Impact of Biomarkers, Proteomics, and Genomics in Cardiovascular Disease

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This special issue of Clinical Chemistry provides a comprehensive perspective into the current and future impact of biomarkers, proteomics, and genomics in cardiovascular disease. The growth in both the clinical use and new investigations of biomarkers, whether proteomic or genomic, has been explosive over the past 10 years. Protein biomarkers have been anchored by interdisciplinary guidelines (laboratory medicine, cardiology, emergency medicine, and epidemiology) that have provided international acceptance of cardiac troponin as the standard biomarker for use in the diagnosis and management of patients with acute coronary syndrome. In an additional paradigm shift, natriuretic peptides have come to be accepted for use in the diagnosis, management, and risk assessment of heart failure patients. More recently, the role of genomics has been shown by the introduction of basic-science findings into clinical practice, a trend that will only continue to evolve and that will carry substantial implications for future guidelines directed at early detection and therapy, and the ultimate goal of improving patient outcomes.

The articles in this special issue address 3 primary areas. The first area is the evolving role of analytically improved and better-characterized cardiac troponin assays, as has been demonstrated by the growing number of high-sensitivity assays (1). High-sensitivity cardiac troponin assays have improved the early diagnostic accuracy for acute myocardial infarction (2, 3), the assessment of risk outcomes for acute coronary syndromes (4), and the prediction of cardiovascular risk in the community (5, 6). As assays become more analytically sensitive, the importance of serial changes (8) in cardiac troponin concentrations over time is being studied (2, 7, 8).

The second area addressed in this special issue is the role of natriuretic peptides (9–12) and other emerging biomarkers (13–17) for optimizing clinical diagnostics and outcomes in patients with heart failure.

The third area of focus is genomics and heart disease. This area addresses multiple topics, including cardiovascular sequencing, transcriptomics, and epigenetics (18); general genomics (19); metabolomics (21); and PCSK9 and LDL cholesterol responses from the JUPITER trial (22).

In addition to reviews and reports of original research, this special issue contains 3 opinion articles on biomarkers of vulnerable plaque (23), clopidogrel and CYP2C19 testing (24), and the controversy of whether the mechanism of release of cardiac troponin into the circulation is caused by reversible or irreversible injury (25); a Q&A on the challenges that in vitro diagnostics companies face in obtaining US Food and Drug Administration 510(k) clearance for biomarkers such as cardiac troponin; a Perspective on a novel technology for measuring cumulative cardiac biomarker exposure (26); 2 Point/Counterpoint features; and 3 editorials.

Finally, this special issue highlights the human side of the scientific study of cardiovascular disease. Ladenson (27) gives us a historical reflection on the evolution of cardiac biomarkers for the detection of acute myocardial infarction, and an interview with Dr. Eugene Braunwald (28) captures the essence of the life of a man who has demonstrated a great zeal for life and served as a role model for growing interdisciplinary partnerships between cardiology and laboratory medicine. In other words, there is something for everyone in this issue on the impact of biomarkers, proteomics, and genomics in cardiovascular disease.

Author Contributions: All authors confirmed they have contributed to the intellectual content of this paper and have met the following 3 requirements: (a) significant contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (b) drafting or revising the article for intellectual content; and (c) final approval of the published article.

Authors’ Disclosures or Potential Conflicts of Interest: Upon manuscript submission, all authors completed the Disclosures of Potential Conflict of Interest form. Potential conflicts of interest:
Introduction

Employment or Leadership: F.S. Apple, Clinical Chemistry, AACC; D.A. Morrow, Clinical Chemistry, AACC; S. Blankenberg, guest editor, Clinical Chemistry, AACC.

Consultant or Advisory Role: F.S. Apple, Instrumentation Laboratory, Alere, Abbott Diagnostics, and T2 Biosystems; D.A. Morrow, Beckman Coulter, Critical Diagnostics, Instrumentation Laboratory, Ortho Clinical Diagnostics, Roche, and Siemens.

Stock Ownership: None declared.

Research Funding: Siemens, Radiometer, Alere, Abbott Diagnostics, and Roche.

Expert Testimony: None declared.

References