A 54-Year-Old Diabetic Man with Low Serum Cholesterol

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CASE

A 54-year-old asymptomatic man with a 5-year history of type 2 diabetes mellitus (T2DM) was found to have an extremely low serum cholesterol concentration. He had no history of major childhood illness, malabsorption, or any cardiovascular or neurologic dysfunction. He had smoked for 30 years and was not using alcohol or any lipid-lowering drugs. Additionally, he was not a vegetarian. His family history included stroke (father died at age 52 years) and chronic kidney disease (57-year-old brother). His eldest son had died of a suspected myocardial infarction at the age of 21 years. The patient had a blood pressure of 120/80 mmHg, a heart rate of 78 beats/min, and a body mass index of 32 kg/m^2. The results of a physical examination were normal. Hepatic steatosis and mild hepatomegaly were observed via abdominal ultrasonography. A transthoracic echocardiogram was normal, and the results of a treadmill exercise test (Bruce protocol) were negative.

Laboratory studies were performed. Serum concentrations of liver enzymes, results of thyroid function tests, and values of hematology parameters were all normal, as were those for serum bilirubin, creatinine, urea nitrogen, uric acid, and calcium. The fasting serum glucose concentration was increased [155 mg/dL (8.6 mmol/L); reference interval, 60–110 mg/dL (3.33–6.11 mmol/L)], and the patient's hemoglobin A_{1c} value was 7% (reference interval, 4%–6%). The laboratory results for serum lipids, lipoproteins, apolipoproteins, proteins, immunoglobulins, and fat-soluble vitamins and provitamins are shown in Table 1. Of note, the serum concentrations of total cholesterol (TC), triglycerides, LDL cholesterol (LDL-C), and apolipoprotein B (apo B) were all markedly decreased. The serum concentrations of total protein and globulin were both high. The results of serologic tests for hepatitis A, B, and C viruses and HIV were negative.

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Table 1. Selected patient laboratory results with corresponding reference intervals.

Variable	Result	Reference interval
Lipids, lipoproteins, and apolipoproteins		
TC, mg/dL (mmol/L)	70 (1.81)	<200 (5.18)[b]
TG,[a] mg/dL (mmol/L)	22 (0.25)	<150 (1.69)[b]
LDL-C, mg/dL (mmol/L)	10 (0.26)	<100 (2.59)[c]
HDL-C, mg/dL (mmol/L)	56 (1.45)	≥60 (1.55)[b]
apo A-1, mg/dL (g/L)	106 (1.06)	104–202 (1.04–2.02)
apo B, mg/dL (g/L)	<20 (<0.2)	66–133 (0.66–1.33)
Serum proteins and immunoglobulins		
Total Protein, g/dL (g/L)	8.6 (86)	6.4–8.3 (64–83)
Albumin, g/dL (g/L)	4.2 (42)	3.5–5.2 (35–52)
Globulin, g/dL (g/L)	4.4 (44)	2.5–3.5 (25–35)
β_2-Microglobulin, mg/L (nmol/L)	1.5 (127)	0.96–2.16 (81–183)
IgA, mg/dL (g/L)	2300 (23)	57–543 (0.57–5.43)
IgG, mg/dL (g/L)	696 (6.96)	700–1600 (7.00–16.00)
IgM, mg/dL (g/L)	<25 (<0.25)	40–230 (0.4–2.3)
Fat-soluble vitamins and provitamins		
Vitamin E, mg/dL (μmol/L)	0.52 (12.1)	0.60–1.80 (13.9–41.8)
β-Carotene, μg/dL (μmol/L)	7.2 (0.13)	10–80 (0.19–1.50)

[a] TG, triglycerides.
[b] Desirable value is indicated in parentheses.
[c] Optimal value is indicated in parentheses.

Questions to Consider
• What are the typical lipid abnormalities seen in persons with T2DM?
• What are possible causes for low serum cholesterol, LDL, and apo B?
• What further testing could be done to clarify the cause of the decreased lipid concentrations in this case?
• Given the patient's serum total protein and globulin results, what additional testing should be performed?

Final Publication and Comments

The final published version with discussion and comments from the experts will appear in the May 2012 issue of *Clinical Chemistry*. To view the case and comments online, go to http://www.clinchem.org/content/vol58/issue4 and follow the link to the Clinical Case Study and Commentaries.

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