

The International 22nd Puijo Symposium
"PHYSICAL EXERCISE IN CLINICAL MEDICINE –
CRITICAL APPRAISAL OF SCIENTIFIC EVIDENCE"
June 24 - 28, 2014 Kuopio, Finland

PHYSICAL ACTIVITY AND SERUM METABOLIC PROFILE FROM ADOLESCENCE TO EARLY ADULTHOOD

Pahkala K^{1,2}, Lehtovirta M¹, Heinonen O^{2,3}, Würtz P⁴, Ala-Korpela M^{4,5,6}, Soininen P^{4,5}, Kangas AJ⁴, Helajärvi H², Viikari J⁷, Rönnemaa T⁷, Simell O¹, Niinikoski H⁸, Raitakari O^{1,9}
¹Research Centre of Applied and Preventive Cardiovascular Medicine, ²Paavo Nurmi Centre, Dept of Physiology, ³Dept of Physical Activity and Health, ⁷Dept of Medicine, ⁸Dept of Pediatrics, and ⁹Dept of Clinical Physiology and Nuclear Medicine, University of Turku, Turku, Finland; ⁴Computational Medicine, Institute of Health Sciences, University of Oulu, Oulu, Finland; ⁵NMR Metabolomics Laboratory, School of Pharmacy, University of Eastern Finland, Kuopio, Finland; ⁶Computational Medicine, School of Social and Community Medicine & Medical Research Council Integrative Epidemiology Unit, University of Bristol, Bristol, United Kingdom
E-mail: katja.pahkala@utu.fi

Objectives

In adults physically active lifestyle is associated with healthier metabolic profile compared with inactive peers. The aim of this study was to investigate the longitudinal associations of physical activity with serum metabolic profile in adolescence and early adulthood.

Methods

Serum metabolome was quantified with nuclear magnetic resonance spectroscopy at the age of 15 and 19 years in a longitudinal atherosclerosis prevention study (STRIP). The analysis yielded 135 metabolic measures, of which ~60 key variables were selected. Leisure-time physical activity (LTPA) was assessed with a questionnaire, and metabolic equivalent hours/week of LTPA were calculated by multiplying weekly mean exercise intensity, duration and frequency. Data on both serum metabolome and LTPA were available for 454 participants at age 15, and 362 at age 19. Repeated measures analysis of covariance was used for the analyses (sex and age included in the model).

Results

LTPA was associated with several lipid and lipoprotein metabolites related mainly to high-density lipoprotein (HDL) and very-low-density lipoprotein (VLDL). HDL particle size, large HDL total lipid concentration, HDL-, and HDL₂-cholesterol concentrations were directly associated with LTPA, while VLDL particle size, VLDL total lipid, and large VLDL triglyceride concentrations showed an inverse association with LTPA (p all <0.010). LTPA was not associated with serum amino acids whereas polyunsaturated fatty acids-to-total fatty acids concentration increased with increasing LTPA level ($p=0.041$). LTPA was directly associated with creatinine, citrate and urea concentrations (p all <0.010). α 1-acid glycoprotein, linked to e.g. inflammation, decreased with increasing LTPA ($p=0.0027$).

Conclusions

Physical activity in adolescents and young adults is reflected in several serum metabolites indicative of better cardiometabolic risk profile.