

## Exaggerated blood pressure response at mild exertional intensity is associated with lower exercise capacity and worsening of cardiac structural and functional profile

A.K. Woznicka, M. Kabaj, W. Kosowski, J. Zachwyc, R. Pehcerczyk, M. Przewlocka-Kosmala, E.A. Jankowska, P. Ponikowski, W. Kosmala

Wroclaw Medical University, Wroclaw, Poland

**Funding Acknowledgement:** Type of funding source: Public grant(s) – National budget only. Main funding source(s): National Science Centre Poland

Even with normal blood pressure (BP) measured at rest, some individuals may experience excessive BP elevation with exercise, termed as an “exaggerated BP response to exercise” (ExBPR). The most common definition of ExBPR is SBP  $\geq 210$  mm Hg in men and  $\geq 190$  mm Hg in women at peak exercise intensity (ExBPR-PI). However, evidence exists that increase in SBP  $\geq 150$  mm Hg at an early stage of exercise stress test (i.e. at mild exercise intensity, ExBPR-MI) can effectively identify hypertension not diagnosed by conventional methods. No studies exploring the pathophysiological significance of ExBPR-MI have been undertaken to date.

**Aim:** To investigate the association of ExBPR-MI with exercise capacity and cardiac morpho-functional characteristics.

**Methods:** A group of 109 subjects (mean age  $52 \pm 13$  yrs) with and without a pre-established diagnosis of hypertension, having clinical indications for an exercise stress test, with seated clinic BP  $< 140/90$  mm Hg, underwent resting echocardiographic imagining and cardiopulmonary exercise testing using a ramped Bruce protocol.

**Results:** Based on the BP response at 3 minutes of exercise, the population was divided into two subsets: ExBPR-MI+ and ExBPR-MI- (SBP  $\geq$  and  $< 150$  mmHg, respectively). The ExBPR-MI+ group was characterized by lower peak oxygen uptake, higher LV mass and left atrial size, and more impaired LV diastolic function (lower E/A and  $e'$ , and higher E/e'). When the study cohort was stratified using peak BP response, significant differences indicating an adverse impact of ExBPR-PI were demonstrated only for LV diastolic parameters but not for peak VO<sub>2</sub> and cardiac morphology indices (Table 1).

**Conclusions:** ExBPR-MI predisposes to reduced exercise capacity and detrimental alterations in cardiac morphology and function. As mild exercise intensity is more frequently present during routine daily activities than peak exercise intensity, ExBPR-MI may be a more important pathophysiological contributor to target organ damage than peak BP response, and may represent a potential new target for preventive and therapeutic measures.

	ExBPR-MI+ (n=51)	ExBPR-MI- (n=58)	p	ExBPR-PI+ (n=20)	ExBPR-PI- (n=89)	p
peak VO <sub>2</sub> , ml/kg/min	27.6 $\pm$ 7.3	32.1 $\pm$ 12.2	0.04	30.4 $\pm$ 8.3	30.0 $\pm$ 11.3	0.84
LVMI, g/m <sup>2.7</sup>	41 $\pm$ 9	36 $\pm$ 9	0.009	41 $\pm$ 9	38 $\pm$ 9	0.21
LA dimension, mm	39.3 $\pm$ 4.9	37.0 $\pm$ 4.6	0.01	38.2 $\pm$ 5.7	38.0 $\pm$ 4.8	0.90
E/A	1.14 $\pm$ 0.38	1.45 $\pm$ 0.36	<0.001	1.02 $\pm$ 0.28	1.35 $\pm$ 0.38	<0.001
$e'$ , cm/s	7.5 $\pm$ 2.1	9.2 $\pm$ 2.5	<0.001	7.2 $\pm$ 1.9	8.7 $\pm$ 2.5	0.02
E/e'	9.0 $\pm$ 3.4	7.4 $\pm$ 2.2	0.01	8.9 $\pm$ 2.5	7.9 $\pm$ 2.9	0.23

Table 1