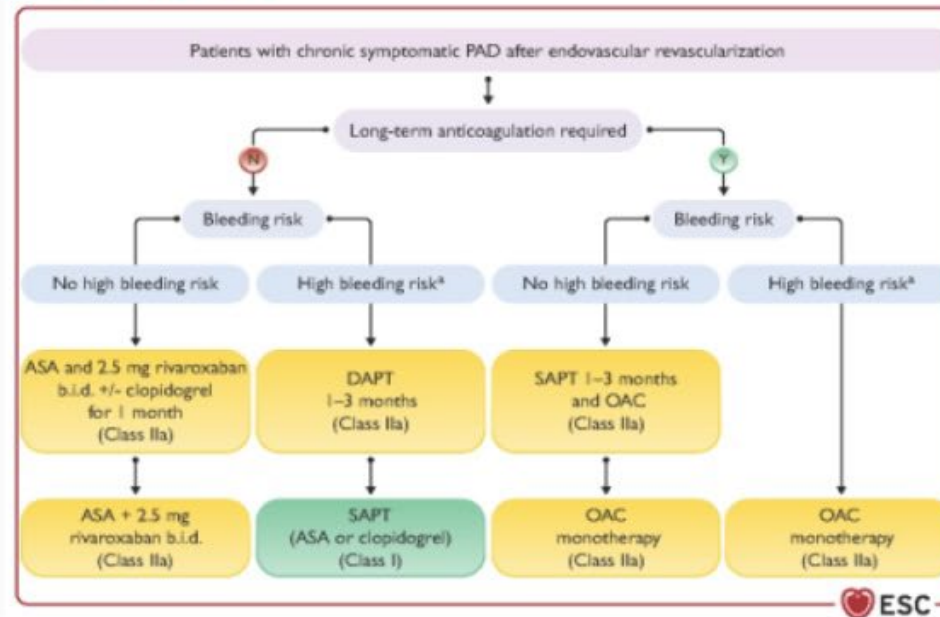
Recommendations

Use of antiplatelet therapy with aspirin alone (range 75–160 mg o.d.) or clopidogrel alone (75 mg o.d.) is recommended for the reduction of MACE in patients with symptomatic PAD.

Treatment with combination rivaroxaban (2.5 mg b.i.d.) and aspirin (100 mg o.d.) should be considered for patients with PAD, high ischaemic risk, and non-high bleeding risk.

Class	Level
I	A
IIa	A

New recommendations for antithrombotic treatment following revascularization



Recommendations

Treatment with combination rivaroxaban (2.5 mg b.i.d.) and aspirin (100 mg o.d.) should be considered for patients with PAD and non-high bleeding risk following lower-limb revascularization.

DAPT for at least 1 month after revascularization may be considered to reduce limb events.

Class	Level
IIa	B
IIb	B

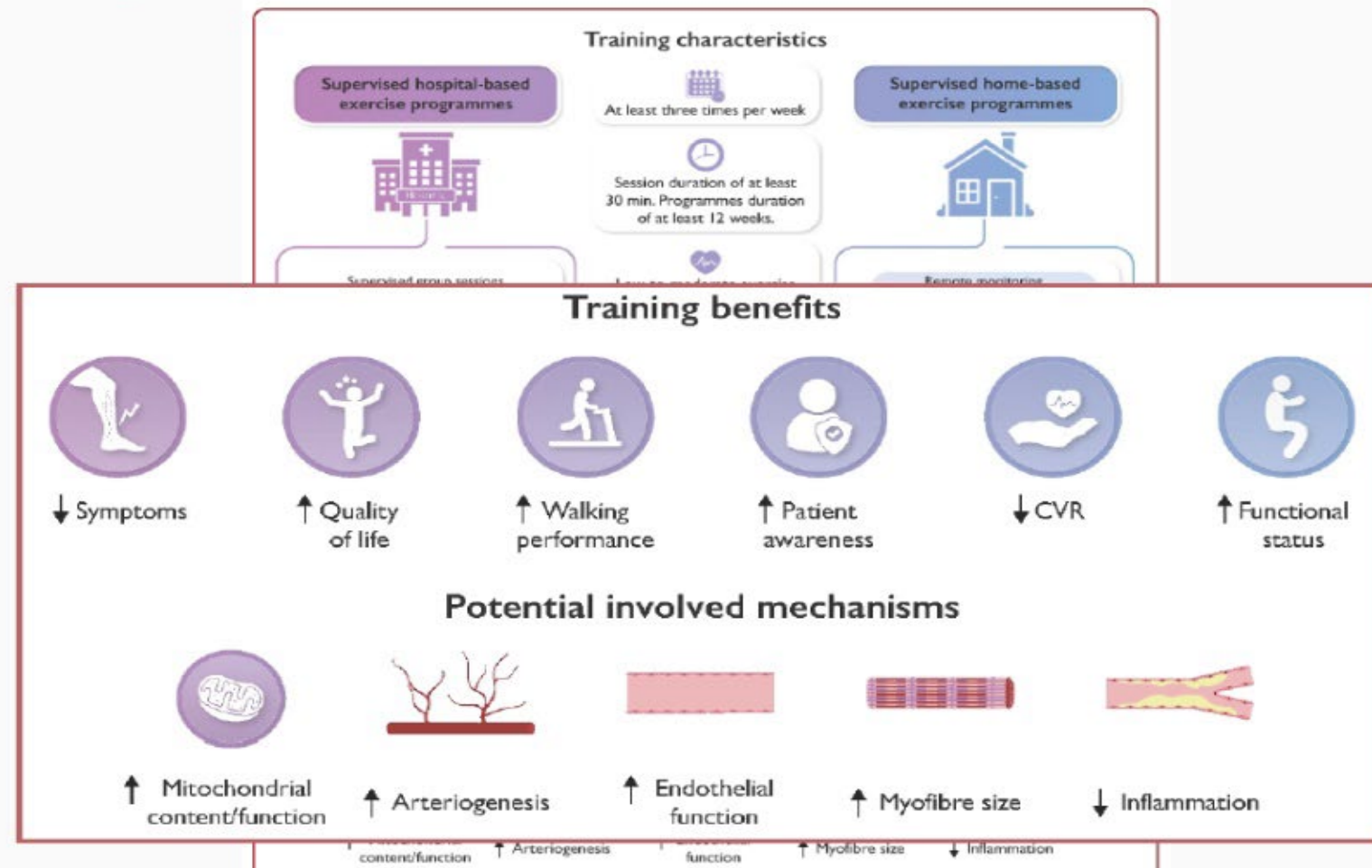
New recommendations for *antihypertensive therapy* in patients with PAAD

Recommendations	Class	Level
In patients with PAAD and hypertension a SBP target towards 120–129 mmHg, if tolerated, is recommended.	I	A
In patients with PAAD and hypertension, ACEIs or ARBs should be considered as first-line antihypertensive therapy.	IIa	B
An individualized, more lenient BP goal (e.g. <140/90 mmHg) should be considered in: •Age >85 years •Residential care •Symptomatic orthostatic hypotension	IIa	C
An individualized, more lenient BP goal (e.g. <140/90 mmHg) may be considered in: •Clinically severe frailty at any age •Limited life expectancy (<3 years)	IIb	C

New recommendations for *lipid-lowering therapy* in patients with PAAD

Recommendations	Class	Level
In patients with atherosclerotic PAAD, lipid-lowering therapy is recommended.	I	A
An ultimate LDL-C goal of <1.4 mmol/L (55 mg/dL) and a >50% reduction in LDL-C vs. baseline are recommended in patients with atherosclerotic PAAD.	I	A
Statins are recommended in all patients with PAD.	I	A
If the target LDL-C level is not achieved on maximally tolerated statins and ezetimibe, treatment with a PCSK9 inhibitor is recommended in patients with atherosclerotic PAAD, to achieve target values.	I	A
If the target LDL-C level is not achieved, a combination of statins and ezetimibe is indicated in patients with atherosclerotic PAAD, to achieve the given target values.	I	B
For statin-intolerant patients with atherosclerotic PAAD, at high CV risk, who do not achieve their LDL-C goal on ezetimibe, it is recommended to add bempedoic acid either alone or in combination with a PCSK9 inhibitor.	I	B

Exercise training in PAD



New recommendations on *exercise training* in PAD



Recommendations	Class	Level
<i>Recommendations for exercise therapy in patients with peripheral arterial disease</i>		
In patients with symptomatic PAD, SET is recommended.	I	A
In those patients undergoing endovascular revascularization, SET is recommended as an adjuvant therapy.	I	A
When SET is not available or feasible, a structured and monitored (calls, logbooks, connected devices) HBET programme should be considered.	Ila	A
Training frequency of at least three times per week, training session duration of at least 30 min, and training programme duration of at least 12 weeks should be considered.	Ila	B

Training frequency and duration

3x/week, 30minutes, 3months

New recommendations on follow-up in PAD

Recommendations	Class	Level
In patients with symptomatic PAD, after a 3-month period of OMT and exercise therapy, <u>PAD-related QoL</u> assessment is recommended.	I	B
In patients with symptomatic PAD and impaired <u>PAD-related QoL</u> after a 3-month period of OMT and exercise therapy, revascularization may be considered.	IIb	B
It is recommended to regularly, at least once a year, follow up patients with PAD, assessing <u>clinical and functional status, medication adherence, limb symptoms, and CVRFs</u> , with DUS assessment as needed.	I	C

Highlights

- Multidisciplinary approach and multimodal treatment strategies
- Decision making with vascular team involvement
- Implementation of exercise training in symptomatic (effort-related) PAD
- Follow-up strategies and recognition of patients' quality of life

Goal:

promote independence, **improvement of QoL, and prevention of further deterioration of cardiovascular health**

Supervised Exercise Therapy (SET) – First-Line Treatment

- Strongest evidence: Multiple meta-analyses and guidelines recommend structured walking programs as first-line therapy for patients with intermittent claudication. *Eur Heart J. 2024 Apr 14;45(15):1303-1321.*
- Effectiveness: SET* significantly increases both pain-free and maximum walking distance (up to 150% improvement within 3–6 months).
- Recommended protocol: At least 3 sessions per week, 30–60 minutes per session, under supervision.

* supervised exercise therapy

Alternative Exercise Approaches

- When SET not available or feasible, a structured and monitored (calls, logbooks, connected devices) HBET programme to be considered.

JAMA Netw Open. 2023 Sep 5;6(9); Eur Heart J. 2024 Apr 14;45(15):1303-1321.

- Strength training: benefits muscle strength and walking performance but has less supporting evidence than walking therapy.
- Arm & cycle ergometry: option for patients with severely impaired walking capacity.

** home based exercise training*

Recommendations for exercise therapy in patients with peripheral arterial disease

In patients with symptomatic PAD, SET is recommended.

I

A

In those patients undergoing endovascular revascularization, SET is recommended as an adjuvant therapy.

I

A

Health insurance perspective:

limited reimbursement, lack of standardized billing options, preference for invasive procedures (no insurance issues), limited availability of specialized SET programs

Recommendations for interventional treatment of asymptomatic and symptomatic peripheral arterial disease (general)		
In patients with symptomatic PAD, after a 3 month period of OMT and exercise therapy, PAD-related QoL assessment is recommended.	I	B
It is recommended to adapt the mode and type of revascularization options to anatomical lesion location, lesion morphology, and general patient condition.	I	C
In patients with symptomatic PAD and impaired PAD-related QoL after a 3 month period of OMT and exercise therapy, revascularization may be considered.	IIb	B

ERASE: RCT, endovascular revascularization plus SET (106) or SET only (106);
 Δ in MWD favored combination tx @ 1-y, difference @ 5-y no longer significant.

Ann Surg. 2022 Dec 1;276(6):e1035-e1043

Metaanalysis: endovascular revascularization plus SET superior walking outcome vs monotherapy. *Res Pract. 2015;2015:960402*

Smoking Cessation and Lifestyle Modification

- Strong evidence: Smoking cessation is the most impactful modifiable risk factor, significantly reducing cardiovascular events. *Front Cardiovasc Med.* 2023 Apr 28;10:1154708
- Diet and weight control: The Mediterranean diet and DASH diet improve vascular health and overall outcomes. *Can J Cardiol* 2022 May;38(5):672-680
- Antithrombotic therapy: Clopidogrel or low-dose rivaroxaban combined with aspirin for secondary prevention.

Pharmacological Support for Rehabilitation

- Statins: Lower cardiovascular risk and may improve walking ability

Recommendations for lipid-lowering therapy in patients with peripheral arterial and aortic diseases

In patients with atherosclerotic PAAD, lipid-lowering therapy is recommended.	I	A
An ultimate LDL-C goal of <1.4 mmol/L (55 mg/dL) and a >50% reduction in LDL-C vs. baseline are recommended in patients with atherosclerotic PAAD.	I	A
If the target LDL-C level is not achieved on maximally tolerated statins and ezetimibe, treatment with a PCSK9 inhibitor is recommended in patients with atherosclerotic PAAD, to achieve target values.	I	A
If the target LDL-C level is not achieved, a combination of statins and ezetimibe is indicated in patients with atherosclerotic PAAD, to achieve the given target values.	I	B
For statin-intolerant patients with atherosclerotic PAAD, at high CV risk, who do not achieve their LDL-C goal on ezetimibe, it is recommended to add bempedoic acid either alone or in combination with a PCSK9 inhibitor.	I	B

Pharmacological Support for Rehabilitation

- Blood pressure control:

Recommendations in 2017 (PAD) and 2014 (Aortic)	Class	Level	Recommendations in 2024	Class	Level
Recommendations for antihypertensive therapy in patients with peripheral and aortic disease					
In patients with PAD and hypertension, it is recommended to control blood pressure at <140/90 mmHg	I	A	In patients with PAAD and hypertension an SBP target towards 120–129 mmHg, if tolerated, is recommended.	I	A
ACEIs or ARBs should be considered as first-line therapy in patients with PAD and hypertension.	IIa	B	ACEIs/ARBs may be considered in all patients with PAD, regardless of BP levels, in the absence of contraindications.	IIb	B

Conclusion

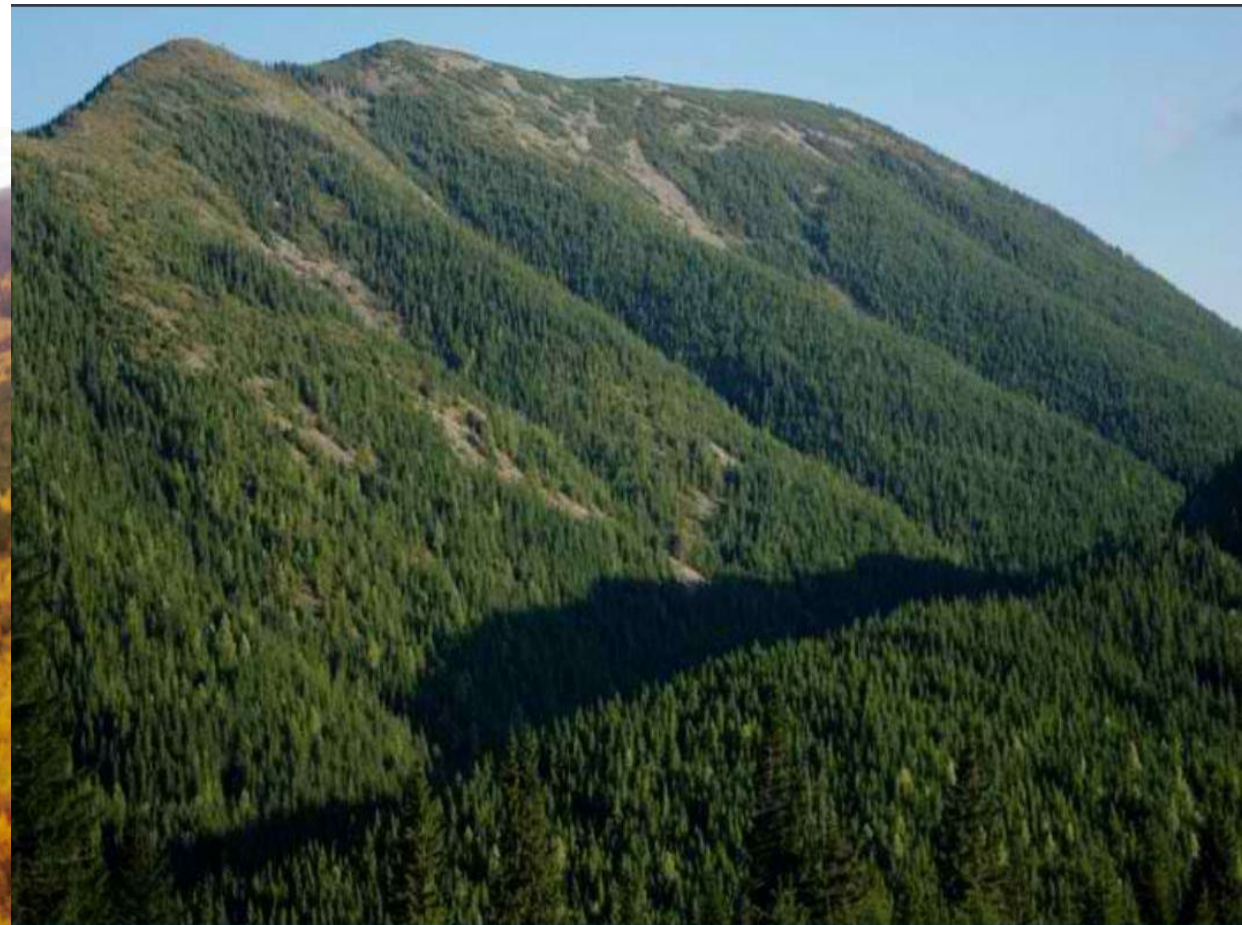
- SET or HBET gold standard for conservative PAD rehabilitation.
- Comprehensive medical and non-medical management crucial to improve outcomes, mitigate symptoms, and reduce risk of MACE/MALE.
- Pharmacological secondary prevention supports rehabilitation but cannot replace lifelong and high levels of regular physical activity.
- Revascularization is required for treatment-resistant cases or critical ischemia.

"Covasna Model"

- Nonpharmacological treatment
 - Natural factors of Covasna
 - Climatotherapy – aerotherapy
 - Bath with mineral waters (CO₂)
 - Mofettes (dry bath with CO₂)
 - Exercise training
 - Counselling to change behaviour (tobacco use, obesity sedentarism, diet, etc.)
 - Psychotherapy
 - Diet
 - Pharmacotherapy

Climatotherapy

- Climatotherapy is a therapeutical method that makes use of natural enviromental factors namely the climate change in order to maintain or ameliorate the organism's state of health
- Covasna has a moderate climate of medium height mountains, with sedative effects
 - Altitude: 560-600 m
 - Rich negative air ionisations
 - Resinous aerosols from the conifers forests







The carbogaseous waters

- Best effect are obtained at concentrations of 0.5-1g/l
 - The most important part in the balneary therapy of cardiovascular affections by the cutaneous peripheral vasodilating effects brought about by the carbonic gas which is resorbed in the tegument (30-35 ml/min/m²) acting as peripheral vasodilating medicine. This vasodilation is obtained by the direct action of the resorbed carbon dioxide on the musculature of the vascular walls. A secondary mechanism is obtained by the excitation of the cutaneous receptors which is produced by the bubbles of carbon dioxide laid in a thin layer on the skin. Another component is the termic element.
- The effects of this process on the systemic circulation are:
 - The reduction of the peripheral resistance, which facilitates the heart activity
 - The increase of the systolic flow and flow per minute, as a result of the cutaneous vasodilatation, but in advantageous conditions for the physical activity of the myocardium,

- In the last analysis, the carbogaseous baths bring about, by these haemodynamic modifications, an economical moderate training of the heart, when the energetic metabolic stress of the organism does not increase, on the contrary, it even slightly lessens as a result of the reduction of the central temperature
- At the same time the carbogaseous baths also represent an exercise of adaptation of the systems of neurovegetative and endocrine regulation to an adequate stress, which combines the pharmacologic effect of the carbon dioxide with the thermoregulating circulatory stress
- The increase of the venous return flow, the better vascularizing of the heart, along with concomitant reduction of the pulse frequency due to the induced hypothermia, are all favourable effects of the carbogaseous bath with various cardiovascular patient



The mofettes

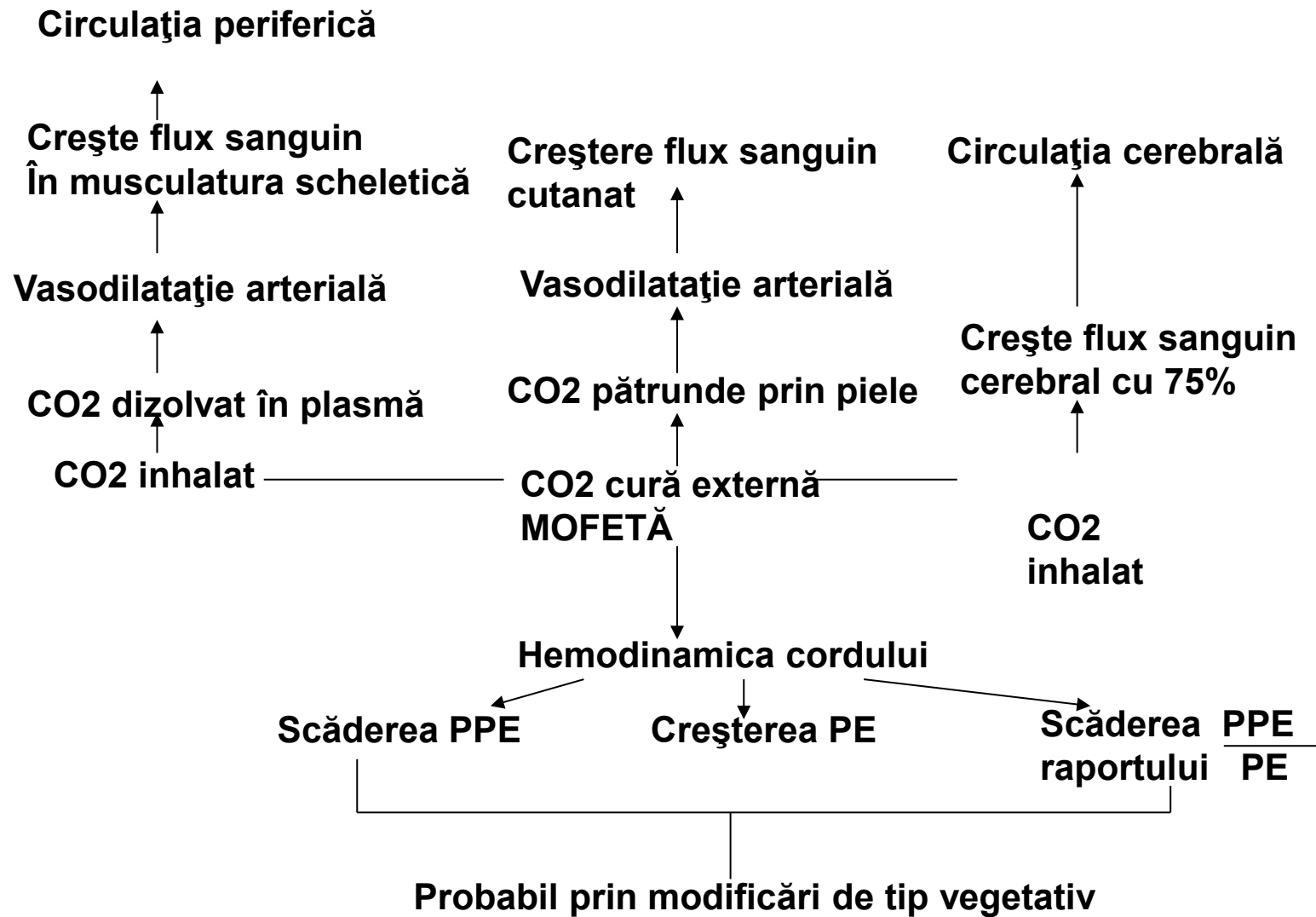
Consists in the captation of the

Emanations of free gas CO_2 in the vulcanic regions, and its use as such for therapeutic purposes in rooms specially equipped that allow the decline gas accumulation, since it is heavier than air

Contains also sulphureous and radon emanations (0,3 $\mu Ci/l$ ^{222}Rn)



Congresul Național de Medicină Fizică, de Recuperare și Balneoclimatologie



- Bring vasodilating effects following the inhalation in the mofette of an air containing a high percentage of carbon dioxide (1,5-2% volumes CO_2) the cerebral and muscular circulatory flow increases, which accounts for the favourable effects of the mofettes in the atherosclerosis with arterial peripheral and cerebral localization.

A model of institutional prevention and rehabilitation

= 66 years in Valea Zânelor
(The Fairies Valley)=



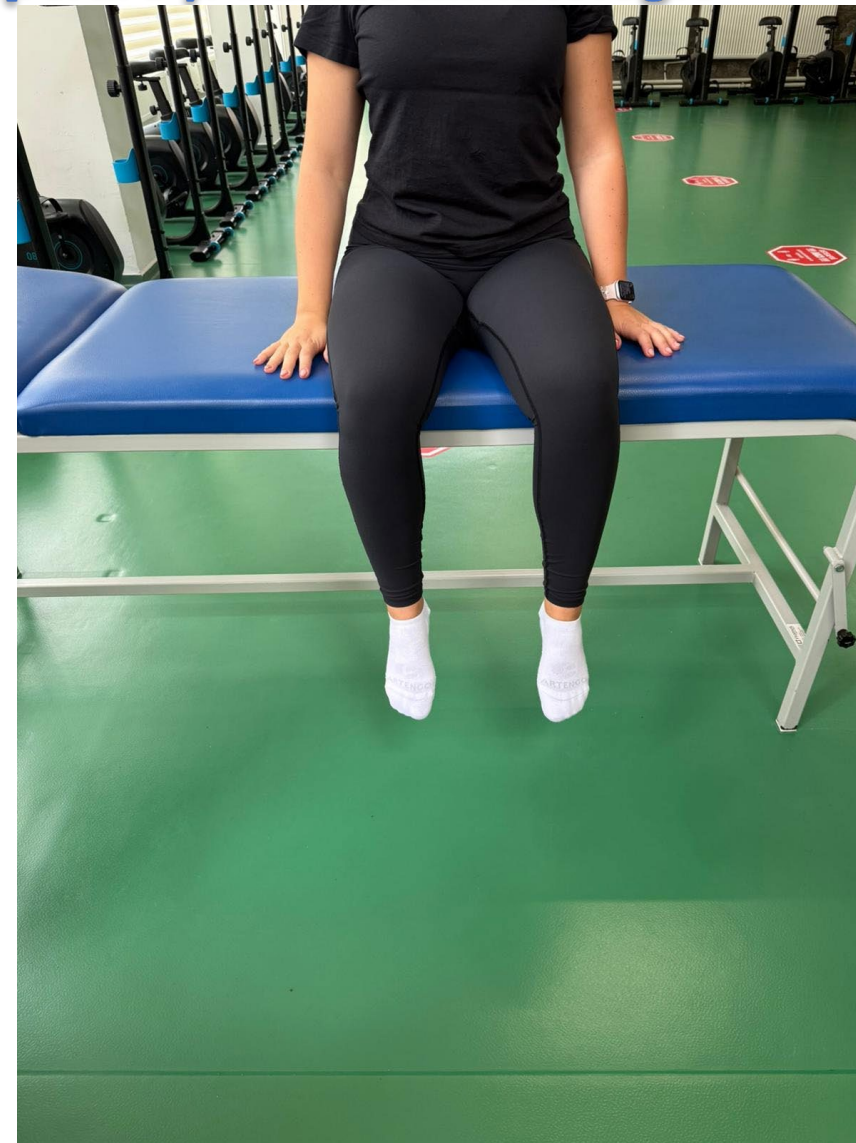
“Covasna Model”

Training exercises for managing PAD symptom

- 1.- Supervised walking programs
- 2.-Leg muscle strengthening exercises
- 3.-Endurance training
- 4.-Flexibility training exercise

















Electrotherapy

It can be used in the treatment of PAD to:

- improve blood circulation
 - reduce pain
- aid in the healing of lesions
 - TENS currents
 - galvanic currents

The role of Telemedicine in PAD

1- Remote monitoring

2- Remote supervised exercise programs

3 -Education and support

The role of AI in PAD

- 1- Early diagnosis and screening
- 2- Risk stratification
- 3- Remote monitoring
- 4- Optimization of therapeutic exercises
- 5- AI assisted surgery and endovascular interventions
- 6- Research and personalized medicine

Conclusions

Patients with PAD should receive comprehensive OMT, including supervised exercise training and lifestyle modification. A personalized programme of guidelines-guided pharmacotherapy to reduce cardiovascular risk factors, major adverse cardiac event, major adverse limb event, should be prescribed and tightly followed. The programme with carbogaseous waters and moffetes added to classical programme to patients with PAD, improve peripheral circulation and normalize vascular hyperreactivity, improve collateral circulation and claudication index, reduce tensional values and give bradycardic tendency during cures.

Programmes for recovery of patients with PAD could be improved using the potential of the natural factors of Covasna resort.



Vă mulțumesc !

