T2D, Cholesterol, and Neuropathy: What's the Link?

— Lower LDL cholesterol might be a risk factor for nerve damage in type 2 diabetes

by Kristen Monaco, Staff Writer, MedPage Today May 31, 2019

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Lower levels of serum cholesterol were linked to more peripheral nerve damage in type 2 diabetes, a German study found.

In a cohort of 100 adults with type 2 diabetes, the lipid equivalent lesion load of nerve tissue was positively correlated with the average size of a peripheral nerve lesion (r=0.44; P<0.001 with the nerve's cross-sectional area), reported Felix Kurz, MD, of Heidelberg University Hospital, and colleagues.

Additionally, the lipid equivalent lesion load of nerve tissue in participants' right legs was also positively correlated with the maximum length of a nerve lesion (r=0.71; P<0.001).

Writing in *JAMA Network Open*, Kurz's group reported that the lipid equivalent lesion loads were also negatively correlated with the following other variables:

- Total serum cholesterol level (r= -0.41; P<0.001)
- High-density lipoprotein (HDL) cholesterol level (r= -0.30; P=0.006)

- Low-density lipoprotein (LDL) cholesterol level (r= -0.33; P=0.003)

- Nerve conduction velocities of the tibial (r= -0.33; P=0.01)

The lipid equivalent lesion load of these nerves was also negatively correlated with nerve conduction velocities of the tibial (r= −0.33; P=0.01) and peroneal nerves (r= -0.51; P<0.001). A similar negative correlation was also seen with the compound muscle action potentials (CMAP) of the tibial (r= -0.31; P=0.02) and peroneal nerves (r= -0.28; P=0.03).

The analysis included adults with type 2 diabetes -- 64 with distal symmetric diabetic polyneuropathy (DPN) and 36 who were free of DPN. All individuals underwent a magnetic resonance neurography of the right middle thigh with a 3.0-T scanner at a single center in Germany.

Among individuals with DPN, the average lesion load in vital nerve tissue was about 20%, with an average 63 mm maximum lesion length, compared with only 10% in those without DPN, with a 50 mm maximum lesion length.

Those with DPN had significantly lower total serum cholesterol levels, which was driven by lower LDL cholesterol levels, as follows:

- Total serum cholesterol level: 175.00 mg/dL [DPN] vs 197.31 mg/dL [No DPN]

- HDL cholesterol level: 52.21 mg/dL vs 51.14 mg/dL

- LDL cholesterol level: 87.73 mg/dL vs 113.90 mg/dL

- Triglycerides: 221.92 mg/dL vs 166.71 mg/dL

Both total serum cholesterol levels and LDL cholesterol were positively correlated with tibial and peroneal nerve conduction velocities, and tibial nerve CMAP.

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"To our knowledge, this study was the first to visualize in vivo that low levels of serum cholesterol, specifically LDL-C, were accompanied by peripheral nerve damage in [type 2 diabetes] DPN," the research group wrote, noting that the study "contradicts the results of previous studies that indicated that lowering serum cholesterol levels potentially slows the progression of DPN by lowering total serum cholesterol and LDL-C levels."

"Instead, our findings are in line with results of previous studies that found that the intake of statins and a decrease of serum cholesterol level are associated with neuropathic symptoms, microvascular damage, and an accelerated deterioration of peripheral nerve fibers," Kurz and co-authors said.

They said that one possible explanation for the findings could be that "lowering serum cholesterol levels impairs peripheral nerve regeneration because cholesterol cannot be produced in axons and therefore has to be supplied to neurite tips and adjacent Schwann cells of regenerating axons by either axonal transport or external supply via HDL-C and LDL-C."

Because so many new therapies are now aimed at treating dyslipidemia in type 2 diabetes, like PCSK9 inhibitors, patients with low cholesterol levels should be on high alert for any signs of neuropathy, the researchers concluded.

Kristen Monaco is a senior staff writer, focusing on endocrinology, psychiatry, and nephrology news. Based out of the New York City office, she's worked at the company since 2015.

Disclosures

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Primary Source

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