

**Cardiopulmonary exercise test in children with congenital heart diseases: correlation between ventilatory parameters and maximum oxygen uptake.**

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Introduction: Ventilatory parameters measured by cardiopulmonary exercise test (CPET) are correlated to maximum oxygen uptake (VO<sub>2</sub>max) and morbidity in adults with chronic heart failure. Such parameters as oxygen uptake efficiency slope (OUES) and VE/VCO<sub>2</sub> slope are interesting in severe cardiac conditions when a maximal CPET is not possible. Very few data is available in children with congenital heart diseases (CHD). We aimed to identify the correlation between OUES, VE/VCO<sub>2</sub> slope and VO<sub>2</sub>max in a large cohort of CHD and control children.

Methods: We included all children who performed a CPET between 2010 and 2015 in 2 French pediatric CHD tertiary care centers. The CHD group was defined upon Houyel's classification. Children with no chronic disease, no treatment and normal physical examination were included in the control group. Data were adjusted on age and gender for comparisons between both groups. Correlations were measured with Pearson coefficients.

Results: 798 children (496 CHD and 302 controls) were included. OUES was strongly influenced by gender and age ( $p < 0,001$ ) and slightly correlated to VO<sub>2</sub>max ( $r = 0,25$ ;  $p < 0,001$ ). Values of OUES divided by the weight (OUES/kg) were close to VO<sub>2</sub>max (mean  $48,6 \pm 8,8$  for females and  $39,4 \pm 7,3$  for males). OUES/kg was strongly correlated to VO<sub>2</sub>max in both groups ( $r = 0,83$ ;  $p < 0,001$ ). VE/VCO<sub>2</sub> slope was influenced by age but not gender and did not correlate to VO<sub>2</sub>max in both groups. However VE/VCO<sub>2</sub> slope was more elevated in single ventricles ( $35.5$  vs  $29.6$ ;  $p < 0.001$ ), right heart diseases ( $33.4$  vs  $30.2$ ;  $p < 0.001$ ), pulmonary restrictive syndrome ( $33.1$  vs  $30.3$ ;  $p < 0.001$ ).

Conclusion: OUES is strongly influenced by anthropometric variables. The "OUES/weight" value is more relevant in pediatric population and correlates extremely well to VO<sub>2</sub>max. We recommend using it for non maximal CPET. In pediatric CHD clinical trials, VE/VCO<sub>2</sub> slope could also be used as an endpoint in right heart diseases and single ventricles.