Relationship between Lipid Levels and Coronary Atherosclerotic Plaque Scores by Coronary Computed Tomography Angiography (CTA) in Subjects with Elevated Triglycerides

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Introduction

- Objective of the study: To analyze triglyceride, high density lipoprotein (HDL) cholesterol and low density (LDL) cholesterol levels in patients with high triglycerides (200-499 mg/dl) for a correlation with semi-quantitative plaque scores (non-calcified plaque, total plaque and coronary artery calcium (CAC) plaque scores) in patients from the EVAPORATE study.

- Summary of the EVAPORATE study: To analyze the effect of Vascepa (an omega-3 fatty acid) on improving coronary atherosclerosis in patients on statins with high triglyceride levels.¹

Methods

- 72 subjects of the EVAPORATE (Effect of Vascepa on Improving Coronary Atherosclerosis in people with High Triglycerides Taking Statin Therapy) trial received baseline Coronary CTA.

- Comprehensive blood panel was inclusive of LDL-C, HDL-C and Triglyceride levels (Boston Heart Diagnostics, Framingham, MA).

- Coronary CTA was evaluated using a modified 17-segment American Heart Association coronary tree model. CAC score, Total Plaque Severity (TPS: total amount of plaque in segment), Total Non-Calcified Plaque Score (TNPS) and Segment Involvement Score (SIS: total number of segments with plaque) were measured (AW, GE Medical Systems, Milwaukee, WI).

- Triglyceride, HDL-C and LDL-C levels were analyzed for an association with non-calcified, calcified and total plaque scores using multivariable regression analysis.

- Data was adjusted for age, gender, diabetes, hypertension, family history and current smoking.

Results

The strongest correlation was observed for HDL-C and increasing CAC (p=0.024) after adjusting for age, gender, diabetes, hypertension, family history of CAD and smoking.

Table 1 Baseline Characteristics in Patients with High Triglycerides

<table>
<thead>
<tr>
<th>Subjects at Baseline (n=72)</th>
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<tr>
<td>Lipid Levels (mg/dL)*</td>
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<tr>
<td>HDL Cholesterol (62.5% of 38.6 ± 10.6 subjects with&lt;40 mg/dL)</td>
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<tr>
<td>LDL Cholesterol</td>
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<td>Triglycerides</td>
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Table 2 Associations between Lipid Levels and Coronary Plaque Scores

| HDL-C and TNPS | 0.06 |
| HDL-C and Total CAC Score* | 0.024 |
| HDL-C and TPS * | 0.041 |

*Indicates significant associations with p < 0.05

References


Discussion

It is commonly known that high triglyceride3,4 and LDL-C levels2,4 are risk factors for coronary artery disease. However, in this study, these variables were not found to be significantly correlated (p>0.05) with higher plaque scores. This result may be explained by the small sample size and the uniform population, all with high triglycerides. Comparison with a low triglyceride group is planned. Another known risk factor for atherosclerosis is low HDL-C²,⁴, and we did find the association between HDL-C levels and high CAC scores to be significant (p<0.05).

Conclusion

- Among standard lipids, HDL-C is an independent predictor of total CAC score and total plaque severity.

- As higher plaque scores are associated with greater risk of coronary events, these findings show that HDL-C is an independent risk factor for coronary artery disease in persons with high triglycerides.

Figure 1 A 72 y/o man with high triglycerides. (A) Straightened view of the left anterior descending (LAD) artery. (B) A cross section of the LAD showing mixed, calcified and non-calcified coronary plaque. Coronary segmentation model and quantitative measurement of different plaque types. (D, E and F) Dense calcium: white; Necrotic core or low-attenuation plaque: red; Fibrous fatty: light green; Fibrous: dark green. LM = left main; pLAD = proximal left anterior descending artery; mLAD = mid left anterior descending artery.