ApoA5 and ApoE Haplotypes Modify Associations of Serum Lipids with Dietary Patterns among Persons with Recently Diagnosed Type 2 Diabetes

Katharina S. Weber[1,2], Anette E. Buyken[3], Birgit Knebel[2,4], Klaus Strassburger[2,5], Jörg Kotzka[2,4], Peter Stehle[6], Julia Szendroedi[1,2,7], Karsten Müssig[1,2,7], Michael Roden[1,2,7], for the GDS Group

[1]Institute for Clinical Diabetology, German Diabetes Center at Heinrich Heine University, Leibniz Institute for Diabetes Research, Düsseldorf, Germany; [2]German Center for Diabetes Research (DZD), München-Neuherberg, Germany; [3]DONALD Study, IEL - Nutritional Epidemiology, University of Bonn; [4]Institute for Clinical Biochemistry and Pathobiochemistry, German Diabetes Center at Heinrich Heine University, Leibniz Institute for Diabetes Research, Düsseldorf, Germany; [5]Institute for Biometrics and Epidemiology, German Diabetes Center at Heinrich Heine University, Leibniz Institute for Diabetes Research, Düsseldorf, Germany; [6]Department of Nutrition and Food Sciences, University of Bonn, Bonn, Germany; [7]Department of Endocrinology and Diabetology, Medical Faculty, Düsseldorf, Germany

Dietary patterns affect dyslipidemia in type 2 diabetes (T2D) but responsiveness may vary by genotype. This study examined independent associations of dietary patterns with serum lipid levels and interactions with haplotypes of apolipoprotein (Apo)A5 and ApoE among persons with recently diagnosed T2D.

Food consumption was assessed by a food propensity questionnaire. Fasting serum concentrations of triglycerides (TG), high-density (HDL) and low-density lipoprotein (LDL) cholesterol as well as genotypes were determined in 348 patients of the German Diabetes Study (mean diabetes duration 6 months). Dietary patterns were derived using principal component analyses (PCA) and reduced rank regression (RRR), which extracted patterns explaining variation in serum lipids. PCA yielded interpretable dietary patterns, which were, however, not related to serum lipid levels.

Relevance of the extracted RRR pattern varied by ApoA5 and ApoE haplotype ($P_{interaction} < 0.05$). A dietary pattern characterized by preferred consumption of unfavorable carbohydrates, whilst avoiding fruits and vegetables was directly and independently associated with TG levels among ApoA5*2 carriers; those in the highest tertile of adherence to this RRR pattern had 99% higher TG levels compared to carriers in the lowest tertile ($P_{trend} = 0.002$). Inverse independent associations of a dietary pattern characterized by low consumption frequencies of high-fat foods or high-percentage alcoholic beverages with LDL levels were primarily seen among ApoE2 carriers: those in the highest tertile of pattern adherence had 40% lower LDL levels ($P_{trend} = 0.001$) than those in the lowest tertile.

Our explorative analyses suggest that associations of dietary patterns with TG and LDL differ by ApoA5 and ApoE haplotype in patients with recently diagnosed T2D.