Lipoprotein(a) levels over time

A long-term follow-up study of a large cohort of children

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INTRODUCTION

- The European Atherosclerosis Society (EAS) recommends measuring Lp(a) levels in patients with intermediate or high cardiovascular risk. In clinical practice Lp(a) is often measured once in these patients, assuming that it is stable over time. However, several studies reported within-person fluctuations of Lp(a) levels, showing that Lp(a) does not remain constant over time.
- Therefore, we evaluated Lp(a) levels in a large cohort of children who were followed-up into adulthood if Lp(a) levels remain constant with increasing age and if Lp(a) levels fluctuate within the individual patient.

AIM: to evaluate whether Lp(a) levels remain constant with increasing age and if Lp(a) levels fluctuate within the individual patient

METHODS

- Study population and design:** we performed a retrospective cohort study in children that were referred to the outpatient clinic of the Academic Medical Center for a tentative diagnosis of inherited dyslipidemia between 1989 and 2017.
- Statistics:** Linear mixed models were used to evaluate Lp(a) levels with increasing age and intra-individual changes in Lp(a) levels over time.

RESULTS

Table 1. Demographic and clinical characteristics at first visit

	Study population n=2,813
Male gender – no (%)	1,424 (51)
Mean age (years) – mean (SD)	10.1 (3.6)
Body mass index (kg/m ²) – mean (SD)	18.3 (3.9)
Systolic blood pressure (mmHg) – mean (SD)	110 (12)
Diastolic blood pressure (mmHg) – mean (SD)	65 (9)
Lipids and lipoproteins	
Total cholesterol (mmol/L) – mean (SD)	6.4 (1.9)
LDL-cholesterol (mmol/L) – mean (SD)	4.7 (1.9)
HDL-cholesterol (mmol/L) – mean (SD)	1.4 (0.3)
Triglycerides (mmol/L) – median (IQR)	0.66 (0.46-0.97)
Lipoprotein (a)* (mg/L) – median (IQR)	143 (62-380)
Diagnosis – no (%)	
Molecular proven non-FH	285 (10)
Probably non-FH	363 (13)
Highly probable FH	136 (5)
Molecular proven heterozygous FH	1,923 (69)
Molecular proven homozygous FH	18 (1)
Other causes of dyslipidemia	65 (2)
Statins – no (%)	576 (21)

SD: standard deviation; no: number; LDL: low-density lipoprotein; HDL: high-density lipoprotein; IQR: interquartile range; FH: familial hypercholesterolemia. *At first measurement

Table 2. Percental and absolute change in Lp(a) levels for a child of 10 years at the age of 11, 15, 20 and 30 years (n=2,813)

	% Change*	Mean Lp(a) levels*	Mean Lp(a) levels (example)
Child of 10 years (reference)	-	149 mg/L	470 mg/L
At age 11	1.2 (0.8 – 1.5)	151 mg/L	476 mg/L
At age 15	5.9 (4.2 – 7.7)	158 mg/L	498 mg/L
At age 20	12.2 (8.5 – 16.0)	167 mg/L	527 mg/L
At age 30	25.9 (17.7 – 34.6)	188 mg/L	592 mg/L

*Estimated from the model

Figure 1. The regression line (95% confidence interval) when Lp(a) measurements are plotted against age

Mixed models analysis showed within-subject variation of 37.4% (95% CI: 36.2 – 38.7)

CONCLUSION

Our findings suggest that Lp(a) levels do not remain stable from childhood into adulthood:

- Lp(a) increases exponentially with increasing age
 - Lp(a) exhibits considerable fluctuations over time in the individual patient
- Therefore, we recommend measuring Lp(a) more than once in the individual patient