

# Cardiovascular Risk Profile and Lifestyle Habits in a Cohort of Italian Cardiologists (from the SOCRATES Survey)

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on Behalf of the SOCRATES Investigators<sup>†</sup>

Cardiologists' cardiovascular profile and lifestyle habits are poorly known worldwide. To offer a snapshot of the personal health habits of Italian cardiologists, the Survey on Cardiac Risk Profile and Lifestyle Habits in a Cohort of Italian Cardiologists (SOCRATES) was undertaken. A Web-based electronic self-reported survey, accessible through a dedicated Web site, was used for data entry, and data were transferred through the Web to a central database. The survey was divided into 4 sections: baseline characteristics, medical illnesses and traditional cardiovascular risk factors, lifestyle habits, and selected medication use. The e-mail databases of 3 national scientific societies were used to survey a large and representative sample of Italian cardiologists. During the 3-month period of the survey, 1,770 of the 5,240 cardiologists contacted (33.7%) completed and returned  $\geq 1$  sections of the questionnaire. More than 49% of the participants had 1 of the 5 classic risk factors (hypertension, hypercholesterolemia, active smoking, diabetes, and previous vascular events). More than 28% of respondents had 2 to 5 risk factors, and only 22.1% had none and therefore, according to age and gender, could be considered at low to intermediate risk. Despite the reported risk factors, >90% of cardiologists had a self-reported risk perception quantified as mild, such as low or intermediate. Furthermore, overweight and obesity, physical inactivity, and stress at work or at home were commonly reported, as well as limited use of cardiovascular drugs, such as statins or aspirin. In conclusion, the average cardiovascular profile of Italian cardiologist is unlikely to be considered ideal or even favorable according to recent statements and guidelines regarding cardiovascular risk. © 2013 Elsevier Inc. All rights reserved. (Am J Cardiol 2013;112:226–230)

Cardiovascular disease (CVD) remains the leading cause of death in developed countries.<sup>1</sup> The cornerstone of CVD prevention is the promotion of a healthy lifestyle and the appropriate identification and treatment of traditional cardiovascular risk factors. Indeed, a growing body of evidence indicates that simple changes in lifestyle and diet decrease the clinical impact of several risk factors and improve long-term outcomes in primary and secondary prevention settings.<sup>2</sup> Physicians involved in primary prevention are key players in CVD risk control strategies. In addition, cardiologists frequently provide counseling and education for CVD risk reduction to citizens and patients and therefore likely serve as role models for behavioral change.<sup>3–5</sup> Thus, it can be expected that cardiologists who

know their own risk factor profiles and who follow healthy lifestyle behaviors will be more ardent proponents of risk factor modifications for their patients. Unfortunately, cardiologists' cardiovascular profile and lifestyle habits are poorly known worldwide. A survey assessing the personal healthy habits of American cardiologists showed that cardiologists as a group appear to have lower rates of cardiovascular risk factors and follow healthier lifestyles compared with the general adult United States population.<sup>6</sup> To date, similar studies have not been conducted among cardiologists in the Mediterranean area. Thus, to offer a snapshot of the personal health habits of Italian cardiologists, the Survey on Cardiac Risk Profile and Lifestyle Habits in a Cohort of Italian Cardiologists (SOCRATES) was undertaken.

## Methods

The e-mail databases of 3 national scientific societies (Associazione Nazionale Medici Cardiologi Ospedalieri, Associazioni Regionali Cardiologi Ambulatoriali, and the Italian Association for Cardiovascular Prevention, Rehabilitation and Epidemiology) were used to survey a large and representative sample of Italian practicing cardiologists.

A Web-based electronic self-reported survey, accessible through a dedicated Web site, was used for data entry, and data were transferred through the Web to a central database. Anonymity was provided for all subjects.

The Web-based survey was divided into 4 sections: baseline characteristics, medical illnesses and traditional

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See page 230 for disclosure information.

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Table 1  
Cardiologists' demographics and professional features (n = 1,763)

Variable	Value
Women/men	465 (26.5%)/1,288 (73.5%)
Mean age (yrs)	53
Age distribution (yrs)	
<40	181 (10.3%)
40–65	1,490 (85%)
>65	83 (4.7%)
Gender distribution according to age	
Women/men, <40 yrs	95/83
Women/men, 40–65 yrs	365/1,119
Women/men, >65 yrs	1/82
Specialty	
Clinical cardiology	1,316 (74.7%)
Cardiac/coronary catheterization	232 (13.2%)
Prevention/rehabilitation	114 (6.4%)
Other	100 (5.7%)

Percentages were calculated according to the total number of responses (missing responses excluded).

Table 2  
Prevalence of cardiovascular risk and lifestyle factors (n = 1,754)

Risk or Lifestyle Factor	Percentage
Hypertension	23.3
Diabetes mellitus	3.2
Hypercholesterolemia	35
Smoking status	
Active	12.4
Previous	27.5
Family history of coronary artery disease	13.4
Previous cardiovascular events	5.2
Physical activity	
Minimal or none	39.4
Mild to moderate	45.5
Intense	15.1
Mediterranean diet	83.5
Stress at work	27.3
Stress at home	14.3

Percentages were calculated according to the total number of responses (missing responses excluded).

cardiovascular risk factors (yes or no), lifestyle habits (multiple choice), and selected medication use. Baseline demographics included age, gender, height, weight, body mass index, and waist circumference. A list of previous or current CVDs, such as self-reported history of vascular events, hypertension, hypercholesterolemia, and diabetes, was collected. In addition, physical and biochemical parameters, such as heart rate and blood pressure (self-collected at the time of questionnaire compilation), total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglycerides, serum creatinine, and fasting glucose were reported. Cardiologists were asked to indicate the timing of their blood analysis (within the past 12 months or previously). Personal habits included smoking status, exercise habits, and dietary servings of fruits, vegetables, fish, and fats. Questions regarding stress at work or at home were also posed. Participants were asked to indicate the types of cardiovascular or metabolic

Table 3  
Baseline information and biochemical parameters (assessed in the past 12 months) (n = 1,619)

Variable	Value
Blood pressure (mm Hg)	
Systolic	122 ± 11
Diastolic	77 ± 7.6
Systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg	9.7%
Mean body mass index (kg/m <sup>2</sup> )	24.9 ± 3.3
25–29.9	38.4%
≥30	7.2%
Waist circumference (cm)	
Men	95.0 ± 10.5
Women	79.1 ± 11.2
>102 cm (men)	19.9%
>88 cm (women)	20%
Total cholesterol (mg/dl)	197.6 ± 34.8
>190 mg/dl	54.5%
Subjects with total cholesterol >190 mg/dl and without known hypercholesterolemia	27%
Low-density lipoprotein cholesterol (mg/dl)	115 ± 31
High-density lipoprotein cholesterol (mg/dl)	53.6 ± 11.5
<40 (men)	9.9%
<45 (women)	10.3%
Triglycerides (mg/dl)	122 ± 47
Fasting blood glucose (mg/dl)	92 ± 13
Subjects with fasting blood glucose >126 mg/dl without known diabetes	0.4%
Prevalence of metabolic syndrome (Adult Treatment Panel III definition)*	9.3%
Creatinine (mg/dl)	0.9 ± 0.3
Estimated glomerular filtration rate (Chronic Kidney Disease Epidemiology Collaboration method) (ml/min)	88.5 ± 17
<60 ml/min/1.73 m <sup>2</sup>	4%

Data are expressed as mean ± SD or as percentages. Percentages were calculated according to the total number of responses (missing responses excluded).

\* Prevalence of the metabolic syndrome may have been underestimated because of concomitant drug therapy acting on lipid fractions and blood pressure.

Table 4  
Prevalence of medication use (n = 1,564)

Medication	Percentage
Aspirin	7.1
Other antiplatelet agents	1.7
Angiotensin-converting enzyme inhibitors	7
Angiotensin receptor blockers	14.2
β blockers	11.2
Calcium antagonists	4.5
Statins	16.3
Fibrates	2.8
Oral hypoglycemic agents/insulin	2.5

medications used and to provide data on any target organ damage and/or subclinical atherosclerosis that were available at the time of the questionnaire. Finally, self-reported evaluations of their own cardiovascular risk profile assessments (low, intermediate, or high) were requested. The data

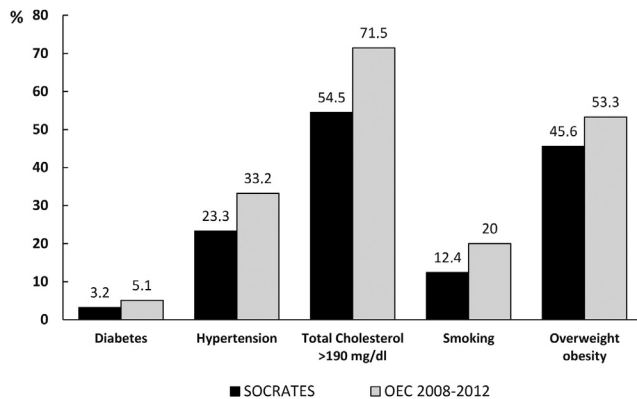


Figure 1. Comparison of rates of different traditional risk factors between SOCRATES and Osservatorio Epidemiologico Cardiovascolare (OEC) – Progetto Cuore.

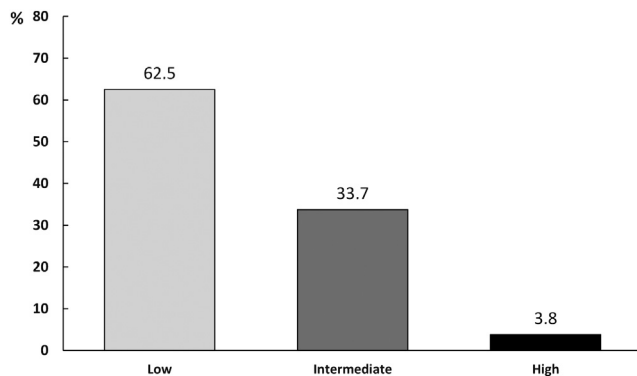


Figure 2. Prevalence of cardiologists at low, intermediate, and high risk, expressed as personal estimate of one's own cardiovascular risk profile.

collection instrument was designed using a multiple-choice format, with pull-down menus or check boxes and obligatory (required) items to be answered, to reduce the risk for confounding responses.

The survey was conducted through the Web site <http://www.socrates.qbgroup.it>. In January 2012, e-mails were sent to 5,240 cardiologists (mean age 53 years, range 28 to 89, 26% women) among current members of Associazione Nazionale Medici Cardiologi Ospedalieri, Associazioni Regionali Cardiologi Ambulatoriali, and the Italian Association for Cardiovascular Prevention, Rehabilitation and Epidemiology using e-mail addresses available from each society's database. This initial e-mail explained the survey and the consent process and directed cardiologists to the Web site, where they could click on the SOCRATES survey and complete it. The recruitment e-mail informed the cardiologists that completing the Web-based survey implied consent to use the collected data, that the collected data would be stored in an encrypted and secure database, and that no identifying information would be collected. It was emphasized that no individual data would be used for any purpose. The survey required about 8 to 10 minutes for completion.

Cardiologists were invited to complete the survey during a 3-month period from January 17 to April 18, 2012. To enhance survey response, a reminder notice was sent to all

Table 5

Number of subjects with 0, 1, or 2 to 5 risk factors (hypercholesterolemia, diabetes, smoking, hypertension, and previous vascular events) according to self-estimate of cardiovascular risk

Risk Factors	All	Self-Reported Cardiovascular Risk		
		High	Intermediate	Low
0	311 (22.1%)	1 (0.3%)	39 (12.5%)	271 (87.1%)
1	694 (49.4%)	4 (0.6%)	189 (27.2%)	501 (72.2%)
2–5	401 (28.5%)	48 (12%)	246 (61.3%)	107 (26.7%)
All	1,406 (100%)	53 (3.8%)	474 (33.7%)	879 (62.5%)

cardiologists for a total of 7 times after the first invitation, at an interval of approximately every 10 to 14 days, providing a reminder to complete the questionnaire.

All data collected in the survey were analyzed. Demographics and subjects characteristics were described with the use of descriptive statistics. Absolute and percentage frequencies were used for qualitative variables; mean, SD, range, median, and quartiles were used to summarize quantitative variables. Principal data were also stratified by gender, age, and self-reported cardiovascular risk. SAS (SAS Institute Inc., Cary, North Carolina) was used for statistical analysis.

## Results

During the 3-month period of the survey, 1,770 of the 5,240 cardiologists contacted (33.7%) completed and returned  $\geq 1$  section of the questionnaire. Most of the physicians agreeing to participate answered  $< 24$  hours after receiving the first or subsequent invitation. If there was no response within 24 hours of the e-mail, the rate of participation decreased significantly without repeated reminder e-mails. The response rate that was seen across different regions of the country was quite uniform, so that these data could be considered representative of Italian cardiologists, regardless of their locations.

Cardiologists' demographics and professional features are listed in Table 1. Most cardiologists were 40 to 65 years of age, with 10% aged  $< 40$  years and 4.7% aged  $> 65$  years. Women represented 1/4 of the total, but among cardiologists aged  $< 40$  years old, there were more women than men.

Table 2 lists the prevalence of cardiovascular risk and lifestyle factors. More than 20% reported histories of hypertension, and 1/3 reported hypercholesterolemia. Diabetes was relatively uncommon, whereas active smoking, a sedentary lifestyle, and stress at work were reported frequently. Most cardiologists reported eating a Mediterranean-style diet. Finally, a history of atherosclerotic vascular events (coronary, carotid, or peripheral) was reported by 5.2% of the cardiologists in the survey.

The self-reported physical and biochemical data are listed in Table 3. Irrespective of a history of hypertension and/or pharmacologic therapy, about 10% of participants reported arterial pressure higher than normal values;  $> 45\%$  were overweight or obese, and 20% of men and women had waist circumferences greater than normal. Blood analysis performed within 12 months was reported by 76% of the participants: cholesterol levels were  $> 190$  mg/dl in  $> 50\%$

of cardiologists, including 27% of subjects not reporting histories of hypercholesterolemia. Furthermore, 1.6% had glucose levels  $>126$  mg/dl, despite not reporting diagnoses of diabetes. Metabolic syndrome, as defined by the National Cholesterol Education Program Adult Treatment Panel III definition, was identified in 9.3% of subjects, but its real prevalence may have been underestimated as a consequence of concomitant pharmacologic treatment for hypertension and hyperlipidemia. Finally, a mild reduction of renal function, as expressed by an estimated glomerular filtration rate  $<60$  ml/min/1.73 m<sup>2</sup>, was present in 4% of the cardiologists.

Target organ damage, such as left ventricular hypertrophy and urinary microalbuminuria, was reported by 3% and 1.4%, respectively, and subclinical atherosclerosis, such as asymptomatic carotid plaque and peripheral artery disease, was reported by 4.4% and 0.3% of the cardiologists, respectively. However, many of the respondents (5.6% to 27.1%, depending on the diagnosis) had no knowledge of whether they had these diagnoses.

The percentages of cardiologists taking cardiac medications for risk factor modification are listed in Table 4.

We compared the rates of diabetes, hypertension, hypercholesterolemia, active smoking, and overweight or obesity observed in cardiologists aged 40 to 65 years old with those detected in 1,011 age-matched healthy Italian subjects with similar educational levels evaluated from Osservatorio Epidemiologico Cardiovascolare – Progetto Cuore<sup>7</sup> during the past 4 years. Results are shown in Figure 1 and indicate a lower prevalence of traditional risk factors in cardiologists compared with the general adult Italian population.

Finally, the prevalence of subjects at low, intermediate, or high risk, expressed as personal estimate of one's own cardiovascular risk profile, is shown in Figure 2. More than 95% of the cardiologists reported being at low to intermediate cardiovascular risk. Table 5 lists the number of subjects with 0, 1, or 2 to 5 risk factors (hypertension, hypercholesterolemia, diabetes, active smoking, and previous cardiovascular events) according to self-reported cardiovascular risk: only 12% of cardiologist with  $\geq 2$  risk factors considered themselves at high risk.

## Discussion

The findings of this survey carried out in a large population of European cardiologists living in the Mediterranean area demonstrate a relatively large prevalence of traditional risk factors for atherosclerotic vascular disease, although lower than that observed in the general adult Italian population with similar age and educational levels. Surprisingly, although Italian cardiologists are aware of the role of risk factors in the pathogenesis of atherosclerosis and consequent cardiovascular mortality and morbidity,  $>49\%$  of the participants had 1 of the 5 classic risk factors (hypertension, hypercholesterolemia, active smoking, diabetes, and previous vascular events). More than 28% of respondents had 2 to 5 risk factors, and only 22.1% had none and therefore, according to age and gender, could be considered at low to intermediate risk (Table 5). Despite the reported risk factors,  $>90\%$  of cardiologists had

a self-reported risk perception quantified as mild, such as low or intermediate (Figure 2). Furthermore, overweight or obesity, physical inactivity, and stress at work or at home were commonly reported, as well as limited use of cardiovascular drugs such as statins and aspirin (Table 4). When all these data are considered together, the average cardiovascular profile of Italian cardiologists is unlikely to be considered ideal or even favorable according to recent statements and guidelines regarding cardiovascular risk.<sup>8–11</sup> Thus, there is large room for improvement and a need for education and intervention.<sup>12</sup>

A small amount of data are currently available on the cardiovascular profiles of other communities of cardiologists.<sup>5,6</sup> Abuisse et al<sup>6</sup> used a paper questionnaire to evaluate the individual cardiovascular habits of 800 cardiologists in the United States. A response rate of 59% was obtained, which is higher than ours, although their collection lasted 5 months compared with 3 months in this survey. Also in their study, the prevalence of individual risk factors for cardiologists was lower than that of the age-matched adult United States general population and compared well with our results for Italian cardiologists. Differences were evident, however. For example, active smoking was much less common in United States cardiologists than in their Italian colleagues (1.7% vs 12.4%). Body mass indexes were slightly higher in American cardiologists (mean  $25.0 \pm 3.4$  vs  $24.9 \pm 3.3$  kg/m<sup>2</sup>) and similar in the proportion of those qualifying as obese (body mass index  $\geq 30$  kg/m<sup>2</sup>). The far greater proportion of women in SOCRATES (26.5% vs 7.1%) must be taken into account and may have affected the comparison. American cardiologists exercise more than their Italian colleagues, with 89% versus 60.6% reporting repeated weekly exercise. Finally, aspirin and statin use was higher in American cardiologists (37% vs 7.1% and 30% vs 16.3%, respectively).

Only 33.7% of cardiologists completed and returned the survey, and the behavior of these cardiologists may differ from that of those who did not participate in the survey. It is likely that those with unfavorable lifestyles would be less likely to respond, which may bias the results. Because of the anonymous nature of this survey, we were unable to compare respondents with nonrespondents.

As with all survey data, the ascertainment of personal lifestyle habits and medical history is subject to recall bias and to concerns of accuracy with self-reported data. Nevertheless, comparisons with other national samples suggest that the data are reasonable, and there is some research suggesting that e-mail surveys may elicit more candid responses compared with mailed surveys.

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## Disclosures

The authors have no conflicts of interest to disclose.

## Appendix

### SOCRATES Investigators

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