Male Sexuality and Cardiovascular Risk. A Cohort Study in Patients with Erectile Dysfunction

Giovanni Corona, MD,*§¶ Matteo Monami, MD,†¶ Valentina Boddi,* Michela Cameron-Smith, MD,* Francesco Lotti, MD,* Giulia de Vita, MD,* Cecilia Melani, MD,‡ Daniela Balzi, MD,* Alessandra Sforza, MD,§ Gianni Forti, MD,* Edoardo Mannucci, MD,† and Mario Maggi, MD*

*Andrology Unit, Department of Clinical Physiopathology, University of Florence, Florence, Italy; †Diabetes Section, Geriatric Unit, Department of Critical Care, University of Florence, Florence, Italy; ‡Epidemiological Unit, Azienda Sanitaria Locale 10, Florence, Italy; §Endocrinology Unit, Maggiore-Bellaria Hospital, Bologna, Italy

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ABSTRACT

Introduction. Although penile blood flow (PBF) has been recommended as an additional diagnostic test in identifying erectile dysfunction (ED) patients at risk for latent cardiovascular disease, no study has ever assessed the possible association of PBF and the relational component of sexual function with incident major cardiovascular events (MACE).

Aim. The aim of this study is to investigate whether severity of ED, PBF, and other factors related to a couple's relationship predict incident MACE.

Methods. A consecutive series of 1,687 patients was studied. Different clinical, biochemical, and instrumental (penile flow at color Doppler ultrasound) parameters were evaluated.

Main Outcome Measures. Information on MACE was obtained through the City of Florence Registry Office.

Results. During a mean follow-up of 4.3 ± 2.6 years, 139 MACE, 15 of which were fatal, were observed. Cox regression analysis, after adjustment for age and Chronic Disease Score, showed that severe ED predicted MACE (hazard ratio [HR] 1.75; 95% confidence interval 1.10–2.78; $P < 0.05$). In addition, lower PBF, evaluated both in flaccid (before) and dynamic (after prostaglandin-E1 stimulation) conditions, was associated with an increased risk of MACE (HR = 2.67 [1.42–5.04] and 1.57 [1.01–2.47], respectively, for flaccid [<13 cm/second] and dynamic [<25 cm/second] peak systolic velocity; both $P < 0.05$). Reported high sexual interest in the partner and low sexual interest in the patient proved to have a protective effect against MACE.

Conclusions. The investigation of male sexuality, and in particular PBF, and sexual desire, could provide insights not only into present cardiovascular status but also into prospective risk. **Corona G, Monami M, Boddi V, Cameron-Smith M, Lotti F, de Vita G, Melani C, Balzi D, Sforza A, Forti G, Mannucci E, and Maggi M. Male sexuality and cardiovascular risk. A cohort study in patients with erectile dysfunction. J Sex Med 2010;7:1918–1927.**

Key Words. Major Cardiovascular Events; Erectile Dysfunction; Penile Doppler Ultrasound; SIEDY

Introduction

Erectile dysfunction (ED) is determined by organic, psychological, and relational factors, which contribute in different proportions to reported symptoms in individual patients [1]. Organic ED shares many of the same risk factors as cardiovascular disease (CVD), including conditions such as diabetes mellitus, arterial hypertension, dyslipidemia, and the cluster of cardiovascular and metabolic factors that define metabolic syndrome (MetS) [2]. The link between ED, cardiovascular risk factors, and CVD has been apparent since the early 1970s [3]; only recently, however, ED has been commonly considered a predictor of CVD [4,5].

Dynamic penile color Doppler ultrasound (PCDU) is the gold standard in diagnosing arterio-

¶Corona and Monami equally contributed to the paper.

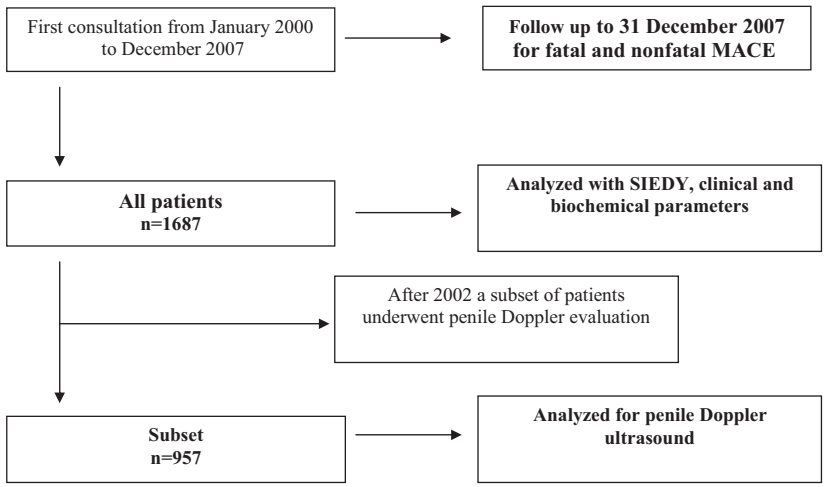

Figure 1 Flow chart of the patients included in the study. MACE = major cardiovascular events.

genic ED [6,7], while the most widely used parameter to predict adequacy of penile circulation is cavernous peak systolic velocity (PSV, cm/second), measured 5–20 minutes after an intracavernous injection of a vasodilating agent. We recently demonstrated that the flow in the cavernosal arteries can also be routinely evaluated by PCDU in the flaccid state, with an accuracy of more than 80% in identifying patients with pathological dynamic PSV [8].

Penile blood flow (PBF) has been suggested as an additional diagnostic test to identify ED patients at risk for latent CVD [9]. So far, however, no study has evaluated the possible association between penile vascular flow and forthcoming CVD.

Aim

The aim of the present study is to evaluate possible associations of ED severity, PBF, and reported couple relationship problems with cardiovascular morbidity and mortality.

Methods

Patients and Baseline Assessment

At the beginning of this decade we developed and validated a 13-item structured interview (SIEDY) for the assessment of the components concurring with ED. This instrument has demonstrated its utility in different cross-sectional studies [1,2,8]. We have now extended our data by collecting longitudinal information regarding CVD. This study is designed as an observational prospective cohort study of a sample of subjects enrolled in a clinical facility. A consecutive series of 1,687 patients attending our unit for ED for the first time between 2000 and 2007 was studied (Figure 1). The baseline characteristics of the sample are summarized in Table 1.

All patients enrolled underwent the usual diagnostic protocol applied to newly referred subjects at the Andrology Outpatient Clinic. All the data provided were collected as part of a routine clinical procedure and therefore, according to Italian law, approval from the local Ethical Committee was not required. In addition, at the time of the first visit, all patients gave their informed consent to have their clinical records included in a dedicated database and they were aware that their data, made anonymous, would be used for clinical research purposes. Patients were interviewed prior to the beginning of any treatment, and before any specific diagnostic procedure, using the SIEDY structured interview [1]. This is a 13-item structured interview composed of three scales, which identify and quantify components concurring with ED. Scale 1 deals with organic disorders and it is made up of questions 4, 13, and 15, concerning medical history, morning/nocturnal erection, and ejaculate volume, respectively. Scale 2 deals with disturbances in the relationship with the primary partner and it is made up of questions 7, 8, 9, and 10, concerning reported presence of disease in the primary partner, primary partner's climax and desire, and menopausal symptoms, respectively. Scale 3 deals with psychological traits and it is made up of questions 2, 3, 6, 11, 12, and 14, concerning the presence of life stressors, conflict in the primary relationship and within the family, extramarital affairs, and patient's hypoactive sexual desire (HSD), respectively. The patient's answer is codified on a 0–3 Likert scale by the interviewer.

Table 1 Characteristics of the sample

Age (years)	52.9 ± 12.8 (range 17–88)
Marital status (%)	
Stable relationship living together	74.2
Stable relationship not living together	15.5
Nonstable relationship	10.3
Education (%)	
None/primary school	17.0
Secondary school	30.4
High school	33.2
University	19.4
Morbidities (%)	
Current smoker	33.1
Hypertension	27.4
Diabetes mellitus	20.4
CVD at enrollment	11.6
Metabolic syndrome (NCEP-ATPIII criteria)	33.3
Drugs used (%)	
Beta-blockers	5.9
Ace inhibitors/sartanic	19.7
Diuretics	11.4
Calcium channel blockers	9.4
Oral antidiabetics	13.8
Insulin	3.7
Clinical, laboratory, and instrumental parameters	
BMI (kg/m^2)	26.4 ± 3.9
Waist circumference (cm)	97.4 ± 10.1
SBP (mm Hg)	140 (130–150)
DBP (mm Hg)	85 (80–90)
Glycemia (mg/dl)	96 (87–108)
Total cholesterol (mg/dl)	205.8 ± 42.6
High density lipoprotein cholesterol	49.8 ± 12.0
Triglycerides (mg/dl)	119 (830–171)
Total testosterone (nmol/L)	16.5 ± 6.2
Flaccid PSV at PCDU (cm/second)	16.0 ± 5.5
Flaccid PSV at PCDU < 13 cm/second (%)	35.5
Dynamic PSV at PCDU (cm/second)	53.5 ± 20.6
Dynamic PSV at PCDU < 25 cm/second (%)	5.4
Dynamic PSV at PCDU 25–35 cm/second (%)	13.2
Dynamic PSV at PCDU >35 cm/second (%)	81.4
SIEDY scale score	
Scale 1 (organic domain of ED)	3.2 ± 2.4
Scale 2 (relational domain of ED)	1.8 ± 1.9
Scale 3 (intrapsychic domain of ED)	3.1 ± 2.1
ED severity (%)	
Mild	70.6
Moderate	13.6
Severe	15.8

Data are expressed as mean ± SD when normally distributed, median (quartiles) when not normally distributed, and as percentages when categorical. CVD = cardiovascular diseases; BMI = body mass index; SBP = systolic blood pressure; DBP = diastolic blood pressure; PSV = peak systolic velocity at penile colour Doppler ultrasound (PCDU) before (flaccid) and after (dynamic) prostaglandin-E1 stimulation. ED = erectile dysfunction. ED severity (difficulties in achieving an erection sufficient for penetration in <50%, mild ED; 50–75%, moderate ED, and >75%, severe ED; see ref. [1]).

Scale 1 score ranges between 0 and 12, Scale 2 score ranges between 0 and 12, and Scale 3 score ranges between 0 and 18. A score ≥ 3.5 of SIEDY Scale 1 is predictive of organic disturbances underlying ED with a sensitivity and specificity of about 70% [1].

The characteristics of ED were assessed using SIEDY Appendix A, as previously described [1]. In particular, severity of ED was categorized on a 3-point scale using question 1D of SIEDY appendix A (difficulties in achieving an erection sufficient for penetration in < 50%, mild ED; 50–75%, moderate ED, and > 75%, severe ED; see ref. 1). Patient's HSD was evaluated using question 14 of SIEDY ("Did you have more or less desire to make love in the last three months?") rating 0 = unmodified or mild reduced desire, 1 = moderate reduced or never present desire [1]. Partner's HSD was assessed using question 8 of SIEDY ("Does your partner have more or less desire to make love than in the past?") rating 0 = unmodified or mild reduced desire, 1 = moderate reduced or never present desire [1].

Patients were asked to report any kind of drugs used. Chronic Diseases Score, an index of concomitant morbidities, was calculated as previously described. This is an aggregate comorbidity measure based on current medication used and originally validated for use as a predictor of physician-rated disease status, self-rated health status, hospitalization, and mortality [10]. MetS was defined according to the NCEP-ATPIII definition, as previously reported [2].

Main Outcome Measures

All patients underwent a complete physical examination, with measurement of blood pressure (mean of three measurements 5 minutes apart, in sitting position, with a standard sphygmomanometer), height, weight, and waist circumference. Blood samples were drawn in the morning, after an overnight fast, for determination of blood glucose (by glucose oxidase method, Aeroset Abbott, Rome, Italy), total and high density lipoprotein cholesterol, triglycerides (by automated enzymatic colorimetric method; Aeroset Abbott, Rome, Italy), and total testosterone (by electrochemiluminescent method, Modular Roche, Milan, Italy).

A subset of 957 patients visited after 2002 underwent PCDU examination performed in the flaccid state and 20 minutes after a prostaglandin-E1 (PGE1; 10 mg) intracavernous injection (dynamic evaluation), as previously described ([6–8]; see also Figure 1). PCDU procedure was performed as recommended in "Standard Practice in Sexual Medicine," produced by the International Society for Sexual Medicine Standards Committee [11]. Arteriogenic ED as derived by PCDU was defined when PSV after the PGE1 intracavernous injection was lower than 25 cm/second, as previously described [6–8,11]. A less restrictive criterion (PSV < 35 cm/second) was also considered [6–8,11]. When PSV was evalu-

ated in the flaccid state, a threshold of 13 cm/second was considered, as previously reported [8]. The characteristics of this subset were not significantly different from those of the whole sample (data not shown).

Follow-up

Events were identified through the regional hospital discharge system and the City of Florence Register Office. Information on mortality up to December 31, 2007, including causes of death, was obtained from the City of Florence Registry Office, which contains complete and updated records of all persons living within city boundaries. For those who had moved away, queries were sent to the Registry Office of the new city of residence. Nonfatal cases of CVDs requiring hospitalization were identified through the regional hospital discharge system. Following the International Classification of Diseases, fatal and nonfatal major cardiovascular events (MACE) were coded as 410–414 (ischemic heart disease), 420–429 (other heart diseases), or 798–799 (sudden death) for cardiac diseases; as 430–434 or 436–438 for cerebrovascular disease, and 440 for peripheral arterial disease. The dataset of the regional hospital discharge system, which is used for administrative (reimbursement) purposes, contains complete data on all hospital admissions of subjects residing within the borders of the local health district. The compilation in the register of causes of death is completed for any deceased subjects. Therefore, these sources of data allow a complete retrieval of information on all subjects, with no loss at follow-up.

Statistical Analysis

Data were expressed as mean ± SD when normally distributed, and as median (quartiles) for parameters with non-normal distribution, unless otherwise specified.

Kaplan–Meier analysis of survival was performed with definition of Hazard Ratios (HR) and 95% Confidence Intervals, and a stepwise Cox regression was carried out for multivariate analysis adjusting all data for age and Chronic Diseases Score [10]. All analyses were carried out with SPSS 12.0.1 statistical package (SPSS Inc., Chicago, IL, USA) and a $P < 0.05$ was considered statistically significant.

Results

In the whole sample, during a mean follow-up of 4.3 ± 2.6 years (median 4 years, range 0–8 years), 139 MACE, 15 of which were fatal, were observed, with a yearly rate of 0.23%. Of those cases, 85 were ischemic heart diseases (of those 41 were acute myocardial infarction), 40 cerebral (stroke or transient ischemic attack), and 14 were peripheral artery diseases. Furthermore, 73 (4.1%) patients died during follow-up from noncardiovascular (N = 59) or unspecified causes (N = 14). The incident of MACE was higher in subjects with hypertension (early rate 0.33% vs. 0.19% in hypertensive and non-hypertensive subjects, respectively; $P < 0.05$), diabetes mellitus (early rate 0.38% vs. 0.23% in diabetic and nondiabetic subjects, respectively; $P < 0.005$), and MetS (early rate 0.24% vs. 0.19% in MetS and non-MetS subjects, respectively; $P < 0.05$).

Figure 2 shows the association between baseline characteristics (derived from medical history and clinical evaluation) of the study participants and incident MACE. After adjusting for age and Chronic Diseases Score, a higher incidence of MACE was associated with smoking, prevalent CVDs at enrollment, systolic blood pressure, body mass index, the number of MetS components, and Framingham risk score. Conversely, a higher educational level appears to be a preventative factor. Reported moderate to severe partner HSD was also found to be a predictor of MACE (see also Figure 3), whereas patient HSD had a preventative role. The association between MACE risk and partner HSD was confirmed even after adjustment for patient sexual desire (HR = 2.01 [1.34–3.02]; $P < 0.001$).

At univariate analysis, patients with PSV < 25 cm/second, when compared with the rest of the sample, were older (60.3 ± 8.0 vs. 54.8 ± 11.7 years old; $P < 0.001$); showed higher cardiovascular risk as assessed using Framingham risk score (22.5 ± 9.4 vs. 15.9 ± 9.0; $P < 0.005$); and has a higher prevalence of SIEDY-derived organic ED (SIEDY Scale 1 score ≥3.5, 76.2% vs. 23.8%, respectively; $P < 0.005$). Subjects reporting a main problem in *maintaining* an erection in more than 50% were younger (50.4 ± 11.9 vs. 58.7 ± 10.9 years old; $P < 0.0001$) and healthier (Chronic Diseases Score 1.2 ± 1.92 vs. 1 ± 2.3; $P < 0.001$) when compared with those complaining of a severe difficulty in *obtaining* an erection. Severe difficulty in *obtaining* an erection and reduced PSV were associated with incident MACE (Figure 4). The association of severe ED with MACE was confirmed after adjusting for age and Chronic Diseases Score in a Cox regression model (HR = 1.75 [1.10–2.78]; $P < 0.05$). Conversely, patients who reported

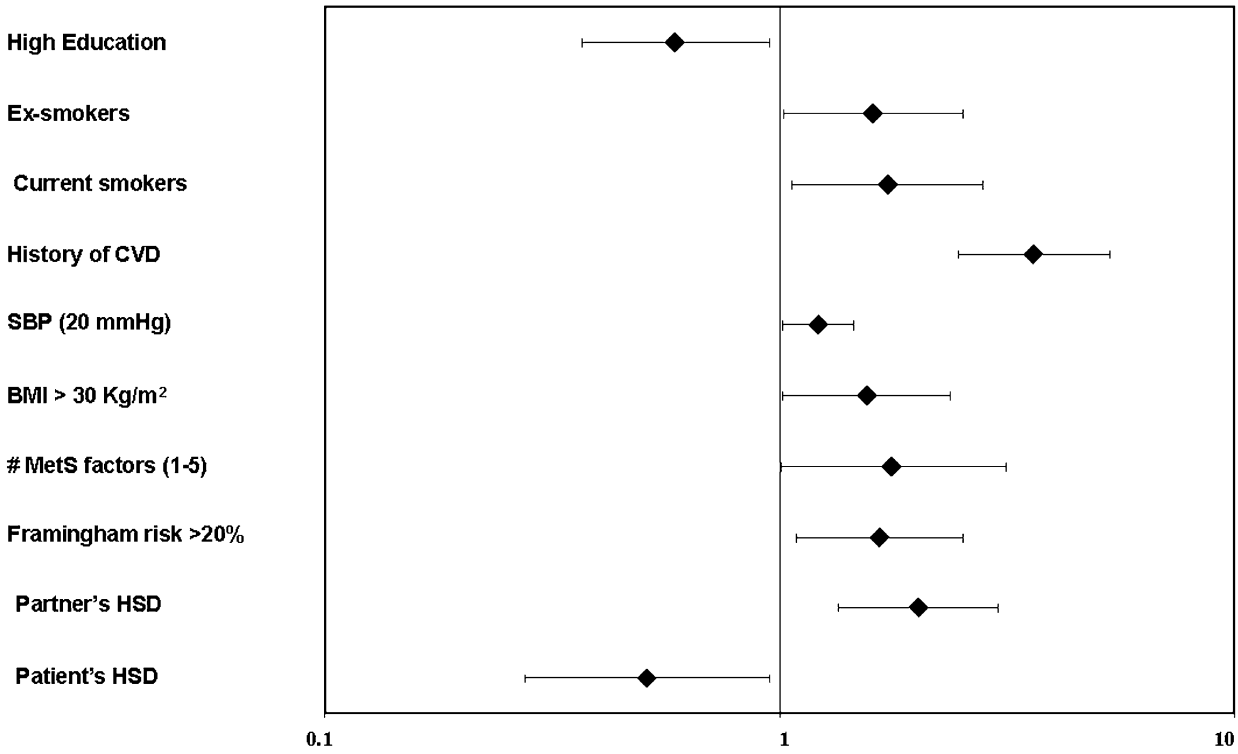

Figure 2 Hazard ratio and 95% confidence interval (log scale) for incident major cardiovascular events (MACE) of different parameters obtained from baseline medical history and clinical evaluation. All data have been adjusted for age and Chronic Disease Score. High education = higher than high school, CVD = cardiovascular diseases at enrollment; SBP = systolic blood pressure, MetS = metabolic syndrome; BMI = body mass index; HSD = hypoactive sexual desire.

a main problem in *maintaining* an erection in more than 50% of occasions had a lower risk of MACE (HR = 0.60 [0.39–0.91]; $P < 0.05$). End diastolic velocity (EDV) value was not significantly different between subjects complaining of a main problem in *maintaining* vs. *obtaining* an erection (3.2 ± 4.4 vs. 3.7 ± 4.4 cm/second; $P = 0.274$). In addition, no association between EDV and incident MACE was observed (not shown).

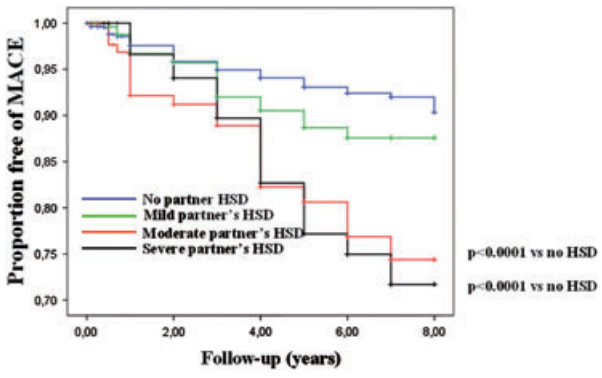

Figure 3 Risk of incident major cardiovascular events (MACE) as derived from Kaplan Mayer curves, according to partner's hypoactive sexual desire severity.

At multivariate analysis, after adjusting for the same confounders, dynamic PSV was significantly associated with an increased risk of MACE (HR = 1.05 [1.02–1.08] for each decrement of 5 cm/second; $P < 0.0001$). In particular, PSV < 25, but not from 25 to 35 cm/second, was associated with an increased risk of MACE (HR = 2.67 [1.42–5.04] and 1.65 [0.96–2.84] for PSV 25 and 25–35 cm/second, respectively). Similar associations were also observed when PSV was evaluated in a flaccid state. In particular, when a PSV threshold of 13 cm/second was chosen, an HR of 1.57 (1.01–2.47) for MACE ($P < 0.05$) was observed. All of these associations were confirmed when Framingham risk score and use of specific medicaments such as diuretics, beta-blockers, and antidiabetic drugs were introduced into the model (HR = 1.69 [1.00–2.86], $P = 0.05$ and 2.14 [1.06–5.02], $P < 0.05$ for flaccid PSV < 13 cm/second and dynamic PSV < 25 cm/second, respectively).

Interestingly, when penile Doppler parameters were introduced into the same Cox regression

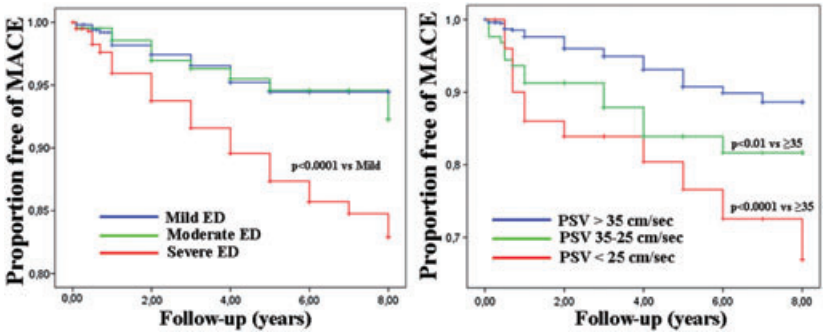

Figure 4 Risk of incident major cardiovascular events (MACE) as derived from Kaplan Mayer curves, according to erectile dysfunction (ED) severity (difficulties in achieving an erection sufficient for penetration in <50%, mild ED; 50–75%, moderate ED, and >75%, severe ED; see ref. [1]) or to different degrees of penile vascular insufficiency (dynamic peak systolic velocity PSV, >35, 35–25 or < 25 cm/second).

model along with partner and patient's HSD, adjusting for patient and partner's age and Chronic Diseases Score, the association between incident MACE and patient's HSD disappeared while all other correlations were confirmed (Table 2). The association between partner's HSD and MACE persisted even when Framingham risk score (HR = 2.37 [1.28–4.44]; $P < 0.01$), or testosterone plasma levels (HR = 2.29 [1.28–4.11]; $P < 0.001$) were introduced into the model. Finally, when only cardiac events were considered, the predictive value of PSV < 25 cm/second and partner's HSD was confirmed after adjusting for age and Chronic Diseases Score (HR = 2.47 [1.10–5.55] and 2.56 [1.31–5.01] for PSV < 25 mcg/s and partner's HSD, respectively; both $P < 0.05$).

Discussion

Erectile dysfunction is a very common multidimensional disorder deriving from a continuous spectrum of clinical elements including physical illness (organic component of ED), reaction to stress (intrapsychic component of ED), or an unhappy couple relationship (relational component of ED). SIEDY structured interview can simultaneously measure and score all these aspects [1].

Although the vast majority of patients assessed showed normal penile vascular parameters, the present study confirms that pathological SIEDY organic domain (SIEDY scale 1 score ≥3.5) is strongly predictive of a severe impairment of penile vascular flow [1]. In addition, our results suggest that the investigation of the severity of ED and of its emotional and relational correlates might provide insights not only with regard to a patient's sexual health, but also regarding the risk of future MACE.

Table 2 Adjusted hazard ratio for incident major cardiovascular events of different parameters as derived from Cox regression model after adjustment for patient and partner's age and Chronic Diseases Score

Parameter	Hazard ratio	*P* <
Partner's HSD	2.62 (1.53–4.49)	0.0001
Patient's HSD	0.62 (0.27–1.44)	ns
Flaccid PSV < 13 cm/second	1.72 (1.01–2.92)	0.01
Dynamic PSV < 25 cm/second	2.65 (1.21–5.84)	0.05

HSD = hypoactive sexual desire; PSV = peak systolic velocity at penile Doppler ultrasound; ns = not significant.

It has been suggested that ED and CVDs should be considered as different manifestations of a common underlying vascular pathology [2,5,9]. Two large studies have found an association between ED and the risk of forthcoming cardiovascular events. Thompson et al. [12], in the Prostate Cancer Prevention Trial, found that men with ED had a 45% higher risk of cardiac events after 5 years of follow-up. Similar data have been recently reported by Inman et al. [4] in the Olmsted County Study. Interestingly, it has also been suggested that ED itself could be considered the most efficient predictor of silent coronary artery disease (CAD) in a diabetic population independently of glycometabolic control, and ED severity [13–15].

We previously reported that the evaluation of penile vascular flow in a flaccid state could predict the presence of silent CAD with an accuracy of 80% [8]. It has been hypothesized that impairment in penile vascular flow mirrors an underlying endothelial dysfunction [16,17], because both share common pathogenetic mechanisms ("*artery size hypothesis*"; [9]). According to this hypothesis, ED manifests earlier than CAD because the smaller penile arteries reach critical narrowing, with insufficient blood flow, earlier than larger vessels [9].

Present data are in line with this evidence. In our series, severe ED was associated with an 80% increase of cardiovascular risk. Notably, a higher incidence of MACE was observed in patients com-

plaining of severe difficulties in achieving, but not in maintaining, an erection sufficient for penetration. Although both disturbances can coexist in the same patients, in most subjects they can be differentiated. In fact, we previously demonstrated in a large cross-sectional study that those reporting difficulties in maintaining an erection as their foremost problem are younger, healthier, and show a lower degree of penile artery insufficiency and higher performance anxiety [18,19].

Hence, the type of ED must be carefully assessed before extrapolating on cardiovascular risk. Although PCDU is generally accepted as the least invasive reliable assessment method for vascular ED, its popularity among clinicians is relatively limited, because of its cost and lack of standardization [7]. Accordingly, in the evaluation of patients with ED, the European Association of Urology [20] and American Urological Associations [21] do not recommend PCDU in all cases, but only as a second level procedure. It has been suggested that PCDU could be useful in the identification of patients at a higher risk for CVD [9].

An original finding of this study is that the evaluation of penile flow could be used not only to identify patients deserving further investigation for silent CADs [9], but also to stratify future cardiovascular risk in patients with ED. In particular, an increased 5% (range 2–8%) risk of MACE was evident for each decrement of 5 cm/second in the dynamic PSV. Current data regarding the relationship between CVD and impaired PBF are mainly derived from small cross-sectional studies focused on the association between PSV and the results obtained from myocardial stress test or penile angiography [7–9]. We demonstrated that the impaired penile vascular flow might predict incident MACE even after adjustment for traditional risk factors such as Framingham risk score. In particular, a dynamic PSV below 25 cm/second is associated with a relevant increase of CV risk. Patients below that threshold have more than double the risk of MACE in comparison with the same Framingham risk score and a PSV > 25 cm/second. Notably, this threshold for PSV is generally considered the most useful cut-off for identifying penile vascular insufficiency [6–8]. Although measurements of PSV in the flaccid state are debatable [6–8], our results confirm its utility. We previously reported in a small series of apparently uncomplicated type 2 diabetic subjects, that a reduction of flaccid PSV below the threshold of 13 cm/second was associated with silent CAD (as assessed by myocardial perfusion scintigraphy) in 80% of cases [8]. In addition, in a large series of subjects with ED, we demonstrated that a pathological flaccid PSV was associated with a higher prevalence of CV risk factors [8]. Although PSV in the flaccid state < 13 cm/second is a predictor of incident CVD, PGE1-stimulated PSV < 25 cm/second appears to be a more relevant indicator of risk. The present data suggest that PGE1-stimulated PCDU could be superior to flaccid PCDU in the identification of cardiovascular risk in patients with ED. Hence, further studies are needed to better clarify the role of flaccid PSV in ED patients. At present, PGE1-stimulated ultrasound examination of PBF is used as a method for diagnosing arteriogenic forms of ED. The present data suggest that, in patients with ED, such an examination could also provide relevant information on cardiovascular risk. However, it should be also recognized that the interpretation of these data needs caution because of the limited number of patients studied. Hence, further studies are advisable in order to better clarify this point. In contrast to PSV (flaccid and dynamic), EDV, an index of possible penile venous link [7], does not provide insights on forthcoming MACE.

In addition, an unexpected finding of this study was the association between impairment of partner sexual desire and patient cardiovascular risk. Partner's HSD was assessed using question 8 of SIEDY [1], which essentially reflects the perceived patient's feeling or partner's sexual interest. This is tantamount to say that a perceived love protects a lover's life. Apparently, having a partner who desires you is not only fun, but it also protects health. The reasons for the association between the perceived partner's love and CVD are not easy to explain, although some hypothesis can be drawn. Connection and engagement in social relationships are essential for human beings [22,23]. Some evidence supports the concept that social relations have protective effects on health in patients with CVDs [24,25]. Accordingly, Löfvenmark et al. [24] demonstrated that perceived loneliness leads to more hospitalization episodes and longer hospital stays for chronic heart failure during a 1-year period, despite a lack of signs of more severe diseases or more concomitant morbidities. The perception of reduced partner desire could therefore be theoretically associated with higher CV risk. On the other hand, the apparently protective role of male HSD could be interpreted as a defensive psychological mechanism contrasting perceived loneliness because of relational problems. Partner HSD maintains its association

with morbidity and mortality even after adjusting for patient desire and other tradition risk factors such as Framingham risk score. We [26] and others [27–29] recently reported that a hypogonadal state could be associated with an impaired couple relationship. Because a reduced testosterone plasma levels has been associated with forthcoming fatal and nonfatal MACE in subjects with [30] and without [31–36] ED, we introduced testosterone as a covariate in a Cox model with partner's HSD. Even after adjusting for testosterone levels, partner's HSD still retains the ability to predict a higher CV risk. Hence, a high marital quality is a positive predictor for a healthy survival not only in patients with chronic heart diseases [24,37,38], but also in subjects with ED (present study). Further studies are advisable in order to better clarify the psychobiological correlates of perceived partner's HSD in subjects with ED and how the female sexual function impacts on male CV events.

Several limitations should be recognized. First of all, these results were taken from patients consulting an Italian Andrology Clinic for sexual dysfunction, who could have different characteristics from those consulting general practitioners or other specialists, not seeking medical care or without ED. In fact, results obtained in specific clinical settings cannot be easily generalized to wider populations. Conversely, phenomena observed in samples from the general population cannot always be extended to patients seeking treatment for a specific condition. Penile Doppler ultrasound was not performed in all patients. However, the subset of subjects who underwent PCDU was not statistically different from the rest of the sample and the data were confirmed even after adjustment for strong confounding factors, such as Chronic Diseases Score [10]. Given the very highly selected nature of the subpopulation that underwent Penile Doppler ultrasound, results of this study needs confirmation in other population samples. Considering the strong association between ED and organic morbidities [1], the high prevalence of diabetes mellitus, smoking, and MetS found in our study might be considered another potential confounding factor. Furthermore, the identification of nonfatal MACE and cardiovascular death through registers raises the possibility of misclassification of some cases.

Conclusions

Our study demonstrates that investigating male sexuality, and in particular erectile function and its relational correlates, could provide insights not only regarding present cardiovascular status but also with respect to prospective risk of CV events. Assessment of PBF is relevant, and most probably sufficient for this purpose, but obtaining information on inability to achieve or maintain erection could also predict forthcoming cardiovascular morbidity.

Corresponding Author: Mario Maggi, MD, Clinical Physiopathology, Andrology Unit, University of Florence, Viale Pieraccini, 6, Florence 50139, Italy. Tel: (39) 0554271415; Fax: (39) 0554271413; E-mail: m.maggi@DFC.UNIFI.IT

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Statement of Authorship

Category 1

(a) Conception and Design
Giovanni Corona; Mario Maggi

(b) Acquisition of Data
Giovanni Corona; Michela Cameron-Smith; Cecilia Melani; Daniela Balzi; Francesco Lotti; Alessandra Sforza

(c) Analysis and Interpretation of Data
Giovanni Corona; Matteo Monami; Mario Maggi; Gianni Forti; Edoardo Mannucci

Category 2

(a) Drafting the Article
Giovanni Corona; Mario Maggi

(b) Revising It for Intellectual Content
Giovanni Corona; Gianni Forti; Edoardo Mannucci; Mario Maggi

Category 3

(a) Final Approval of the Completed Article
Giovanni Corona; Mario Maggi

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