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Specific, Robust, Reproducible: The Hunt for the Ideal Biomarker

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Identification of robust and specific biochemical/ molecular markers of the cardiovascular disease is one of the biggest challenges in the modern cardiology. Ideally, cardiac markers should be reliable, easy to detect, stable and cost-effective. The results of cardiac marker measurements together with standard diagnostic approaches should provide precise information about the cardiovascular pathology and, ideally, should help to assess the severity of the disease.

In this special issue, several research groups demonstrate new data about cardiac markers in heart failure, cardiac arrest and after coronary artery bypass graft surgery.

Taub et al. analyze the data obtained during serial measurements of brain–type natriuretic peptide (BNP) in the patients with heart failure (VAMPIRE study). The authors convincingly show that serial measurements of BNP levels in heart failure patients could help to prevent untimely hospitalization [1]. Georgieva and Vitlianova demonstrate significant decrease of heme oxygenase-1 (HO-1), a cardioprotective stress protein, in the patients with chronic heart failure compared to control group and discuss the possibility to use HO-1 as a biomarker for chronic heart failure [2]. Suska and colleagues use an elegant approach and investigated the activity of a salivary protein, called salivary α-amylase and its potential to be a new biomarker of chronic heart failure. The authors show a strong positive correlation between salivary α-amylase and well-established marker pro-BNP and, simultaneously, negative correlation between salivary α-amylase and arterial blood pressure. The authors conclude that salivary α-amylase might have a potential to serve as non- invasive biomarker for cardiovascular disease, including chronic heart failure [3]. Copeptin, the C-terminal part of the vasopressin prohormone, recently described as a marker for rule out the acute myocardial infarction [4], was determined in the blood specimens of patients with systolic heart failure to assess their individual prognosis at 24 months. Marques and colleagues show that copeptin serum levels positively correlated with severity degree of heart failure and, ultimately, with individual mortality rates at 2 years [5]. Stammet and colleagues analyzed a biosignature of the blood cells obtained from the patients who were resuscitated after cardiac arrest and were treated with hypothermia. Gene expression patterns of the patients with favorable neurological outcome were compared to those of the patients with poor outcome. The authors identified the chemokine (C-X3-C motif) receptor 1 (CX3CR1) as a novel biomarker that was significantly increased in the patients with favorable outcome [6]. The example how already known biomarkers can be used to compare different surgical techniques for their safety and/or occurrence of adverse events was demonstrated by Brown et al. [7]. The authors compared expression of inflammation markers Interleukin-6 and high sensitivity C6 reactive protein (hs-CRP) following conventional coronary artery bypass graft surgery (CCAB) and off-pump coronary artery bypass graft surgery (OPCAB). The data demonstrate that patients, who were operated using OPCAB technique, showed increased systemic inflammation response compared to the patients who underwent conventional artery bypass graft surgery [7].

The authors who present the data in this special issue demonstrate that different measurement regiments of well-established biomarkers for cardiovascular disease provide valuable information about progression and/or stage of the disease. Alternatively, novel biomarkers identified in the clinical settings let us hope that these biomarkers will serve as additional tools to make an individual diagnosis of the cardiovascular disease more accurate and reliable.

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