

Doctor Claudia Walther (EUD ID : 99113)  
Heart Center Leipzig  
Cardiology Dpt.  
Struempelstr. 39  
04289 - Leipzig Germany  
Phone : +49 3418651428 - Fax : +49 3418651461  
Email : waltherc@medizin.uni-leipzig.de

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Title : Cardiovascular responses to daily school exercise lessons in children  
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C. Walther<sup>1</sup>, V. Adams<sup>1</sup>, S. Erbs<sup>1</sup>, L. Gaede<sup>1</sup>, K. Machaliza<sup>1</sup>, A. Koerner<sup>2</sup>, W. Kiess<sup>2</sup>, G. Schuler<sup>1</sup> - (1) Heart Center Leipzig, Leipzig, Germany (2) University Hospital for Children and Adolescence, Leipzig, Germany

**Background:** The prevalent life style of children in developed countries is associated with a multitude of harmful trends resulting in overweight, early diabetes, and hypertension. A major contributing factor is the decline of physical activity which can be observed in school children of every age. Aim of this prospective study was to improve physical fitness and activity by means of additional school exercise lessons and to investigate its effect on cardiovascular function and risk markers.

**Methods:** 188 students (age 11.1  $\pm$ 0.8 years, 53% female) from seven classes of three different high schools in Leipzig were randomized to an intervention group (IG) with daily school exercise lessons for 1 year (1Y) and a control group (CG) with regular school sports (2 hours per week). 29 children of a high school with special focus on competitive sports and physical education served as reference group (RG). Measurements were performed at baseline and after 1 year.

**Results:** Baseline levels of body mass index (BMI), blood pressure, and lipid profile were comparable in all groups. After 1 year of daily school exercise lessons BMI-standard deviation score (SDS) decreased significantly in children of IG ( from 0.014  $\pm$ 0.01 to -0.25  $\pm$ 0.01,  $p < 0.01$ ). After 1 year the percentage of overweight and obese children decreased in IG (from 13% to 9%,  $p = 0.14$ ) whereas it increased in children of CG (from 11% to 13%). At 1 year maximal oxygen consumption (VO<sub>2</sub>max) improved significantly by 29% (IG: from 37.9  $\pm$ 0.5 ml/min\*kg to 48.8  $\pm$ 0.7 ml/min\*kg,  $p < 0.001$ ) and by 17% (CG), but did not reach RG-levels (60.2  $\pm$ 1.2 ml/min\*kg,  $p < 0.001$  vs. IG and CG). At 1 year of daily exercise lessons, there was a significant increase of HDL-cholesterol (from 1.38  $\pm$ 0.03 mmol/L to 1.42  $\pm$ 0.03 mmol/L,  $p < 0.05$ ), and a significant decrease of triglycerides (from 1.10  $\pm$ 0.04 mmol/L to 1.04  $\pm$ 0.05 mmol/L,  $p < 0.05$ ) and systolic blood pressure (from 103  $\pm$ 1 mmHg to 98  $\pm$ 1 mmHg,  $p < 0.05$ ). There was a mean percentage increase of 74% of circulating progenitor cells (CPCs, CD34+/KDR+ cells) in children of IG at one year in comparison to no change in CG.

**Conclusion:** Regular physical activity has a significant positive influence on body composition, exercise capacity, and cardiovascular risk markers. Thus increased physical activity has to be recommended for primary prevention of cardiovascular diseases in school children.