OBSERVATIONS

# Impaired Postprandial Metabolism of Apolipoprotein B48–Containing Remnant Particles in Normolipidemic Subjects With Brittle Type 1 Diabetes

Impaired metabolism of intestinally derived chylomicron remnants has been implicated in the development of atherosclerosis among normolipidemic patients with coronary heart disease (1,2) and, indeed, in other conditions associated with increased vascular disease such as obesity, metabolic syndrome, type 2 diabetes, and familial hypercholesterolemia (3–5). However, the role of these particles in the increased atherosclerotic risk associated with type 1 diabetes is unclear. No studies to date have examined apolipoprotein (apo)B48, a specific marker of chylomicron particle number, in the human type 1 diabetic population.

Nine normolipidemic subjects (five male and four female) with brittle type 1 diabetes and seven healthy normolipidemic control subjects (two male and five female) were studied. Subjects were matched based on sex, age (53.3 ± 3.3 vs. 46.5 ± 6.3 years; $P = 0.31$), and BMI (24.9 ± 1.2 vs. 23.7 ± 0.80 kg/m$^2$; $P = 0.44$). The duration of diabetes in the nine diabetic subjects was 41.6 ± 3.3 years (range 20–45), and A1C concentration was 8.9 ± 0.5%.

Subjects were fasted overnight before the test day. On the test day, blood samples were drawn at 0, 2, 4, 6, and 8 h following the breakfast (0.5 h) and lunch (4.5 h) meals in order to stimulate a free-living environment. In statistical comparisons determined by unpaired Student's *t* tests, there were no differences in fasting glucose, insulin, or lipid parameters among subjects with type 1 diabetes compared with those in the control population. In contrast, fasting apoB48 was the only fasting lipid-associated parameter to be higher among subjects with type 1 diabetes relative to that in the control population (22.8 ± 2.5 and 12.3 ± 1.0 μg/ml; $P < 0.01$). The fed response, calculated as postprandial area under the curve (AUC) (0–8 h), revealed no differences in postprandial insulin, cholesterol, or triglyceride AUC between the two groups. However, the postprandial response of plasma apoB48 showed that subjects with type 1 diabetes had a progressive and significant delay in clearance of remnant particles over the 8-h time period. Total plasma apoB48 AUC indicated that circulating apoB48 mass was 31% higher in subjects with type 1 diabetes versus the control population (222.9 ± 11.3 vs. 169.8 ± 15.9 $\mu g \cdot ml^{-1} \cdot 8\ h^{-1}$; $P < 0.01$). Ingestion of sequential meals, consistent with a free-living situation, resulted in a biphasic response of plasma apoB48, peaking at 2 h following both the initial (breakfast) and the second (lunch) meal. Participants with type 1 diabetes demonstrated circulating apoB48 levels that were 45% higher at 6 h ($P < 0.01$), which progressively increased to 69% by 8 h ($P < 0.01$), following the second (lunch) meal.

In conclusion, apoB48 metabolism may be altered in individuals with brittle type 1 diabetes even in the absence of classic dyslipidemia. Further studies using larger sample sizes should examine whether disturbed plasma apoB48 remnants can potentially predict coronary artery disease in this population.

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