# Peripheral arterial disease versus other localizations of vascular disease: The ATTEST study

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*Objective:* Despite the increased cardiovascular morbidity and mortality risk of patients with peripheral arterial disease, previous worldwide studies have documented undertreatment of cardiovascular risk factors in such patients.
*Method:* The ATTEST study was an observational cross-sectional epidemiologic study. Patients (n = 8475) were selected by 3020 general practitioners in France who were asked to include the first three patients with at least one site of proven atherothrombotic disease (peripheral arterial disease of the lower limbs for two patients and coronary artery disease or ischemic stroke for the third patient). We designed the ATTEST study to compare medical management of patients with peripheral arterial disease, including pharmacologic treatment, cardiovascular tests, and physician's assessment of future cardiovascular and amputation risks, with patients with coronary artery disease or ischemic stroke.
*Results:* Only 13% of the patients with peripheral arterial disease (n = 3811) received angiotensin converting enzyme inhibitors, statins, and antiplatelet agents vs 30% of the patients with coronary artery disease or ischemic stroke (n = 4664). This undertreatment of the population with peripheral arterial disease was associated with a too-optimistic physician's assessment of future cardiovascular risk: only 27% of the general practitioners predicted a 5-year cardiovascular risk >20%. Conversely, amputation risk prediction was greatly overestimated: only 44% of the practitioners predicted a 5-year amputation risk <5%.
*Conclusions:* Patients with atherothrombotic disease recruited from primary care practices were not adequately tested and treated, especially the patients with peripheral arterial disease. To improve the medical management of patients with peripheral arterial disease, there is a need for epidemiologic and clinical education of physicians. ( J Vasc Surg 2006;44: 314-8.)

Epidemiologic and natural history studies have determined that peripheral arterial disease (PAD) is highly prevalent and confers a high risk of fatal and nonfatal cardiovascular and cerebrovascular events.[1-4] The PAD Awareness, Risk, and Treatment: New Resources for Survival (PARTNERS) program has included 6979 patients aged ≥70 years or 50 to 69 years with a history of smoking or diabetes mellitus in which PAD was detected by measurement of the ankle-brachial index (ABI). The usual definition of ABI <0.9 was used to assess PAD in 1865 of these patients (29%).[1]

Furthermore, in a longitudinal study, Criqui et al[4] demonstrated that after a 5-year follow-up of 100 patients

with PAD, 16 cardiovascular deaths, 4 cerebrovascular deaths, 3 other vascular deaths, and 7 nonvascular deaths will occur (30% mortality at 5 years); during the same period, two patients will undergo an amputation. Despite this high prevalence of PAD in elderly patients and the increased cardiovascular morbidity and mortality risk associated with PAD, several studies have documented undertreatment of cardiovascular risk factors in patients with PAD.[1,3,5,6]

Again, in the PARTNERS program, participants with PAD were treated less intensively with antihypertensives, antiplatelet therapy, and cholesterol-lowering therapy than those with coronary artery disease (CAD).[1] Reasons for the undertreatment of cardiovascular risk factors in patients with PAD are not well understood. However, a national survey study from the United States documented deficiencies in physician knowledge and attitudes regarding the importance of treatment of atherosclerotic risk factors for patients with PAD.[5,6]

The objectives of the ATTEST (prise en charge de l'ArTériopaThie oblitErante des membreS inférieurs chez les paTients en médecine générale) study were to compare pharmacologic treatment (primary objective) and medical management, including cardiovascular tests, and physician's assessment of future cardiovascular and amputation risks (secondary objectives) of patients with proven PAD with patients with other vascular site(s) involved in atherothrombosis.

**Table I.** Cardiovascular risk factors of patients included in the ATTEST study according to localization of vascular disease

| Parameters | Isolated PAD n = 3811 | PAD and (CAD or CVD) n = 2416 | CAD and/or CVD (without PAD) n = 2248 | P* |
|---|---|---|---|---|
| Cardiovascular risk factors | | | | |
| Age (years) | 66 ± 12 | 69 ± 10 | 66 ± 12 | <.001 |
| Gender (% male) | 80 | 83 | 76 | <.001 |
| Body mass index (kg/m²) | 25.6 ± 3.8 | 26.3 ± 3.9 | 26.6 ± 3.9 | <.001 |
| Hypertension (%) | 58 | 72 | 61 | <.001 |
| Dyslipidemia (%) | 62 | 73 | 70 | <.001 |
| Diabetes mellitus (%) | 22 | 32 | 22 | <.001 |
| Current smoker (%) | 44 | 32 | 23 | <.001 |
| SBP (mm Hg) | 138 ± 13 | 138 ± 14 | 135 ± 14 | <.001 |
| DBP (mm Hg) | 79 ± 8 | 79 ± 9 | 78 ± 8 | <.001 |
| LDL cholesterol (mmol/l) | 3.36 ± 0.78 | 3.21 ± 1.03 | 3.10 ± 0.78 | <.001 |

*PAD*, Peripheral arterial disease; *CAD*, coronary artery disease; *CVD*, cerebrovascular disease; *SBP*, systolic blood pressure; *DBP*, diastolic blood pressure; *LDL*, low-density lipoprotein.
*Analysis of variance.

## METHODS

**Population.** The design of the ATTEST study has been reported elsewhere.[7] Briefly, it was an observational, cross-sectional epidemiologic study that took place in France between April and November 2003. Patients were selected by a geographically representative panel of 3020 general practitioners who agreed to participate in the study. Each physician was asked to include the first three patients identified from his or her practice to fulfill the inclusion criteria. The inclusion criteria were patients (1) >18 years old, (2) with at least one site of proven atherothrombotic disease (PAD of the lower limbs for two patients and proven CAD or ischemic stroke for the third patient), and who were (3) willing to participate in the study and give consent after receiving written and oral information. A total of 8475 patients were included (all data completed) and analyzed. The protocol was approved by the institutional review committees Conseil National de l'Ordre des Médecins, Comité Consultatif sur le Traitement de l'Information en Matière de Recherche dans le domaine de la Santé, Commission Nationale Informatique et Liberté.

Atherothrombotic diseases were defined using the International Classification of Diseases (10th edition). PAD disease was defined as typical symptoms of and/or severe (>70%) stenosis at arterial duplex or arteriography (99% of patients had arterial duplex examinations), and/or a history of surgical or percutaneous transluminal treatment for lower limb arterial disease (excluding the renal and splanchnic circulation and abdominal aortic aneurysm). Coronary heart disease was defined as any history of angina pectoris (chest pain precipitated by exertion and relieved by rest or nitrates) confirmed by coronary angiography, myocardial infarction, typical sequelae on electrocardiography, coronary percutaneous transluminal angioplasty, or coronary artery bypass surgery or a combination. Cerebrovascular disease was defined as a history of ischemic stroke confirmed by computed tomography or magnetic resonance imaging.

A physician-completed inclusion questionnaire contained the following data: gender, age, weight, height, personal history of diabetes mellitus, dyslipidemia, or hypertension, current and previous smoking habit, cardiovascular tests previously performed, and current use of antiplatelet, cardiovascular, lipid-lowering, and antidiabetic drugs. These medical data were not obtained from a formal testing protocol, and the ATTEST study was not planned to add any tests to the management of the patients. Rather, physicians were asked to give the most recent information present in their medical files. Finally, the physicians were asked to estimate future cardiovascular and amputation risks, choosing for each of their 3 patients included for both risks: <5%, 5% to <10%, 10% to <20%, 20% to <50%, and ≥50%.

**Statistical analysis.** The population was divided into three groups: (1) patients with isolated PAD (n = 3811), (2) patients with PAD associated with atherosclerosis in at least one other location, CAD or cerebrovascular disease (n = 2416), and (3) patients with CAD or cerebrovascular disease, or both, but without PAD (n = 2248). Quantitative parameters were described by using means and standard deviations, and qualitative parameters by number and percent. Qualitative parameter distributions within the three groups were analyzed using the $\chi^2$ test. Analysis of variance (ANOVA) was used for quantitative parameter comparisons among the three groups; no post hoc test was performed. $P < .05$ was considered significant. All analyses were performed using SAS 8.1 software (SAS Institute, Cary, NC).

## RESULTS

Table I shows the cardiovascular risk factors of the study population according to the site of atherothrombosis. All ANOVA comparisons are statistically significant because of the large numbers. The most relevant differences showed that patients with isolated PAD were more fre-