Introduction: Pulmonary circulation has unique characteristics in patients after the Fontan operation, which includes lack of pulmonary ventricle, non-pulsatile flow, leading to mild hypoxia mainly due to ventilation/perfusion mismatch in the lung. Although Fontan patients have increasing opportunity of air travel, there has been no evidence-based recommendation for air travel because of no available data on an effect of hypobaric hypoxia (HH) during air travel in these patients.

Methods: We prospectively checked changes in percutaneous oxygen saturation (SpO2;%) and heart rate (HR;bpm) (PULSOX-Me300) during commercial air travel in 7 clinically stable Fontan patients (male = 3, aged 15 to 33 years with the postoperative follow-up of 14-23 years). These patients were asked to list a departure point, an arrival point, and any major adverse event(s) or symptoms during air travel, including headache and palpitations. We compared the dynamics of SpO2 and HR during air travel with recent hemodynamics, pulmonary function test and cardiopulmonary variables during exercise testing (CPX).

Results: Decrease in SpO2 from baseline (92.4±3.7%) to 1st stabilized HH (87.9±5.3%) during air travel was 4.5±2.3% (0.8-7.3%) and was correlated with decrease in SpO2 during CPX (p = 0.0499). SpO2 at 1st stabilized HH correlate with the lowest SpO2 at CPX (70-94%) (p = 0.0192). The peak VO2 was correlated with the lower SpO2 at 1st stabilized HH (r = 0.9132, p = 0.0041). Any hemodynamic data during catheterization did not predict the SpO2 dynamics during corresponding flight. The flight duration was inversely correlated with the magnitude of HH (r = -0.9613, p = 0.0387). One patient with the lowest SpO2 of 78% at 1st stabilized HH experienced headache and malaise during his flight.

Conclusions: Fontan patients showed significant HH during air travel with a wide individual variety. Exercise-induced hypoxia strongly predicted the hypobaric-induced hypoxia and CPX with SpO2 monitoring may help clinicians to guide the air travel in these patients.