

NMR IDENTIFIES ATHEROGENIC LIPOPROTEIN ABNORMALITIES IN EARLY DIABETIC NEPHROPATHY THAT ARE UNRECOGNIZED BY CONVENTIONAL ANALYSIS

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Atherogenic lipoprotein abnormalities may contribute to increased CVD risk in diabetic nephropathy. The aim of this study is compare the sensitivity of nuclear magnetic resonance (NMR) spectroscopy and conventional lipid profile in assessing lipoprotein abnormalities and their relationship to albuminuria and estimated glomerular filtration rate (eGFR) at early stages of kidney disease in patients with type 2 diabetes.

We analyzed serum lipoprotein abnormalities as measured by conventional methods, NMR spectroscopy, and apolipoproteins by immunoprecipitation. Data are from 517 type 2 diabetic men and women aged 40 to 69 years from the Insulin Resistance Atherosclerosis Study. Albumin to creatinine ratio (ACR) was used as a measure of urinary albumin excretion and 4 variable MDRD equation was used to calculate eGFR. One-way ANCOVA was used to analyze the association between lipid and renal abnormalities. Participants had eGFR ranging from 30 to 223.4 ml/min per 1.73m² and ACR ranging from 0.18 to 93.6 mg/mmol.

Division of the sample population into ACR quartiles demonstrates that worsening ACR is associated with a decrease in large LDL and LDL size (both p<0.01) and an increase in large VLDL, medium VLDL, total VLDL, small LDL, IDL particles, and apoB (all p<0.03). Division of the sample population into eGFR quartiles shows that worsening eGFR is associated with an increase in small VLDL, medium VLDL, total VLDL, medium HDL, and IDL particles (all p<0.02). Conventional analysis shows increased triglycerides and non-HDL cholesterol with worsening ACR and increased triglycerides with lower eGFR (all p<0.03).

In subjects with type 2 diabetes, mild increase in albuminuria and mild impairment in renal function are associated with atherogenic lipoprotein abnormalities not apparent with a standard lipid panel.