The Use Oxygen Uptake Efficiency Slope (OUES) at different Levels of Submaximal Exercise in Children

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Introduction
The oxygen uptake efficiency slope (OUES) was first described by Baba et al in 1997 as parameter of submaximal exercise. It is unknown if there is a lower limit of exercise level the patient needs to reach to calculate OUES. We investigated whether OUES at different levels of exercise during cardiopulmonary exercise test (CPET) could still be a predictor of maximal oxygen uptake (VO2 max) and if so, whether OUES values at different levels of exercise differed between each other.

Methods
60 children presenting with innocent chest pain or palpitations who performed an uneventful maximal exercise test were enrolled in the study. The patient group was compared with their predicted values in order to evaluate the normality of the group. OUES was determined at 50%, 75%, 90% and 100% of the test duration. OUES/BSA was calculated for value normalisation as stated in literature. OUES50/BSA, OUES75/BSA, OUES 90/BSA and OUES100/BSA were correlated with VO2max, VO2max/kg, and VE/VCO2. Secondly, the OUES50, 75 and 90 were compared to OUES at 100% of exercise.

Results
In 1 patient, OUES could not be calculated. Mean age was 11,5±2,3 years, weight 43,6±12,4 kg, length 151,2±13,6cm. OUES50/BSA, OUES75/BSA, OUES90/BSA and OUES 100/BSA was 1269±235, 1403±253, 1463±262 and 1493±265 respectively. VO2max was 1668,5±518ml/min VO2max/kg is 41,3±9,7ml/kg/min. Correlation between OUES and VO2 max was strongest for OUES100/BSA (Pearson 0,732, P<0,001), followed by OUES90/BSA (0,709, P<0,001), OUES75/BSA (0,665, P<0,001) and OUES50/BSA (0,614, P<0,001). OUES50/BSA, OUES75/BSA and OUES90/BSA were different from OUES100/BSA. There was no correlation between OUES values and VE/VCO2.

Conclusion
Even when children have only performed 50% of maximal exercise, the OUES/BSA value at this level of exercise has strong positive correlation with VO2max/kg. The correlation however becomes stronger if the child can perform a nearly maximal exercise test. There is significant difference between the OUES values at different levels of submaximal exercise. This finding indicates that the reference values for OUES50, OUES75, OUES90 and OUES100 are different.