SILDENAFIL INCREASES STROKE VOLUME DURING EXERCISE IN PATIENTS WITH CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION

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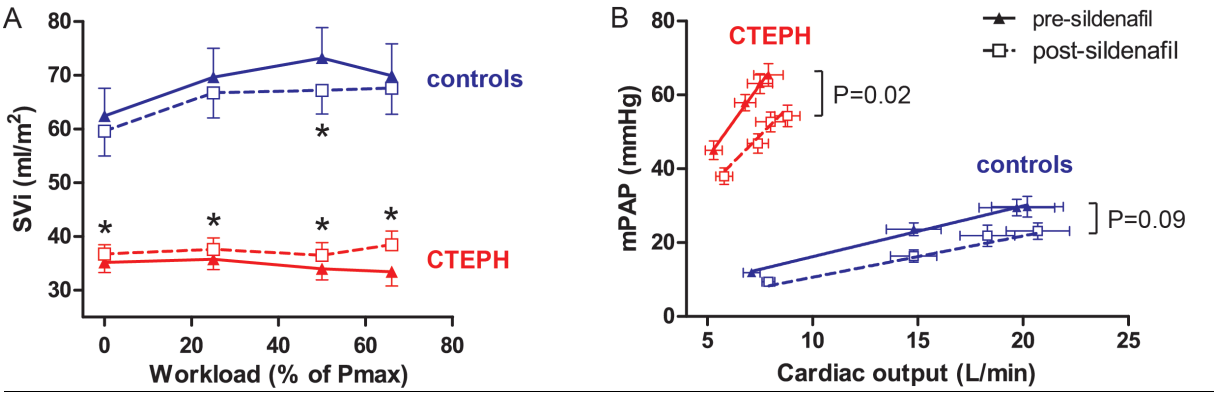
Objective: Stroke volume (SVi) is an important prognostic factor in patients with pulmonary hypertension and is typically assessed at rest. We sought to evaluate whether a single dose of oral sildenafil can influence the SVi response to exercise in patients with chronic thromboembolic pulmonary hypertension (CTEPH).

Methods: Fourteen CTEPH patients and 8 healthy controls underwent cardiac magnetic resonance (CMR) imaging at rest and during incremental supine bicycle exercise to near-maximal exertion with simultaneous invasive hemodynamic monitoring. During real-time exercise and free-breathing, left and right ventricular (LV and RV) volumes were derived from real-time cine imaging and registered with simultaneous invasive measures of mean pulmonary artery pressure (mPAP). Exercise was performed at baseline and then following administration of 50mg oral sildenafil.

Results: As illustrated in Figure 1, CTEPH patients had a greater increase in mPAP relative to cardiac output (CO) than controls at baseline (8.6±1.9 vs. 1.5±0.3 mmHg/l/min; P=0.002). In addition, SVi and RV ejection fraction (RVEF) increased during exercise in controls, but not in CTEPH patients (interaction group*workload P<0.0001). Sildenafil decreased the slope of the mPAP/CO relationship both in CTEPH patients (P=0.02) and in controls (P=0.09). However, this was associated with an increased SVi in CTEPH patients (P<0.05), but not in controls. Within the CTEPH cohort, the increase in SVi following sildenafil was greater during near-maximal exercise-intensity than at rest (P=0.02).

Conclusion: Sildenafil improves RV function and stroke volume during exercise in patients with CTEPH, but not in healthy subjects.

Figure 1


A
SVi (ml/m²)
Workload (% of Pmax)
controls
CTEPH
B
mPAP (mmHg)
Cardiac output (L/min)
pre-sildenafil
post-sildenafil
CTEPH
P=0.02
controls
P=0.09