

Serum lipid and lipoprotein status is more influenced by biological than chronological age in European Adolescents

by

Spinneker A¹, González-Gross M^{1,2,3}, Breidenassel C¹, Al-Tahan J¹, Stoffel-Wagner B⁴,
Gómez-Martínez S⁵, Venneria E⁶, Castillo M⁷, Béghin L⁸, Stehle P¹,
the HELENA Study group

Objective: To investigate the influence of chronological and biological age on lipid and lipoprotein status in healthy European adolescents from the HELENA Study.

Methods: In European adolescents (n=1,084, 53% females, 14.9±1.2 years) serum triglycerides (TG), total cholesterol (TC), high density lipoprotein cholesterol (HDL), and low density lipoprotein cholesterol (LDL) were measured enzymatically. Apolipoprotein (apo) A-1 and apo B were measured by immunochemical reaction. Serum lipoprotein(a) [Lp(a)] was measured by means of particle-enhanced immunonephelometry. The intraassay and interassay coefficients of variation for all parameters measured were <3.9% and <4.3%, respectively. Biological age was assessed by Tanner stages. Univariate analyses of variance were done separately for each lipid parameter using SPSS 17.0. Results are means±standard deviations and *p* values ≤ 0.05 were considered as significant.

Results: Girls had higher lipid and lipoprotein levels compared to boys (*t*-test; all *p*<0.001 except for Lp(a) with *p*=0.027). Chronological age increased solely TG in boys (61±34 mg/dL in 12.5-13.99 year-olds vs. 73±33 mg/dL in 16.0-17.49 year-olds; *p*=0.013). In contrast, TC, HDL, and apo A-1 decreased mainly with increasing biological age in boys (*p*=0.010, 0.034, and 0.013) with levels of 149±23 mg/dL, 52±9 mg/dL, and 1.46±0.20 g/L at Tanner stage V, respectively. TC, LDL, and apo B in girls (167±27 mg/dL, 100±25 mg/dL, and 0.70±0.17 g/L at Tanner stage V) were associated with changes during maturity (*p*=0.017, 0.005, and 0.023).

Conclusions: Compared with chronological age, biological age seems to be a better predictor of changes in lipid and lipoprotein status. Thus, reference values should include biological age.

¹ Institut für Ernährungs- und Lebensmittelwissenschaften - Humanernährung, Rheinische Friedrich-Wilhelms Universität Bonn, Germany

² Facultad de Ciencias de la Actividad Física y del Deporte-INEF, Universidad Politécnica de Madrid, Spain

³ Grupo EFFECTS 262. Departamento de Fisiología, Facultad de Medicina, Universidad de Granada, Spain

⁴ Institut für klinische Biochemie, Universitätsklinikum Bonn, Rheinische Friedrich-Wilhelms Universität, Bonn, Germany

⁵ Immunonutrition Research Group, Department of Metabolism and Nutrition, Instituto del Frio-ICTAN, Spanish National Research Council (CSIC), Madrid, Spain

⁶ Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione, Human Nutrition Unit, INRAN, Rome, Italy

⁷ University of Granada, Department of Medical Physiology, Faculty of Medicine, Research Group EFFECTS 262, Granada, Spain

⁸ Clinique de Pédiatrie, CHRU de Lille, EA-3925, Université de Lille 2, Medicine Faculty, Lille, France