



HAL
open science

Effectiveness of a short duration program combining supervised exercises, nutritional advice and therapeutic education in patients with peripheral artery disease: A retrospective cohort study

A Guézais, M Talbot, Damien Lanéelle, Alexis Le Faucheur, C Bossée-Pilon, T Tueguem Moyo, J E Trihan, Guillaume Mahé

► To cite this version:

A Guézais, M Talbot, Damien Lanéelle, Alexis Le Faucheur, C Bossée-Pilon, et al.. Effectiveness of a short duration program combining supervised exercises, nutritional advice and therapeutic education in patients with peripheral artery disease: A retrospective cohort study. *Vascular Diseases*, 2025, <10.1016/j.vasdi.2025.06.001>. <hal-05158155>

HAL Id: hal-05158155

<https://hal.science/hal-05158155v1>

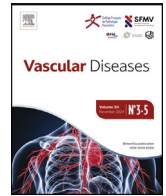
Submitted on 9 Oct 2025

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC BY 4.0 - Attribution - International License



Original article

Effectiveness of a short duration program combining supervised exercises, nutritional advice and therapeutic education in patients with peripheral artery disease: A retrospective cohort study

A. Guézais^{a,b}, M. Talbot^{a,b}, D. Lanéelle^{c,h}, A. Le Faucheur^d, C. Bossée-Pilon^e,
T. Tueguem Moyo^b, J.E. Trihan^{f,g}, G. Mahé^{a,b,d,*,1}

^a Inserm CIC 1414, Clinical Investigation Center, Univ Rennes, 35033 Rennes, France

^b Vascular Medicine Unit, CHU Rennes, Rennes, France

^c Vascular Medicine Department, CHU Caen-Normandie, Caen, France

^d Univ Rennes, M2S (Laboratoire Mouvement, Sport, Santé), Rennes, France

^e Cardiovascular rehabilitation Unit, Clinique Saint-Yves, Rennes, France

^f Vascular medicine Unit, CH Cholet, Cholet, France

^g Vascular medicine department, CHU Angers, Angers, France

^h Inserm COMETE, GIP Cyceron, University of Caen Normandy, Caen, France

ARTICLE INFO

Keywords:

Peripheral artery disease
Supervised exercise training
Maximal walking distance
Ankle-brachial index
Transcutaneous oxygen pressure

ABSTRACT

Objectives: Supervised exercise training (SET) for at least 3 months is a cornerstone in the management of lower extremity peripheral artery disease (PAD). However, optimal duration of SET is discussed. This study aimed to evaluate the effectiveness of a short-duration program combining SET, nutritional advice and therapeutic education on maximal walking distance (MWD). Secondary objectives included assessing the impact of this program on smoking cessation, low-density lipoprotein cholesterol (LDL-c) levels, optimization of medical therapy, and to identify factors associated with MWD improvement.

Methods: We conducted a retrospective, monocentric study. Parameters assessed before and after the program included ankle-brachial index (ABI) at rest, MWD on treadmill, post-exercise ABI, and exercise transcutaneous oxygen pressure (TcPO₂) using the Decrease from Rest of Oxygen Pressure (DROP). LDL-c levels, smoking status, and medical therapy were documented before and after the program.

Results: Forty-three patients (77% men, median age 67 [57–74] years) were included. The median program duration was 23.5 days [20.8–30.5], with 20.7 h [16.8–25.1] of supervised physical activity. MWD increased significantly from 208 m [139–294] to 251 m [171–574] ($P < 0.001$). Improvements in smoking status, LDL-c levels, and medical treatment optimization were also observed. Among all parameters, only the DROP TcPO₂ before the program was significantly associated with MWD improvement ($P < 0.05$).

Conclusion: A short-duration program effectively improved median MWD (+56% [10–159%]), cardiovascular risk management, and was associated with baseline ischemia severity. These findings support the utility of shorter combined programs and the potential value of exercise TcPO₂ in selecting responsive patients.

© 2025 The Author(s). Published by Elsevier Masson SAS. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Peripheral artery disease (PAD) of the lower limbs is a common and serious condition that significantly affects functional capacity and quality

of life [1–4]. Approximately half of patients with PAD experience exertional limb symptoms that reduces importantly their walking performance, as usually quantified by the treadmill maximal walking distance (MWD) [4]. In addition to smoking cessation and the

* Corresponding author. Inserm CIC-1414, Vascular Medicine Unit, CHU Rennes, Univ Rennes, 2, rue Henri-Le-Guilloux, Rennes, France.

E-mail addresses: maheguillaume@yahoo.fr, guillaume.mahe@chu-rennes.fr (G. Mahé).

¹ Twitter: @GMahe.

implementation of optimal medical therapy, supervised exercise training (SET) is strongly recommended by international guidelines and supported by high-level evidence [2,3,5].

Current recommendations specify SET sessions lasting 30 to 60 mins, at least three times per week, for a minimum duration of 12 weeks [1–3,5]. SET has been shown to be effective in the short, medium, and long term, with an average MWD improvement of 79% after a 12-week program [6]. Furthermore, SET has demonstrated similar efficacy to endovascular revascularization in terms of walking performance [6–8]. Beyond functional improvement, SET provides an opportunity to optimize cardiovascular risk management, including pharmacologic therapy (statins, antiplatelet agents, antihypertensives), diet, and patient education, with the goal of reducing major adverse cardiovascular events and improving overall quality of life [2,3].

Although international guidelines endorse a 12-week SET program [2,3,5,9], access to such programs remains limited in both Europe and the United States [10,11]. Moreover, it is well established that not all patients benefit equally from SET [3]. Therefore, shorter-duration SET programs warrant investigation, particularly regarding their efficacy on MWD. Additionally, there is currently no established method to predict which patients are most likely to benefit from SET [6,12,13].

The primary aim of this pilot study was to evaluate the improvement in MWD following a short-duration program that associates SET, nutritional advice and therapeutic education in patients with PAD and exertional limb symptoms. Secondary objectives were to assess the effects of this program on smoking cessation, LDL-cholesterol (LDL-c) levels, optimization of medical therapy, and to identify clinical or physiological factors associated with MWD improvement.

2. Materials and methods

2.1. Study design

This was a monocentric, retrospective study including consecutive patients referred to the vascular medicine unit of Rennes University Hospital (France) for exertional limb symptoms and suspected peripheral artery disease (PAD). Patients were recruited between December 2016 and December 2023. The study was registered on ClinicalTrials.gov (Exercise PAD, NCT03186391). All participants provided informed consent, and the study complied with the principles of the Declaration of Helsinki.

2.2. Inclusion and exclusion criteria

Eligible patients had symptomatic PAD and were referred to a rehabilitation center for the program combining SET, nutritional advice and therapeutic education. Exclusion criteria included: chronic limb-threatening ischemia, absence of walking limitation on initial treadmill test, vascular surgery between the two treadmill tests, and failure to perform the post-program treadmill test.

2.3. Study protocol

Each patient underwent two consultations in the vascular medicine unit, before and after attending the program at a local rehabilitation center. During both visits, the following data were collected: medical history, current treatments, LDL-c levels, smoking status, and self-reported maximal walking distance (MWD). Two treadmill tests were conducted to assess exercise transcutaneous oxygen pressure (Exercise-TcPO₂) and post-exercise ankle-brachial index (ABI). Optimal medical therapy was defined as the combination of an antiplatelet agent, a lipid-lowering drug, and either an angiotensin-converting enzyme inhibitor (ACEI) or angiotensin II receptor blocker (ARB) [5].

2.4. MWD and Exercise-TcPO₂ Assessment

Resting ABI was measured following international guidelines [5,14]; values ≤ 0.90 were considered pathological. Two treadmill tests (3.2 km/

h, 10% incline) were conducted: one for measuring MWD and exercise-TcPO₂, and the other for the measurement of post-exercise ABI [15]. Pain onset and location were recorded, and the test was stopped upon maximal pain. The MWD measured on the first test was used for the analysis.

Exercise-TcPO₂ was measured using Clark electrodes at five sites: chest (reference), left and right buttocks, and left and right calves [16,17]. A DROP (Decrease from Resting Oxygen Pressure) ≤ -15 mmHg at any site indicated ischemia [5,16]. Total DROP TcPO₂ was calculated as the sum of the four peripheral site values; Max DROP TcPO₂ referred to the lowest single value among them [18].

2.5. Post-program evaluation

Post-program measurements replicated the initial evaluation. LDL-c, smoking status, and medications were recorded.

2.6. Supervised exercise training

The SET program included various physical activities: treadmill walking, outdoor walking, “vascular” walking (pain-adapted), cycling, muscle strengthening, and vascular-specific gymnastics (with warm-up). Exercise sessions were tailored to the patient’s physical capacity. Duration and type of each activity were recorded.

2.7. Therapeutic patient education and nutritional counselling

Therapeutic patient education (TPE) is a structured person-centred learning process that supports individuals living with chronic conditions to self-manage their own health by drawing on their own resources, supported by their caregivers and families. Nutritional support is recommended for all patients with chronic vascular diseases [5,19,20].

2.8. Statistical analysis

Data were entered in an Excel[®] database and analyzed using R software[®]. Continuous variables were expressed as mean \pm standard deviation (SD) or median [25th–75th percentile], depending on distribution. Categorical variables were expressed as counts and percentages. Paired *t*-tests or Wilcoxon tests were used for before–after comparisons of continuous variables; McNemar or χ^2 tests were used for categorical variables. Predictive factors of MWD improvement were analyzed using univariate and multivariate linear regression. A *P*-value ≤ 0.05 was considered statistically significant.

3. Results

3.1. Patient characteristics

From December 2016 to December 2023, 85 patients completed two consecutive treadmill tests. Among them, 64 underwent the combined program at our rehabilitation center. After applying exclusion criteria (death, *n* = 1; vascular surgery during the program, *n* = 1; absence of post-program walking test [i.e. loss of follow-up], *n* = 19), 43 patients were included in the final analysis (Fig. 1). Of these, 33 (77%) were men, with a median age of 67 years [57–74].

The baseline characteristics of the study population are summarized in Table 1. The self-reported MWD was 350 m [200–500], and 42% were active smokers. The resting ABI was 0.85 [0.72–0.96] on the right lower limb and 0.81 [0.64–0.96] on the left lower limb. The post-exercise ABI was 0.42 [0.27–0.57] (right) and 0.41 [0.27–0.80] (left). The total DROP TcPO₂ was –84 mmHg [–103 to –54], and the maximum DROP TcPO₂ was –31 mmHg [–43 to –17].

3.2. Characteristics of the program combining SET, nutritional advice and therapeutic education

The median program duration was 23.5 days [20.8–30.5], with a median supervised physical activity time of 15.0 days [14.0–16.0]. The

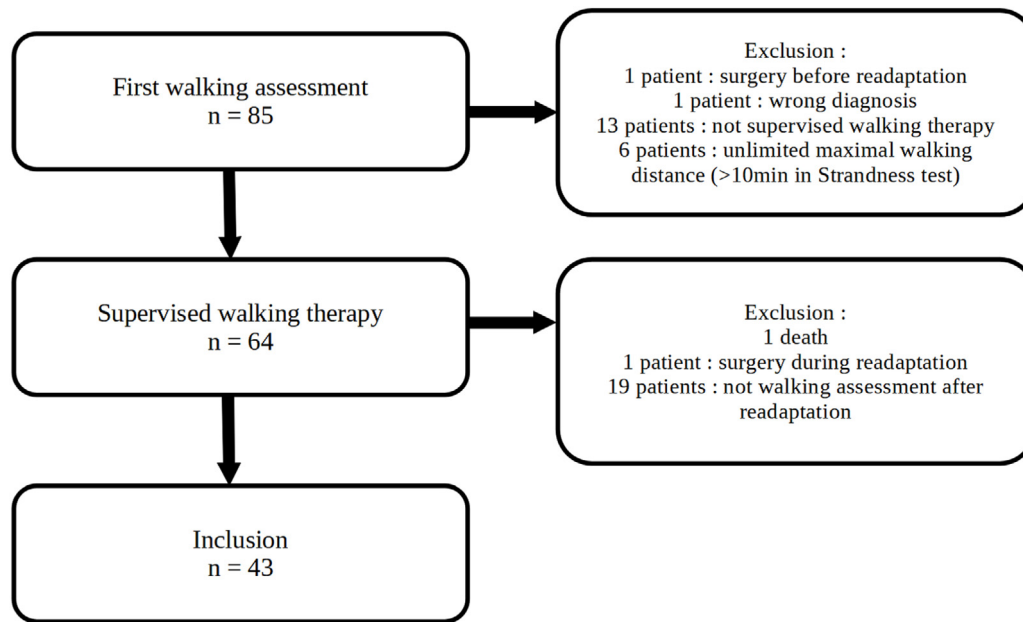


Fig. 1. Flow chart of the included population.

Table 1
Population characteristics.

Variables	Patients (n = 43)
Age (years), median [IQR]	67 [57; 74]
Sex, n (% men)	33 (76.7%)
BMI (kg/m ²), mean ± SD	28.07 ± 4.66
Hypertension, n (%)	36 (83.7)
Dyslipidemia, n (%)	39 (90.7)
Diabetes, n (%)	8 (18.6)
Self-reported MWD (m), median [IQR]	350 [200; 500]
Current smoking, n (%)	18 (41.9)
Smoking cessation, n (%)	18 (41.9)
LDL-c (g/L), median [IQR]	1.00 [0.64; 1.46]
Antiplatelets, n (%)	39 (90.7)
Statins, n (%)	32 (74.4)
Ezetimibe, n (%)	14 (32.6)
ACEIs/ARBs, n (%)	30 (69.8)
Beta-blockers, n (%)	20 (46.5)
Other hypertension treatments, n (%)	23 (53.5)
Right ankle brachial index at rest, median [IQR]	0.85 [0.72; 0.96]
Left ankle brachial index at rest, median [IQR]	0.81 [0.64; 0.96]

LDL-c: Low Density Lipoprotein cholesterol; ACEIs: Angiotensin-Converting Enzyme Inhibitors; ARBs: Angiotensin II Receptor Antagonists; BMI: Body mass index; MWD: maximal walking distance; IQR: interquartile range (25%–75%); SD: standard deviation.

total duration of supervised physical activity was 19.4 h [16.8–25.1]. Details of activities are presented in Table 2. All patients received dietary counselling, and 98% participated in therapeutic education. Among current smokers (n = 18), 50% received smoking cessation support.

3.3. Effects of the program

The median interval between the two treadmill tests was 186 days [135–319]. After the program, the median MWD significantly increased from 208 m [139–294] to 251 m [171–574] ($P < 0.001$). The relative median improvement in MWD was +56% [10–159%], with a median absolute gain of 91 m [14–320]. The mean relative increase was +97 ± 125%, with a mean absolute gain of 192 ± 255 m (Table 3).

In terms of cardiovascular risk factor control, LDL-c levels improved significantly. Of the 30 patients with post-program LDL-c data, 43% achieved the target of < 0.55 g/L, compared to 14% at baseline ($P < 0.05$).

Table 2
Characteristics of the program.

Variable	Patients
Activities (n = 42)	
Total supervised activities (h), median [IQR]	19.35 [16.78; 25.12]
Total supervised walks (h), median [IQR]	7.98 [5.94; 9.16]
Treadmill walk (h), median [IQR]	1.50 [0.74; 2.31]
Outdoor walk (h), median [IQR]	4.75 [4.00; 5.94]
Vascular walk (h), median [IQR]	1.50 [0.75; 2.25]
Bike (h), median [IQR]	3.37 [2.68; 4.71]
Muscle strengthening (h), median [IQR]	8.62 [4.31; 11.19]
Vascular gym (h), median [IQR]	1.50 [0.75; 1.50]
Consultations (n = 43)	
Dietary counselling (%)	43 (100)
Therapeutic education sessions (%)	42 (97.7)
Smoking patients (n = 18)	
Smoking cessation interventions (%)	9 (50.0)

IQR: inter quartile range.

Optimal medical therapy was prescribed to 30% at baseline, 60% after initial consultation, and 72% post-program. Smoking prevalence decreased significantly from 42% to 21% ($P < 0.05$).

Hemodynamic parameters (resting ABI, post-exercise ABI, DROP TcPO₂) showed no significant change after the program (Table 3).

3.4. Factors associated with MWD improvement after the program

In univariate analysis, several variables showed associations with MWD improvement (Table S1–Supplemental material). However, only the total DROP TcPO₂ at inclusion remained significantly associated in the multivariate analysis ($P = 0.029$). Neither initial MWD nor post-exercise ABI predicted the MWD improvement.

4. Discussion

This study demonstrates that a short-duration program combining SET, nutritional advice and therapeutic education is associated with a significant increase in maximal walking distance (MWD) in patients with peripheral artery disease (PAD) and exertional limb symptoms. This functional improvement was accompanied by a significant reduction in smoking prevalence, improved LDL-cholesterol levels, and enhanced

Table 3
Changes in functional and hemodynamic parameters before and after the program.

Variables	Before the program	After the program	P-value
Maximum walking distance (m), median [IQR]	208 [139; 294]	251 [171; 574]	<0.001
Right ankle brachial index at rest, median [IQR]	0.85 [0.72; 0.96]	0.88 [0.67; 0.98]	0.7692
Left ankle brachial index at rest, median [IQR]	0.81 [0.64; 0.96]	0.88 [0.62; 1.01]	0.6092
Right post-exercise ankle brachial index, median [IQR]	0.42 [0.27; 0.57]	0.48 [0.30; 0.71]	0.4538
Left post-exercise ankle brachial index, median [IQR]	0.41 [0.27; 0.80]	0.52 [0.34; 0.92]	0.2268
Right buttock DROP (mmHg), median [IQR]	-16 [-28; -12]	-18 [-25; -11]	0.5347
Left buttock DROP (mmHg), median [IQR]	-16 [-24; -11]	-20 [-29; -13]	0.4141
Right calf DROP (mmHg), median [IQR]	-18 [-29; -12]	-19 [-36; -11]	0.0837
Left calf DROP (mmHg), median [IQR]	-21 [-35; -13]	-19 [-30; -13]	0.2824
DROP Total TcPO2 (mmHg), median [IQR]	-84 [-103; -54]	-85 [-109; -55]	0.57
DROP Max TcPO2 (mmHg), median [IQR]	-31 [-43; -17]	-32 [-42; -20]	0.74

DROP: Delta from Resting Oxygen Pressure; TcPO2: transcutaneous oxygen pressure; Total DROP TcPO2 was calculated as the sum of the four peripheral site values; DROP Max referred to the lowest single value among the four sites; IQR: inter quartile range (25%–75%).

prescription of optimal medical therapy. Among various clinical and physiological parameters, only the baseline total DROP TcPO2 was independently associated with MWD improvement.

SET is a key component in the management of PAD patients who experience exertional limb symptoms [1–3,5,9]. Guidelines have reported the optimal characteristics of SET in terms of intensity (“40%–60% maximal workload based on baseline treadmill test”), frequency (“3 times per week supervised”), duration of exercise per session (“30–50 min of intermittent exercise; goal is to accumulate at least 30 min of walking exercise”), progression of increasing exercise volume (“Every 1–2 wk: increase duration of training session to achieve 50 min.”), and program duration (“At least 12 weeks”) [3]. According to guidelines, a program of at least twelve weeks duration is recommended, corresponding to a minimum total exercise duration of 18 h (i.e., 30-min session, 3 times per week, within 12 weeks). However, the literature supporting this recommendation is sparse [2,3,12].

The guidelines are largely based on the work of Gardner et al. who found that the improvement in MWD occurred rapidly within the first two months of SET with a total exercise duration of 354 mins (i.e. approximately 6 h) [12]. Further improvement was then seen within the next two months, with a plateau between 4 and 6 months [12]. Our study shows that a program of short duration in terms of total length of hospital stay, but in line with recommendations in terms of cumulative exercise duration, demonstrated a benefit in improving MWD. It is noteworthy that the improvement in MWD was more pronounced in our more intensive program, with a mean increase of 97% in contrast to the 51% increase observed at two months in the Gardner et al. study [12]. This is in consistent with previous work suggesting a relationship between the volume of exercise and the degree of the improvement in MWD [21]. The higher the volume, the better the improvement of MWD. The results of our study suggest that a short duration program can be effective in improving MWD. This finding is of particular interest given that previous studies have identified the perceived time commitment as one of the main reasons for individuals’ reluctance to engage in supervised exercise [10,22]. This shorter duration of SET may help to increase patient adherence to this type of SET. In addition, a shorter duration may allow us to treat more patients and be more efficient on a population level.

Another point of interest in the case of the lack of facilities to perform SET is to define criteria that can predict the improvement in MWD after SET [10,22,23]. In other words, can we select patients who should undergo SET? It is a well-established fact that the ability of clinical factors, including resting ABI, Doppler waveforms, and walking questionnaires, to predict MWD improvement is limited [24–26]. Our study suggests that only the DROP total TcPO2 which corresponds to the diffusion of atherosclerosis in the lower limbs was a predictor of the improvement in MWD after SET [18]. Interestingly, neither the initial treadmill MWD nor the post-exercise ABI measured at the initial treadmill test was found to be associated with the improvement in MWD after SET. Although this finding needs to be confirmed in larger studies, it suggests

that exercise TcPO2 may be of interest in identifying patients who should undergo SET. Furthermore, our study confirms the results of previous studies that the type of exercises performed during SET cannot explain the improvement in MWD after SET [6].

Another important aspect of the short duration program is the increase in the number of patients who quit smoking (from 41.9% to 18.6%) as well as the increase in the number of patients on optimal medical treatment (from 49% to 63%) and achieving LDL-c targets. Several studies have shown that too few patients with PAD receive optimal medical treatment and achieve LDL-c targets while studies have demonstrated the benefits of this therapeutic approach [27–29].

The last interesting point is the absence of hemodynamic improvement after the short-duration program. Indeed, in our study, resting ABI, DROPs and post-exercise ABI were not modified after the program suggesting that the improvement in MWD after the program is not linked to hemodynamics [3]. The shortness of the program might be a possible explanation for this result but hemodynamic improvement after SET has also been widely discussed [7,12,30].

4.1. Study limitations

Our study has several limitations. First, the small sample size limits the generalizability of the findings and the statistical power of multivariate analyses. Second, this is a retrospective study without control group and the results cannot be extrapolated because the patients who agreed to undergo the program were few; 64 patients, including 19 lost to follow-up, and do not reflect the entire population of patients with PAD. Third, the median time between completion of the pre- and post-program treadmill tests in this study was 186 (135; 319) days. Standardization of this time (i.e., immediately after completion of the SET) would have been preferable in order to more accurately assess improvement in maximum walking distance by the program. However, this median time also reflects the practical implementation of these tests in real-life situations. Finally, we did not assess whether this improvement was maintained several months after the end of the program. We cannot exclude that a longer duration of the program may have greater sustainability in terms of improvement in MWD, although long-term results are also controversial for longer duration of SET [7,31].

5. Conclusion

A short-duration supervised exercise-training program is associated with significant improvement in maximal walking distance in patients with PAD and exertional limb symptoms. This functional benefit is accompanied by better cardiovascular risk management, including smoking cessation, improved lipid control, and optimization of medical therapy. Among all parameters analysed, baseline total DROP TcPO2 was the only independent predictor of walking distance improvement. These findings remains to be confirmed by larger studies.

Disclosure of interest

The authors declare that they have no competing interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.vasdi.2025.06.001>.

References

- Mazzolai L, Teixeira-Tura G, Lanzi S, Boc V, Bossone E, Brodmann M, et al. 2024 ESC Guidelines for the management of peripheral arterial and aortic diseases. *Eur Heart J* 2024;45:3538–700, doi:<http://dx.doi.org/10.1093/eurheartj/ehae179>.
- Mazzolai L, Belch J, Venermo M, Abovay V, Brodmann M, Bura-Rivière A, et al. Exercise therapy for chronic symptomatic peripheral artery disease. *Eur Heart J* 2024;45:1303–21, doi:<http://dx.doi.org/10.1093/eurheartj/ehad734>.
- Treat-Jacobson D, McDermott MM, Bronas UG, Campia U, Collins TC, Criqui MH, et al. Optimal exercise programs for patients with peripheral artery disease: a scientific statement from the American Heart Association. *Circulation* 2019;139:e10–33, doi: <http://dx.doi.org/10.1161/CIR.0000000000000623>.
- Bura-Rivière A, Mahé G. *Maladies artérielles*. Issy-les-Moulineaux: Elsevier Masson; 2016.
- Mahé G, Boge G, Bura-Rivière A, Chakfé N, Constans J, Goueffic Y, et al. Disparities between International Guidelines (AHA/ESC/ESVS/ESVM/SVS) concerning lower extremity arterial disease: Consensus of the French Society of Vascular Medicine (SFMV) and the French Society for Vascular and Endovascular Surgery (SCVE). *Ann Vasc Surg* 2021;72:1–56, doi:<http://dx.doi.org/10.1016/j.avsg.2020.11.011>.
- Fakhry F, van de Luijngaarden KM, Bax L, den Hoed PT, Hunink MG, Rouwet EV, et al. Supervised walking therapy in patients with intermittent claudication. *J Vasc Surg* 2012;56:1132–42, doi:<http://dx.doi.org/10.1016/j.jvs.2012.04.046>.
- Murphy TP, Cutlip DE, Regensteiner JG, Mohler ER, Cohen DJ, Reynolds MR, et al. Supervised exercise, stent revascularization, or medical therapy for claudication due to aortoiliac peripheral artery disease. *J Am Coll Cardiol* 2015;65:999–1009, doi: <http://dx.doi.org/10.1016/j.jacc.2014.12.043>.
- Koelemay MJW, van Reijen NS, van Dieren S, Frans FA, Vermeulen EJJ, Buscher HCJL, et al. Editor's choice - randomised clinical trial of supervised exercise therapy vs. endovascular revascularisation for intermittent claudication caused by iliac artery obstruction: the SUPER study. *Eur J Vasc Endovasc Surg* 2022;63:421–9, doi:<http://dx.doi.org/10.1016/j.ejvs.2021.09.042>.
- Nordanstig J, Behrendt C-A, Baumgartner I, Belch J, Bäck M, Fitridge R, et al. Editor's choice - European Society for Vascular Surgery (ESVS) 2024 Clinical Practice Guidelines on the management of asymptomatic lower limb peripheral arterial disease and intermittent claudication. *Eur J Vasc Endovasc Surg* 2024;67:9–96, doi:<http://dx.doi.org/10.1016/j.ejvs.2023.08.067>.
- Lanzi S, Belch J, Brodmann M, Madaric J, Bura-Rivière A, Visonà A, et al. Supervised exercise training in patients with lower extremity peripheral artery disease. *Vasa* 2022;51:267–74, doi:<http://dx.doi.org/10.1024/0301-1526/a001024>.
- Saxon JT, Safley DM, Mena-Hurtado C, Heyligers J, Fitridge R, Shishchbor M, et al. Adherence to guideline-recommended therapy-including supervised exercise therapy referral-across peripheral artery disease specialty clinics: insights from the international PORTRAIT Registry. *J Am Heart Assoc* 2020;9:e012541, doi:<http://dx.doi.org/10.1161/JAHA.119.012541>.
- Gardner AW, Montgomery PS, Parker DE. Optimal exercise program length for patients with claudication. *J Vasc Surg* 2012;55:1346–54, doi:<http://dx.doi.org/10.1016/j.jvs.2011.11.123>.
- Gommans LNM, Saarloos R, Scheltinga MRM, Houterman S, de Bie RA, Fokkenrood HJP, et al. Editor's choice - the effect of supervision on walking distance in patients with intermittent claudication: a meta-analysis. *Eur J Vasc Endovasc Surg* 2014;48:169–84, doi:<http://dx.doi.org/10.1016/j.ejvs.2014.04.019>.
- Abovay V, Criqui MH, Abraham P, Allison MA, Creager MA, Diehm C, et al. Measurement and interpretation of the ankle-brachial index: a scientific statement from the American Heart Association. *Circulation* 2012;126:2890–909, doi:<http://dx.doi.org/10.1161/CIR.0b013e318276fcb>.
- Stivalet O, Paisant A, Belabbas D, Omarjee L, Le Faucheur A, Landreau P, et al. Exercise testing criteria to diagnose lower extremity peripheral artery disease assessed by computed-tomography angiography. *PLoS One* 2019;14:e0219082, doi:<http://dx.doi.org/10.1371/journal.pone.0219082>.
- Koch C, Chauve E, Chaudru S, Le Faucheur A, Jaquinandi V, Mahé G. Exercise transcutaneous oxygen pressure measurement has good sensitivity and specificity to detect lower extremity arterial stenosis assessed by computed tomography angiography. *Medicine (Baltimore)* 2016;95:e4522, doi:<http://dx.doi.org/10.1097/MD.0000000000004522>.
- Poulin A, Guilcher A, Omarjee L, Jaquinandi V, Gandon Y, Mahé G, et al. Validation of a software to perform exercise oximetry to diagnose arterial stenosis of the lower limbs. *Atherosclerosis* 2018;278:325–7, doi:<http://dx.doi.org/10.1016/j.atherosclerosis.2018.08.025>.
- Mahé G, Zeenny M, Ouedraogo N, Vielle B, Leftheriotis G, Abraham P. Heart rate recovery after constant-load exercise tests is decreased in proportion to the importance (severity and diffusion) of exercise-induced lower-limb ischaemia. *Clin Physiol Funct Imaging* 2011;31:48–53, doi:<http://dx.doi.org/10.1111/j.1475-097X.2010.00978.x>.
- Carsin M, Mahé G. [Why should vascular patients have a dietary assessment?]. *J Mal Vasc* 2010;35:17–22, doi:<http://dx.doi.org/10.1016/j.jmv.2009.11.003>.
- Loreaux F, Jéhannin P, Le Pabic E, Paillard F, Le Faucheur A, Mahe G. An unfavorable dietary pattern is associated with symptomatic peripheral artery disease. *Nutr Metab Cardiovasc Dis* 2024;34:2173–81, doi:<http://dx.doi.org/10.1016/j.numecd.2024.05.025>.
- Gardner AW, Montgomery PS, Flinn WR, Katzell LI. The effect of exercise intensity on the response to exercise rehabilitation in patients with intermittent claudication. *J Vasc Surg* 2005;42:702–9, doi:<http://dx.doi.org/10.1016/j.jvs.2005.05.049>.
- Cetlin MD, Polonsky T, Ho K, Zhang D, Tian L, Zhao L, et al. Barriers to participation in supervised exercise therapy reported by people with peripheral artery disease. *J Vasc Surg* 2023;77:506–14, doi:<http://dx.doi.org/10.1016/j.jvs.2022.09.014>.
- Dua A, Gologorsky R, Savage D, Rens N, Gandhi N, Brooke B, et al. National assessment of availability, awareness, and utilization of supervised exercise therapy for peripheral artery disease patients with intermittent claudication. *J Vasc Surg* 2020;71:1702–7, doi:<http://dx.doi.org/10.1016/j.jvs.2019.08.238>.
- Miossec A, Tollenaere Q, Lanéelle D, Guilcher A, Métairie A, Le Pabic E, et al. Arterial Doppler waveforms are independently associated with maximal walking distance in suspected peripheral artery disease patients. *Front Cardiovasc Med* 2021;8:608008, doi:<http://dx.doi.org/10.3389/fcvm.2021.608008>.
- McDermott MM, Greenland P, Liu K, Guralnik JM, Celic L, Criqui MH, et al. The ankle brachial index is associated with leg function and physical activity: the Walking and Leg Circulation Study. *Ann Intern Med* 2002;136:873–83.
- Tollenaere Q, Métairie A, Le Pabic E, Le Faucheur A, Mahé G. Use of the Walking Impairment Questionnaire and Walking Estimated-Limitation Calculated by History questionnaire to detect maximal walking distance equal to or lower than 250 m in patients with lower extremity arterial disease. *Front Cardiovasc Med* 2023;10:968213, doi:<http://dx.doi.org/10.3389/fcvm.2023.968213>.
- de Kermenguy C, Durand A, Tollenaere Q, Le Pabic E, Paillard F, Mahé G. A retrospective analysis on optimal medical therapy for patients with symptomatic lower extremity peripheral artery disease: a French observational study. *BMC Cardiovasc Disord* 2024;24:611, doi:<http://dx.doi.org/10.1186/s12872-024-04289-w>.
- Bonaca M, Giugliano RP, Cannon CP, Park JG, Murphy SA, Creager MA, et al. Reduction in the risk of major adverse limb events with ezetimibe versus placebo in addition to statin therapy: insights from the IMPROVE IT trial. *Eur Heart J* 2023;44, doi:<http://dx.doi.org/10.1093/eurheartj/ehad655.2034> ehad655.2034.
- Bonaca MP, Hamburg NM, Creager MA. Contemporary medical management of peripheral artery disease. *Circ Res* 2021;128:1868–84, doi:<http://dx.doi.org/10.1161/CIRCRESAHA.121.318258>.
- Parmenter BJ, Dieberg G, Smart NA. Exercise training for management of peripheral arterial disease: a systematic review and meta-analysis. *Sports Med* 2015;45:231–44, doi:<http://dx.doi.org/10.1007/s40279-014-0261-z>.
- McDermott MM, Kibbe MR, Guralnik JM, Ferrucci L, Criqui MH, Domanchuk K, et al. Durability of benefits from supervised treadmill exercise in people with peripheral artery disease. *JAHA* 2019;8:e009380, doi:<http://dx.doi.org/10.1161/JAHA.118.009380>.