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STRUCTURAL AND FUNCTIONAL ALTERATIONS OF THE CARDIOVASCULAR SYSTEM IN PARKINSON´S DISEASE

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Parkinson´s disease (PD)

- progressive neurodegenerative disorder
- prevalence in developed countries of 0.3% in the adult population
- about 1% in subjects over 60 years of age
- clinically dominant motor symptoms caused by cell damage in the substantia nigra and by a subsequent deficit of dopamine (e.g. tremor, bradykinesia, rigidity, balance disorders)

Cardiovascular system involvement in PD

- manifested mainly by autonomic dysfunction
- defects of the autonomous cardiac innervation
- most frequent symptoms are postural hypotension, chronotropic insufficiency, and reduced heart rate variability (HRV)
- increase of blood pressure (BP) and heart rate (HR) are also impaired in PD patients

Aim

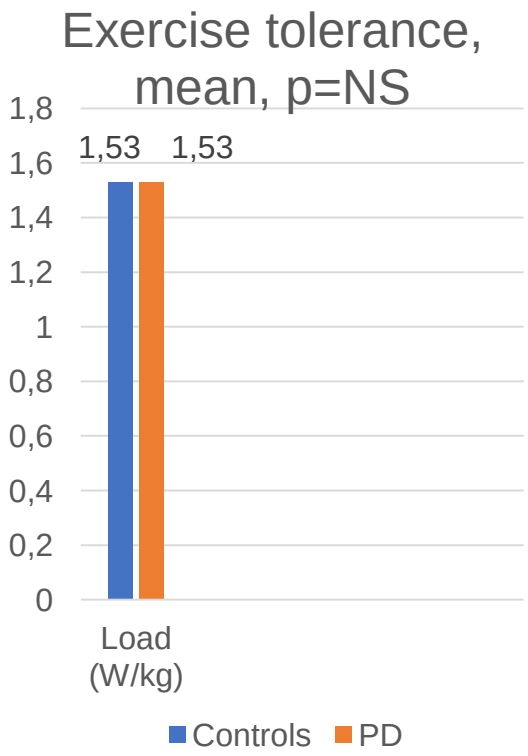
- 1) assess the influence of PD on the cardiovascular system, including HR and BP stress response
- 2) perform advanced measurements of heart volumes and mass using cardiac magnetic resonance
- 3) explore occurrence of AF and other arrhythmias in PD patients without cardiac comorbidities

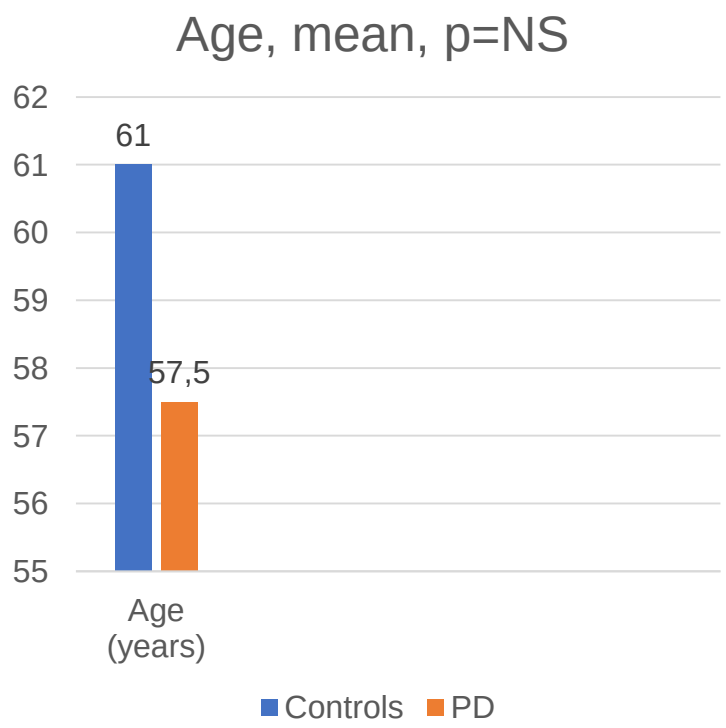
Patients and Methods

- Initially 49 patients
- 19 patients with previous history of cardiac disorders (CAD, hypertension) excluded
- Finally enrolled 30 PD patients (19 men, mean age 57.5 years)
- bicycle ergometry, 24h-ECG Holter monitoring and cardiac MRI (CMR)

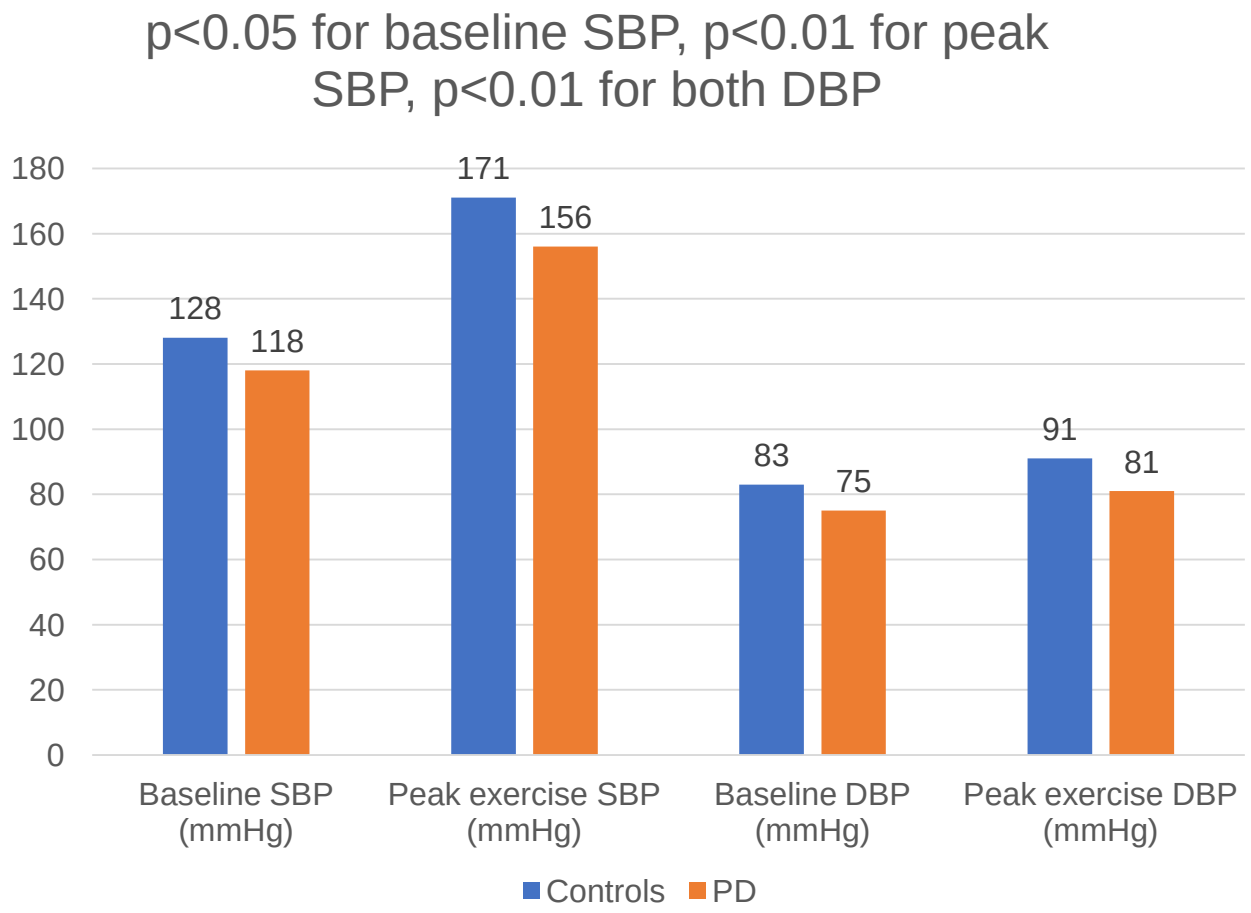
Results – bicycle ergometry

Control group of 24 subjects without previous history of cardiovascular disease and no antihypertensive drug use. Referred for myocardial nuclear perfusion imaging (MPI) and had normal results

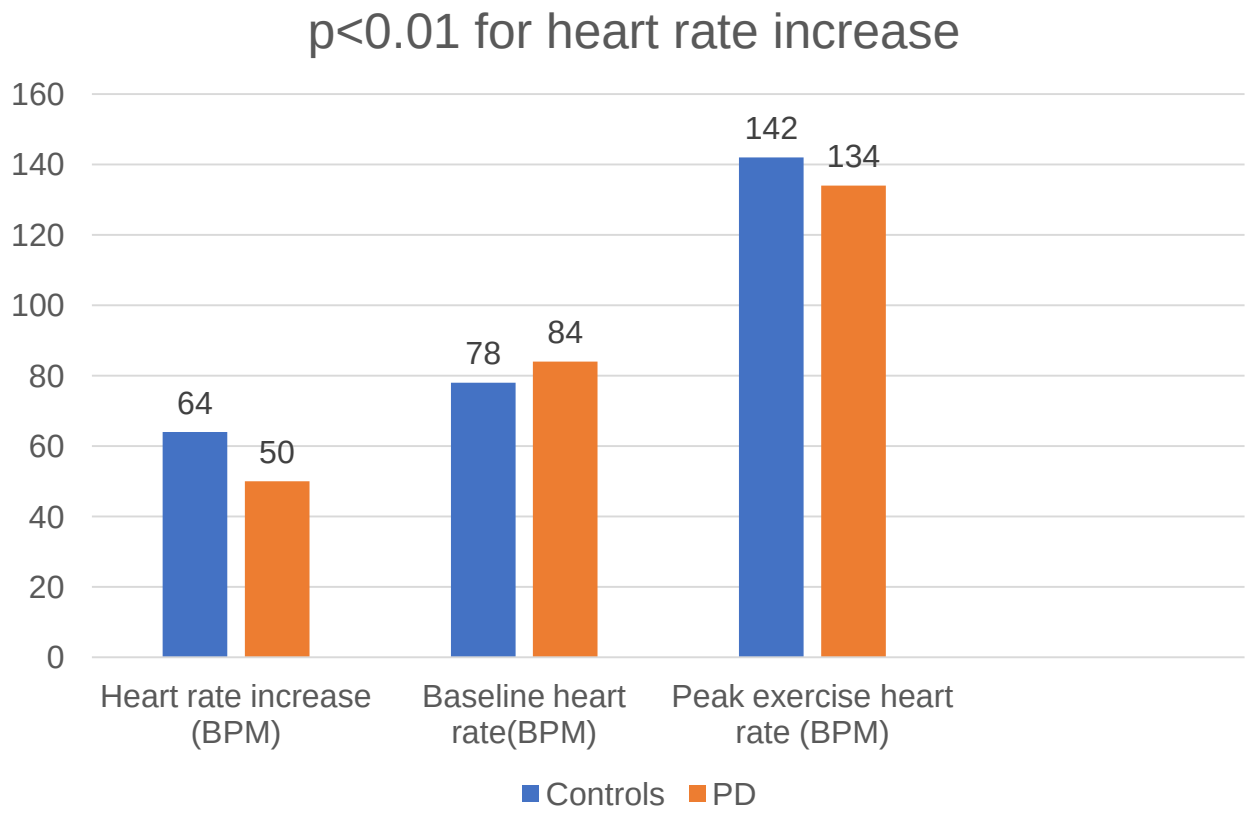




Results – bicycle ergometry, blood pressure



Results – bicycle ergometry, heart rate



Results – 24h-ECG Holter monitoring of 30 PD patients

Minimal heart rate (BPM, mean±SD)	**49.2±7.3**
Maximal heart rate (BPM, mean±SD)	109.9±15.5
Average heart rate (BPM, mean±SD)	71.6±7.9
Paroxysmal AF (No of subjects)	8 (26.7 %)
Paroxysmal SVT (No of subjects)	3 (10 %)
1st degree AV block (No of subjects)	4 (13.3 %)
2nd degree AV block (No of subjects)	1 (3.3 %)
Bundle branch block (No of subjects)	2 (6.6 %)
Premature supraventricular complexes (n, mean±SD)	226.9±489.9
Premature ventricular complexes (n, mean±SD)	182.5±415.1

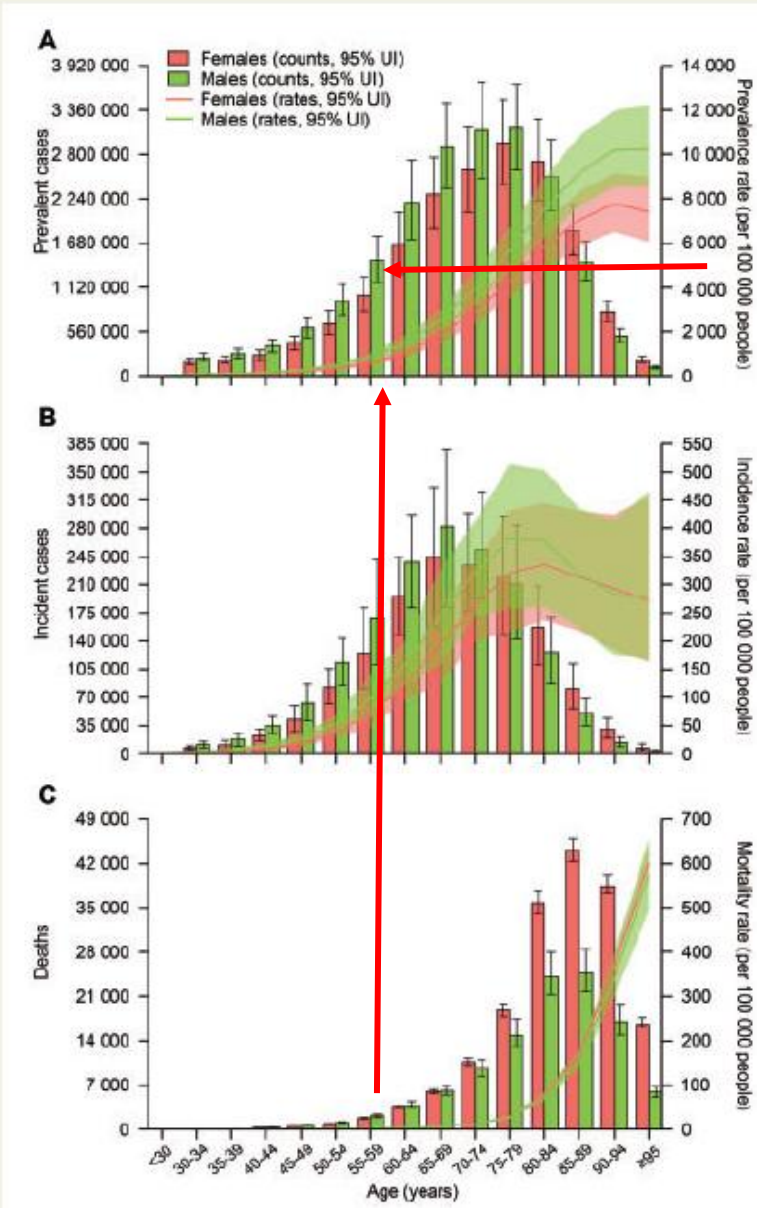


Figure 1 Age-specific counts and rates of prevalent cases (*A*), incident cases (*B*), and deaths (*C*) of atrial fibrillation by sex, 2017. Error bars and shading represent 95% uncertainty intervals.

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ESC European Society of Cardiology
European Heart Journal - Quality of Care and Clinical Outcomes (2021) **7**, 574–582
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Original Article

Global, regional, and national prevalence, incidence, mortality, and risk factors for atrial fibrillation, 1990–2017: results from the Global Burden of Disease Study 2017

Haijiang Dai [1,2†], Quanyu Zhang[3†], Arsalan Abu Much [4,5†], Elad Maor[4,5], Amit Segev[4,5], Roy Beinart [4,5], Salim Adawi[6,7], Yao Lu[2,8*], Nicola Luigi Bragazzi [1*], and Jianhong Wu[1]

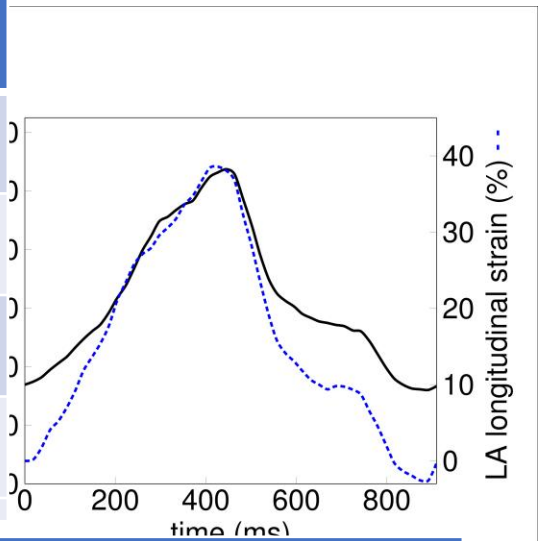
Results – cardiac MRI

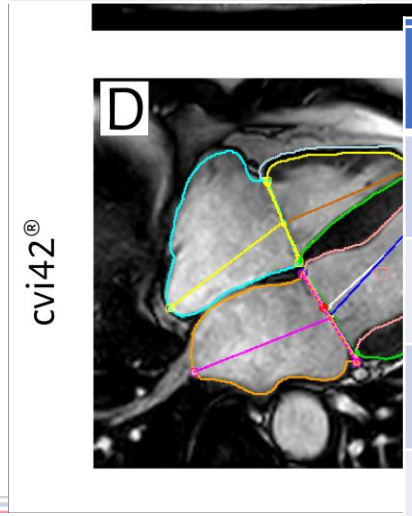
The controls for cardiac magnetic resonance (CMR) were 20 subjects with a clinical indication for CMR with normal CMR findings, no other cardiac results, and no other relevant medical history

- native T1 and T2 relaxation times were not prolonged in PD.
- ECV values in PD were inside the normative values and did not differ from CG.
- LV strain was consistently lower in PD than controls - the difference was not statistically significant

Results – cardiac MRI

Right ventricle	Controls	PD	p
RVEF (%)	64.8 (7.7)	60.5 (8.5)	0.069
RVEDVI (ml/m2)	61.0 (13.1)	73.5 (15.4)	**0.004**
RVESVI (ml/m2)	22.0 (8.1)	29.0 (10.8)	**0.013**
RVSVI (ml/m2)	37.4 (34.3, 40.4)	43.7 (36.8, 47.6)	0.053





Right atrium	Controls	PD	p
RAVImax (ml/m^2)	37.8 (9.6)	48.1 (10.2)	**<0.001**
RAVImin (ml/m^2)	17.2 (5.9)	22.9 (6.9)	**0.004**
RAEF (%)	54.9 (9.6)	52.9 (10.5)	0.500
RALS (%)	48.0 (13.8)	42.6 (14.0)	0.187

Conclusion

- PD patients have high prevalence of AF
- normal myocardial tissue characteristics assessed by cMRI
- Indexed ventricular and atrial volumes are higher in PD patients
- HR a BP stress response is significantly lower in PD patients

Conclusion 2

- Impairment of cardiac functions can influence patient´s quality of life and worsen clinical condition

- Targeted cardiac examination should be included in diagnostic workflow in PD patients

Thank you for your attention

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