lower peak AR velocity for PVF, and an increased LA volume, should most likely receive warfarin treatment.

We conclude that elderly NV-PAF patients at high risk for cerebral infarction seem to have a pseudonormalization pattern of transmitral inflow, and decreased atrial reversal flow of pulmonary venous flow, and increased left atrial volume. Our study provides an important basis on which further trials involving larger numbers of patients may be studied prospectively.

References

[1] Lindgren KS, Pekka Raatikainen MJ, Juhani Airaksinen KE, Huikuri HV. Relationship between the frequency of paroxysmal episodes of atrial fibrillation and pulmonary venous flow pattern. Europace 2003;5: 17–23.

[2] Quinones MA, Otto CM, Stoddard M, Waggoner A, Zoghbi WA. Doppler Quantification Task Force of the Nomenclature and Standards Committee of the American Society of Echocardiography. Recommendations for quantification of Doppler echocardiography: a report from the Doppler Quantification Task Force of the Nomenclature and Standards Committee of the American Society of Echocardiography. J Am Soc Echocardiogr 2002;15:167–84.

[3] Güler N, Demirbağ R, OZkara C, et al. Clinical and echocardiographic predictors of left atrial appendage dysfunction in patients with mitral stenosis in sinus rhythm. J Am Soc Echocardiogr 2004;17:819–23.

[4] Yamada H, Donal E, Kim YJ, et al. The pseudorestrictive pattern of transmitral Doppler flow pattern after conversion of atrial fibrillation to sinus rhythm: is atrial or ventricular dysfunction to blame? J Am Soc Echocardiogr 2004;17:813–8.

[5] Ling L, Hirono O, Okuyama H, Takeishi Y, Kayama T, Kubota I. Ratio of peak early to late diastolic filling velocity of the left ventricular inflow is associated with left atrial appendage thrombus formation in elderly patients with acute ischemic stroke and sinus rhythm. J Cardiol 2006;48:75–84.

[6] Inoue H, Nozawa T, Okumura K, et al. Attitudes of Japanese cardiologists toward anticoagulation for nonvalvular atrial fibrillation and reasons for its underuse. Circ J 2004;68:417–21.

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The patient's motivation during bicycle stress ECG test is dependent on the investigator's sex in male patients

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Abstract

The exercise electrocardiogram is a commonly used non-invasive method for detection of electrocardiogram (ECG) changes secondary to myocardial ischemia. Studies showed the importance of the patient's motivation to reach the estimated submaximal heart rate. The purpose of this study was to test whether the patient's motivation is dependent on the investigator's sex.

We included 1170 patients (in-hospital patients and out-clinic patients; 63.5% male, 36.5% female) in this study. Stress test data (stationary bicycle with gradually increasing intensity) were collected retrospectively: patient's age, sex, maximal power stage, ECG-abnormalities, angina pectoris, and attending physician's sex.

Male patients achieved a higher power stage than their female counterparts (126.5±47.7 W vs. 89.7±30.4 W). When male patients were supervised by a female doctor they reached higher maximum power stages (136.6±53.5 W vs. 121.6±43.3 W; $p=0{,}001$), more often the submaximal heart rate (47.9% vs. 38.3%; $p=0.02$) but complained less frequent about angina pectoris (5.6% vs. 17.3%). In contrast, none of these parameters was dependent on the attending physician's sex in female patients.

The attending physician's sex influences the maximum exercise ability and the incidence of complaints during bicycle stress in male patients but not in females. We would speculate that men try to impress women with physical strength and try to dissimulate physical discomfort or pain. This could possibly influence the validity of such non-invasive methods with exercise dependent detection of myocardial ischemia.

Keywords: Stress test; Coronary artery disease; Ergometry

The stress electrocardiogram (ECG) test is a well-established and inexpensive method for answering important clinical questions related to exercise tolerance and heart disease. Originally, it was used primarily for detection of ST-

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Table 1
Baseline and test characteristics of the study population.

	All patients	Male patients	Female patients	
n, %	1170, 100	743, 63.5	427, 36.5	
Age, years	62.5±13.5	62.2±12.6	63,0±14,9	n.s.
Maximal power stage, Watt	113.1±45.8	126.5±47.7	89.7±30.4	$p<0.001$
Angina pectoris, *n*, %	151, 12.9	98, 13.2	53, 12.4	n.s.
Submaximal heart rate not achieved, *n*, %	626, 53.5	412, 55.4	214, 50.1	n.s.
Submaximal heart rate achieved, *n*, %	423, 36.2	261, 35.1	162, 37.9	n.s.
Maximal heart rate achieved, *n*, %	121, 10.3	70, 9.4	51, 11.9	n.s.

segment changes related to myocardial ischemia. However, modern exercise testing includes also information about exercise capacity, blood pressure response, development of arrhythmias, and whether or not symptoms such as chest pain develop during exercise.

From clinical practice it is largely known that the patient's motivation has also a big impact. No valid results can be obtained if the patients do not want to physically stress themselves. Studies investigated this impressionable motivation: frequent verbal encouragement (every 20–60 s) leads to significantly greater maximum effort in a treadmill test than when no encouragement is given or when the encouragement is infrequent (>180 s) [1].

The influence of the tester's gender on the test person's motivation has not yet been evaluated. The underlying hypothesis was that men try to impress females by optimal performance while females are not influenced by the tester's sex.

We analyzed the records of all performed ergometer stress tests in our Cardiology department (University hospital). Patients are evaluated on ambulant and hospitalized basis. All patients are tested and all results are adjusted according to the standards for stress testing of the American Heart Association [2] and the German Society of Cardiology [3] and their updates. Briefly, a stationary bicycle with gradually increasing intensity (25 W steps) was used, starting with 50 W.

Data of 1170 patients were enrolled in this study, 743 were men (65%), 427 women (35%); 32 patients were excluded due to incomplete data. Of the remaining 1138 patients 379 were investigated by one of three different female doctors (33%), 759 by a male colleague (ten different; 67%)). All data were collected retrospectively. We recorded the patient's age, sex, maximal power stage (number in Watt), abnormalities in the ECG, and clinical manifestations of ischemia like angina pectoris (defined as discomfort including pressure, heaviness, tightness, squeezing, burning experienced in the epigastrium, back, neck, jaw, or shoulders with or without radiation). Standard mean and confidence intervals are reported and an unpaired Student's *t*-test was used to compare the data. All patients were randomly treated by a male or female doctor. The patients in all groups are considered to be equally distributed.

The test characteristics of the study population are summarized in Table 1.

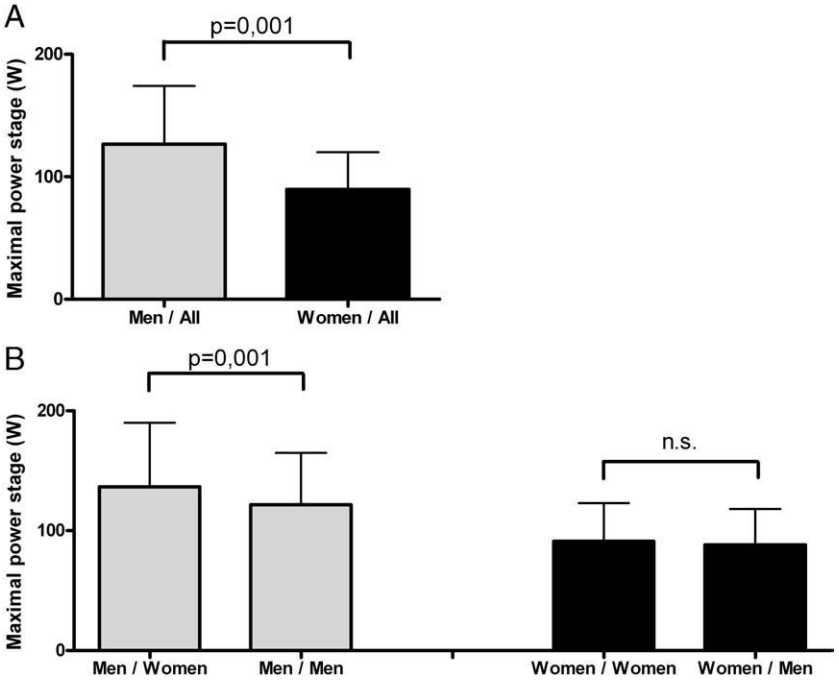

Fig. 1. Maximal power stage in Watt (male patients: grey; female patients: black). A: Significant difference between men and women with the higher achieved power by men. B: Men reach a higher maximum power stage if they are supervised by a female doctor ($p<0{,}001$). In female patients the maximal power stage is independent of the investigator's sex.