

# Novel Measures of LDL and HDL Subfractions and Mortality in Maintenance Hemodialysis Patients

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## INTRODUCTION

- There are limited published studies on chronic kidney disease (CKD) patients regarding total and LDL cholesterol concentrations only.
- Subfraction concentrations is a different aspect of lipoprotein measurements and the relationship to mortality has not been investigated in hemodialysis (HD) patients.
- Measuring subfractions of lipoproteins via novel ion mobility method may better risk-stratify maintenance hemodialysis (MHD) patients.
- We examined mortality predictability of LDL and HDL subfractions in 235 MHD pts over 6 yrs (2001-2007).
- We hypothesized that lipoprotein particle subfractions concentrations have a bearing on mortality in MHD patients.

## METHODS & RESULTS

- In 235 MHD patients from the NIED Study cohort lipoproteins were fractionated from archived baseline plasma samples using an ion mobility method
- Cox proportional models were used to estimate death hazard ratios (HR) [and 95% confidence intervals (95%CI)] across quartiles of LDL and HDL subfractions after adjustment for case-mix (including vintage, Charlson score & Kt/V), malnutrition-inflammation complex (albumin, creatinine, phos, calcium, ferritin, hemoglobin, nPCR, & BMI) and inflammatory markers (CRP, IL-6, & TNF) over 5 years (2001-06).
- HDL subfractions did not correlate with mortality. The highest quartiles of VERY SMALL and LARGE particles of LDL were associated with highest and lowest death risk, respectively (see Table).

Table - HR of death according to quartiles of LDL subfractions concentration

Very small LDL quartiles	Q1 (n=58)	Q2 (n=60)	Q3 (n=59)	Q4 (n=58)	Trend p
Very small LDL(nmol/L)	<57	57-87	88-121	>121	
Unadjusted	1	0.84(0.42-1.70)	0.93(0.45-1.91)	1.54(0.82-2.89)	0.13
Case-mix	1	0.79(0.39-1.61)	0.97(0.47-2.03)	<b>1.75(0.95-3.33)</b>	<b>0.05</b>
Case-mix + lipids	1	0.87(0.41-1.82)	1.07(0.50-2.27)	<b>2.08(1.03-4.20)*</b>	<b>0.02</b>
Previous + MICS	1	0.65(0.29-1.46)	0.89(0.40-1.99)	<b>2.15(1.02-4.56)*</b>	<b>0.02</b>
Previous + inflammation	1	0.65(0.29-1.49)	0.84(0.37-1.94)	<b>2.14(1.00-4.62)*</b>	<b>0.02</b>
Large LDL quartiles	Q1 (n=63)	Q2 (n=55)	Q3 (n=59)	Q4 (n=58)	
Large LDL(nmol/L)	<44	44-76	77-105	>105	
Unadjusted	1	0.70(0.37-1.34)	0.88(0.47-1.62)	<b>0.45(0.22-0.92)*</b>	<b>0.05</b>
Case-mix	1	0.76(0.38-1.52)	0.96(0.51-1.84)	0.53(0.25-1.12)	0.18
Case-mix + lipids	1	0.54(0.27-1.08)	0.76(0.40-1.45)	<b>0.44(0.21-0.94)*</b>	<b>0.08</b>
Previous + MICS	1	<b>0.45(0.21-0.98)*</b>	1.07(0.52-2.21)	<b>0.49(0.21-0.98)*</b>	<b>0.36</b>
Previous + inflammation	1	<b>0.45(0.21-0.98)*</b>	1.14(0.55-2.37)	<b>0.47(0.20-0.99)*</b>	<b>0.37</b>

## CONCLUSIONS

- In this MHD patient population, a high concentration of very small LDL subfractions was associated with increased mortality.
- However, a high concentration of large LDL subfractions led to a decreased risk of mortality.

## KEY LEARNINGS

- ✓ Studies to identify unique characteristics of distinct sub-populations of MHD patients are needed.
- ✓ Larger prospective studies with detailed lipoprotein subfractions analysis are needed to verify our findings in HD patients and to determine appropriate target levels of LDL total and subfractions concentrations.

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