

## Further evidence to support a role of oxidative stress and inflammation in myocardial infarction

### *Miyokart enfarktüsünde oksidatif stresi ve enflamasyonu destekleyen bir başka kanıt*

Today, the cardiovascular diseases represent one of the most severe public health problems with a mortality estimated to be 48% only in Europe. This percentage is expected to increase, especially among the oldest, which are usually more fragile and needy. The strong impact, both economic and social, has significantly increased the number of researchers involved in the clarification of the etiology of these diseases. As cardiovascular disease is a multifactorial disease, it is not surprising to find that the underlying causes are numerous and diverse (1, 2); among others, a central role is played by oxidative stress and inflammation (3, 4). Indeed, it has been widely demonstrated that oxygen radicals are involved in plaque rupture contributing to thromboembolism, thus resulting in acute coronary syndrome (ACS). Also, inflammatory processes contribute to plaque formation and rupture and eventually to ischemia and finally to myocardial necrosis (5). Evidence is growing regarding the prognostic value of markers of inflammation in unstable angina/non-ST segment elevation myocardial infarction (UA/NSTEMI).

However, the independent value of these variables has not been systematically investigated in prospective studies. Neither of the traditionally used biomarkers is thought to be the gold standard in detection of myocardial ischemia or necrosis. A biomarker that could detect quite early the ischemic myocardium as well as define the risk of a future event with high sensitivity and specificity is still lacking (6). Biomarkers have an undeniable role in the evaluation and management of patients with cardiovascular disease. They provide the tools to identify and stratify the risk in patients with possible ACS. Effective prevention of cardiovascular morbidity and mortality requires the development of innovative diagnostic and therapeutic strategies aimed to an early identification of the subclinical disease. The cornerstone used so far in the management of this type of patients is the troponin; unfortunately, it has been recently recognized that this biomarker shows several limitations: first, although highly specific, it is not an early marker; in fact, its levels rise in the blood several hours after cardiac injury; second, especially in old people, it is a marker that it is not able to discriminate between healthy and unhealthy, because it has been recently demonstrated that troponin levels are also high in people without cardiovascular pathologies (7-9); last, troponin is a marker whose increase

denotes ischemia only in the presence of necrosis and therefore does not allow to identify patients with unstable angina or heart failure (10). In general, at least in the case of the elderly, who often have multiple diseases, it could be very important to find other specific markers to improve diagnosis.

The study published in this issue of the *Anatolian Journal of Cardiology* (11) suggests alternative markers to troponin for an early identification of the acute NSTEMI. In particular, the authors have considered the oxidative stress and inflammation parameters; to date, no other study has looked at both of these aspects in patients with cardiovascular disease. Gökdemir et al. (11) have analysed 87 patients: 47 with NSTEMI and 40 with unstable angina pectoris (USAP). For all the subjects, the plasma total oxidative stress (TOS), the total antioxidant status (TAS), the OSI, defined as the ratio of the TOS to TAS level, the white blood cell count (WBC), and the high-sensitive C-reactive protein (hs-CRP) have been measured. The main finding of this study is a significant increase of the plasma levels of TOS and OSI in NSTEMI patients in respect to USAP patients; also a similar result has been found for WBC, hs-CRP, plasma low-density lipoprotein-cholesterol (LDL-C) and triglycerides. As expected, age is positively correlated with TOS and OSI levels. *Vice versa*, troponin I and creatine kinase MB fraction (CK-MB) levels at emergency department admission are not significantly different between the two groups. Altogether these results state that both inflammatory processes and oxidative stress play a role in the pathogenesis of acute NSTEMI.

Interestingly, the present study has considered a sample of patients with an average admission time very low, about 2 hours. This is very important for an early and effective treatment of these patients.

The authors have demonstrated that the most utilized biomarkers, such as troponin I and CK-MB, are not different between NSTEMI and USAP patients, and so they are not good biomarkers for a screening in these pathologies. The alternative inflammatory and oxidative biomarkers proposed by the authors may help the clinicians in the early diagnosis of NSTEMI and in the improvement of the management of these patients.

Although interesting, care must be taken when interpreting these results. This study shows several limitations: first of all,

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the small sample size: in fact, the study has been conducted in a relatively small patient population (total n=87) and in a single department. Large-scale studies are necessary to validate findings presented here. Second, the authors have not considered a follow up: it could be very important to establish if a worse inflammatory and oxidative profile may represent a risk factor for mortality. Finally, as proposed by the authors, a fast measurement (about 10 minutes) of oxidative stress and inflammatory parameters could be implemented in the early management of cardiovascular diseases. However, it may be risky to introduce these determinations in clinical practice before to have confirmed these results in other studies. Further works are requested to elucidate the role of oxidative stress and inflammation into the heart disease enigma.

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