EDITORIAL

YKL-40: an innocent bystander or an active threat in acute and chronic cardiac diseases?

Gerit-Holger Schernthaner, Clemens Höbaus

Division of Angiology, Department of Medicine II, Medical University of Vienna, Vienna, Austria

The levels of YKL-40 (also known as chitinase-3-like protein 1) are increased in various chronic[1] and acute inflammatory conditions[2] caused by local inflammatory cells (mainly macrophages, neutrophils, endothelial, and vascular smooth muscle cells). Inflammation is a key component of atherosclerosis, thus elevation of YKL-40 levels in stable atherosclerotic diseases such as coronary artery disease (CAD),[3] carotid artery disease,[4] and peripheral artery disease[5,6] has been described.

In patients with CAD, several publications have documented an association between YKL-40 levels and atherosclerotic lesion progression,[7] the number of affected coronary arteries,[3] and long-term mortality.[8]

In this issue of *Polish Archives of Internal Medicine*, Ściborski et al[9] reported a study in patients with acute coronary syndrome including ST-segment and non–ST-segment elevation myocardial infarction and controls. YKL-40 levels were elevated in myocardial infarction regardless of ST-segment elevation. Furthermore, an association with the SYNTAX score was seen. The current publication extends the findings of a previous study by Akboga et al,[10] investigating YKL-40 and collateral development and its association with the SYNTAX score in stable CAD.

Although both studies suggested an involvement in acute and stable CAD, they both failed to investigate the "hen and egg" question of whether YKL-40 is an innocent bystander or an active threat in acute and chronic cardiac diseases.

So far, an association of YKL-40 with acute and stable CAD, chronic heart failure,[11-14] and chronic atrial fibrillation[15,16] has been reported. However, during this very year, the highest YKL-40 levels were observed also at acute decompensation of heart failure (oral communication). To overcome the knowledge barrier, studies in the acute setting would be needed to evaluate the degree of acute decompensation (eg, during angiography) and a possible pulmonary volume overload. A delayed echocardiography (>12 h) might not reflect YKL-40 level elevation in acute decompensation.

As long as the causal role of YKL-40 in acute and chronic cardiac disease is not elucidated and proven, the pathophysiological considerations whether YKL-40 is primarily involved in plaque rupture or whether it is an additional relevant inflammatory biomarker in cardiac diseases per se will remain unsolved.

DISCLAIMER The opinions expressed by the author are not necessarily those of the journal editors, Polish Society of Internal Medicine, or publisher.

REFERENCES

1 Vaananen T, Vuolteenaho K, Kautiainen H, et al; on behalf of the NEO-RACo Study Group. Glycoprotein YKL-40: a potential biomarker of disease activity in rheumatoid arthritis during intensive treatment with csDMARDs and infliximab: evidence from the randomised controlled NEO-RACo trial. PLoS One. 2017; 12: e0183294.

2 Nordenbaek C, Johansen JS, Junker P, et al. YKL-40, a matrix protein of specific granules in neutrophils, is elevated in serum of patients with community-acquired pneumonia requiring hospitalization. J Infect Dis. 1999; 180: 1722-1726.

3 Kucur M, Isman FK, Karadag B, et al. Serum YKL-40 levels in patients with coronary artery disease. Coron Artery Dis. 2007; 18: 391-396.

Correspondence to:
Prof. Dr. Gerit-Holger Schernthaner, Division of Angiology, Department of Medicine II, Medical University of Vienna, Waehringer Guertel 18-20, 1090 Vienna, Austria, phone: +43140400 46700, email: gerit.schernthaner@meduniwien.ac.at
Received: November 5, 2018.
Accepted: November 6, 2018.
Published online: November 30, 2018.
Conflict of interest: none declared.
Pol Arch Intern Med. 2018; 128 (11): 636-637
doi:10.20452/pamw.4379

4 Michelsen AE, Rathcke CN, Skjelland M, et al. Increased YKL-40 expression in patients with carotid atherosclerosis. Atherosclerosis. 2010; 211: 589-595.

5 Batinic K, Hobaus C, Grujicic M, et al. YKL-40 is elevated in patients with peripheral arterial disease and diabetes or pre-diabetes. Atherosclerosis. 2012; 222: 557-563.

6 Höbaus C, Tscharre M, Herz CT, et al. YKL-40 levels increase with declining ankle-brachial index and are associated with long-term cardiovascular mortality in peripheral arterial disease patients. Atherosclerosis. 2018; 274: 152-156.

7 Zheng JL, Lu L, Hu J, et al. Increased serum YKL-40 and C-reactive protein levels are associated with angiographic lesion progression in patients with coronary artery disease. Atherosclerosis. 2010; 210: 590-595.

8 Harutyunyan M, Gøtze JP, Winkel P, et al. Serum YKL-40 predicts long-term mortality in patients with stable coronary disease: a prognostic study within the CLARICOR trial. Immunobiology. 2013; 218: 945-951.

9 Ściborski K, Kuliczkowski W, Karolko B, et al. Plasma YKL-40 levels correlate with the severity of coronary atherosclerosis assessed with the SYNTAX score. Pol Arch Intern Med. 2018; 128: 644-648.

10 Akboga MK, Yalcin R, Sahinarslan A, et al. Effect of serum YKL-40 on coronary collateral development and SYNTAX score in stable coronary artery disease. Int J Cardiol. 2016; 224: 323-327.

11 Arain F, Gullestad L, Nymo S, et al. Low YKL-40 in chronic heart failure may predict beneficial effects of statins: analysis from the controlled rosuvastatin multinational trial in heart failure (CORONA). Biomarkers. 2017; 22: 261-267.

12 Harutyunyan M, Christiansen M, Johansen JS, et al. The inflammatory biomarker YKL-40 as a new prognostic marker for all-cause mortality in patients with heart failure. Immunobiology. 2012; 217: 652-656.

13 Bilim O, Takeishi Y, Kitahara T, et al. Serum YKL-40 predicts adverse clinical outcomes in patients with chronic heart failure. J Card Fail. 2010; 16: 873-879.

14 Rathcke CN, Kistorp C, Raymond I, et al. Plasma YKL-40 levels are elevated in patients with chronic heart failure. Scand Cardiovasc J. 2010; 44: 92-99.

15 Marott SC, Benn M, Johansen JS, et al. YKL-40 levels and atrial fibrillation in the general population. Int J Cardiol. 2013; 167: 1354-1359.

16 Henningsen KM, Nilsson B, Johansen JS, et al. Plasma YKL-40 is elevated in patients with recurrent atrial fibrillation after catheter ablation. Inflamm Res. 2010; 59: 463-469.