Quality of life and exercise capacity of elderly patients affected by severe intermittent claudication: revascularization or rehabilitation? A randomized pilot study comparing invasive treatment versus structured home-based exercise.

Introduction
The ageing of population will progressively increase the prevalence of peripheral arterial disease (PAD). The management of intermediate stages of PAD, characterized by a walking disability affecting the quality of life, will represent a critical issue for the sanitary health service. Both interventional treatments and exercise therapy under supervision were found to be effective on improving the quality of life (QoL) and the exercise capacity of PAD patients. Unfortunately, the supervised rehabilitative programs are poorly available and often show a low adherence rate. These critical issues have therefore increased the interest for the structured home-based exercise programs.

The present study aims to compare the effects on QoL, exercise capacity, functional mobility and hemodynamics of an original structured home-based program versus the best interventional option in the elderly patient with moderate-severe walking disability at a 4-month follow up.

Subjects and methods
From a population of 513 patients under study, 27 subjects (M=21; age 68±7 yo) with PAD at grade I - category 2-3 according to the Rutherford classification, affected by at least one comorbidity and with indication for surgical or endovascular interventions were recruited. Patients after a block randomization (1:2) were allocated to one of the two study arms: i) group “Revascularization” (Rev, n=9) based on interventional treatment (endovascular, surgical or both) and ii) “Exercise” group (Ex, n=18) based on a structured rehabilitative program, prescribed at hospital and performed at home, at the maximal asymptomatic speed maintained at home by a metronome.

The outcome measures were performed at the baseline and after four months. The primary endpoint was related to QoL, being represented by the Physical Component (PC) score, determined by the SF-36 questionnaire; the secondary outcome measures included the assessment of the exercise capacity by a constant load treadmill test to determine the Initial Absolute Claudication Distance (ICD, ACD); the functional mobility assessed by the 6-minute walking test to determine the total and the pain-free walking distance (6MWD and PFWD, respectively) and the hemodynamic severity of PAD by calculation of the ankle-brachial index (ABI).

An experimental non-invasive dynamic evaluation of the degree of metabolic adaptations at gastrocnemius muscle was performed during an incremental treadmill test assisted by the Near Infra-Red Spectroscopy (NIRS) technique. The cost-effectiveness ratio of the two treatments was also calculated.
Results
One patient did not receive the treatment for contraindication for surgery and 8 did not complete the study (Rev=2, Ex=6).
Concerning QoL, the score increased for all domains following both treatments; PC score improved in Rev (from 33±6 to 43±3; p=0,022) and in Ex (from 32±9 to 41±8; p<0,001) without significant statistic difference between groups.
The parameters related to exercise capacity improved following both treatments (ICD: Rev from 61±22m to 123±44m; p=0,013; Ex: from 60±29m to 120±75m; p=0,002 - ACD: Rev from 102±69m to 188±132m; p=0,028; Ex: from 102±64m to 158±63m; p<0,001) without significant difference between groups.
Functional mobility also increased following both treatments (PFWD: Rev from 130±38m to 248±102m; p=0,050; Ex from 173±126m to 275±138m; p=0,003 - 6MWD: Rev from 272±91m to 392±102m; p=0,026; Ex from 312±67m to 346±85m; p=0,005) with significant difference for Rev versus Ex for 6MWD (p=0,001) but not for PFWD.
The ABI value for the most ischemic limb significantly increased following both treatments (Rev from 0,57±0,17 to 0,84±0,14, p=0,025; Ex from 0,56±0,19 to 0,66±0,19, p<0,001), with a significant difference for Rev versus Ex (p=0,025).
The incremental test assisted by NIRS showed, at the same walking speed of baseline, a trend of clear reduction for the oxygenation debt at gastrocnemius (-56%) following Rev. This trend was less evident following Ex (-24%), where a concomitant reduction of arterio-venous difference was observed (-28%), suggesting an improved muscle attitude for oxygen extraction capacity.
The cost-effectiveness ratio of the two treatments calculated as Euros spent to gain one meter during exercise testing, showed, considering all parameters collected, an average cost 12-fold higher for Rev compared to Ex (83 vs 8 € considering ACD changes, respectively).
Outcome measures changes related to the primary endpoint were used to calculate the sample size for a future larger clinical trial.

Conclusions
This preliminary study, limited by the small sample size, did not show a significant difference between the two treatments for the QoL-related primary endpoint at the 4-month follow up.
Rev group showed a higher improvements for most parameters compared to Ex, statistically significant only for 6MWD and ABI.
The experimental use of the NIRS technique suggests that the adaptations occurred are related to improved muscle perfusion for Rev and to oxygen extraction for Ex, boosted by a moderate increase of perfusion.
Future studies will clarify whether structured home-based exercise programs, and particularly the original model tested in the present study, may represent an effective and sustainable alternative to the interventional treatments in the elderly PAD patient with moderate-severe claudication.