High-density lipoprotein lipid peroxidation in association with presence of coronary artery disease and atrial fibrillation in a large cross-sectional study

N. Pagonas[1], B. Sasko[1], R. Mueller[1], M. Jaensch[1], W. Dammermann[1], P. Hillmeister[1], I. Buschmann[1], O. Ritter[1], T.H. Westhoff[2], T. Kelesidis[3]

[1]*University Hospital Brandenburg, Brandenburg, Germany;* [2]*Ruhr University Bochum (RUB), Marien Hospital Herne, Bochum, Germany;* [3]*University of California Los Angeles, David Geffen School of Medicine, Los Angeles, United States of America*

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Background: The function of high-density lipoprotein (HDL) cholesterol may play a more important role in the prevention of cardiovascular disease compared to the concentration of the HDL. Cardiovascular diseases such as coronary artery disease (CAD) and atrial fibrillation (AF) have been linked to impaired HDL function.

Purpose: The aim of the present study is to assess a biochemical measure of the antioxidant function of HDL and its association with presence of CAD and AF.

Methods: Patients admitted for elective cardiac catheterization were recruited in this cross-sectional study. Out of 1231 participants that were included in the analyses, 727 patients had confirmed CAD (CAD group), 369 patients had no CAD (no CAD group) and 129 persons were included as a control group. HDL function was measured in sera by determination of HDL-lipid peroxidation content (HDLox) assessed by a validated fluorometric cell-free biochemical assay and was normalized for the levels of HDL cholesterol (normalized HDLox/HDL-C ratio or nHDLox; no units). Results are expressed as median with interquartile range. Associations of nHDLox with presence of CAD and AF were assessed by univariate and multivariate analyses.

Results: Participants in the CAD group had higher levels of nHDLox (0.80, 0.61–1.03) compared to the no CAD (0.70, 0.55–0.93) and control (0.66, 0.55–1.03, no units, $p<0.001$) group. Out of 1206 participants, 233 (19%) had AF and 973 (81%) had no AF. Patients with AF have also higher nHDLox (0.82, 0.60–10.03) compared to persons without AF (0.73, 0.58–0.98, p=0.03). In univariate analysis nHDLox was associated with CAD ($p<0.001$). In multivariate analysis adjusted for age, gender, CAD, BMI and hypertension, nHDLox was a strong independent predictor of atrial fibrillation (p=0.015) but was not an independent predictor of CAD ($p>0.05$)

Conclusions: Reduced antioxidant function of HDL (increased HDLox measured by a biochemical assay), a metric of HDL function, is increased in patients with atherosclerosis and manifested CAD and is also associated with the presence of atrial fibrillation independent of the presence of CAD.