Cholesterol uptake capacity: a new measure of HDL functionality as a predictor of subsequent revascularization in patients undergoing percutaneous coronary intervention

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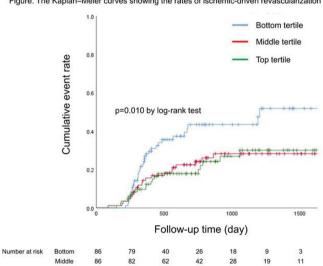
Background: Recent studies have demonstrated the importance of high-density lipoprotein (HDL) functionality in the development of de novo coronary artery disease by using the cholesterol-efflux capacity, a measure of the ability of HDL to promote cholesterol removal from lipid-laden macrophages. Recently, we developed a rapid cell-free assay system to directly evaluate the capacity of HDL to accept additional cholesterol; the measurement of the cholesterol-uptake capacity (CUC) enables HDL functionality to be readily evaluated in our daily practice. However, prognostic implication of CUC measurement at the timing of percutaneous coronary intervention (PCI) remains unclear.

Purpose: We aimed to evaluate the association between baseline CUC and revascularization during follow-up in the patients who underwent PCI.

Methods: We retrospectively reviewed the patients who underwent PCI with follow-up coronary angiography (CAG) or ischemic-driven revascularization. The patients who had the frozen blood samples of which CUC were measurable at the index PCI and follow-up CAG or revascularization were enrolled. We excluded the patients under hemodialysis.

Results: Among a total of 703 consecutive patients who underwent PCI between Dec 2014 and Mar 2019, we finally enrolled 74 patients who underwent ischemic-driven revascularization (revascularization group) and 183 patients who underwent follow-up CAG without revascularization (non-revascularization group).There were no significant difference in baseline traditional cardiovascular risk factors between the groups. However, the presence of diabetes was significantly more frequent in the revascularization group (63.5% vs 41.0%; P=0.001) than in the non-revascularization group. CUC at the index PCI was significantly lower in the revascularization group than in the non-revascularization group (87.0±19.5 vs 93.9±19.2; P=0.004). Multivariate logistic regression analysis revealed that impaired HDL functionality assessed by decreased CUC level at the index PCI (odds ratio; 0.984, 95% confidence interval; 0.969–1.000) was independently associated with subsequent revascularization after PCI. Indeed, there was a graded inverse association between increasing tertiles of CUC levels and the incidence of revascularization during a median follow-up of 881 days (Figure). Especially in the subgroup analysis of non-diabetic patients, decreased CUC level at the index PCI was independently associated with subsequent revascularization (odds ratio; 0.947, 95% confidence interval; 0.915–0.981), while not in diabetic population.

Conclusion: Serum CUC level at the index procedure was associated with subsequent revascularization especially in non-diabetic patients who underwent PCI.

Figure. The Kaplan–Meier curves showing the rates of ischemic-driven revascularization by tertiles of CUC