Book Review

Cardiac Biomarkers: Expert Advice for Clinicians

Cardiac Biomarkers: Expert Advice for Clinicians, published in 2012, is a timely, comprehensive, highly informative review of this continuously moving field, which is still of immediate interest to clinicians. It offers critical insights into the pathophysiology and clinical interpretation of cardiac biomarkers and also covers relevant aspects for the clinical chemist. It summarizes the current state-of-the-art markers of cardiac risk, cardiac ischemia, cardiac dysfunction and kidney injury, and looks towards the future, dealing with markers that may make it from research to routine use.

Alan Maisel is one of the major experts in the field of cardiac natriuretic peptide research of recent years and has edited an excellent book. He managed to compile a well-considered series of chapters with the help of renowned contributors of whom many are opinion leaders in their respective fields. Cardiac biomarkers have permeated our hospitals, and this book is directed towards all readers interested in a review of the state-of-the-art of current routine and possible future cardiac biomarkers, and all readers interested in a deeper understanding of the pathophysiology and clinical use of cardiac biomarkers.

In his preface, Maisel describes the spirit of the construction of the book as “expert advice for clinicians”. Biomarkers are never standalone tests, and there are always caveats and learning curves, and therefore, “biomarkers will make a bad doctor worse and a good doctor better.” Obviously, the purpose of this book is “to make good doctors better” by providing the background information on the interpretation of cardiac biomarkers in everyday clinical practice.

The book is divided into several sections (Box 1): markers of cardiovascular risk; markers of acute coronary syndromes; natriuretic peptides; novel markers of renal injury; and a final section on the promising potential of future biomarkers. In the first section on markers of cardiac risk, after a general overview on available routine markers, a separate chapter summarizes the available literature on an increasingly popular marker of risk stratification, that is, oxidized phospholipids on Apo B-100-containing lipoproteins, the assay for which still needs standardization of methodology.

This biomarker is discussed in relation to lipoprotein(a), lipoprotein-associated phospholipase A₂ and secretory phospholipase A₂. The section on markers in acute coronary syndromes focuses on high-sensitivity cardiac troponin assays. It also reviews potential markers of myocardial ischemia and markers of plaque rupture, which are not all ready for routine use yet. The section on natriuretics covers all relevant aspects from evaluation of the patient with acute shortness of breath to treatment guidance in heart failure, summarizing the available literature and extracting decision limits for translating the literature into routine practice. The next section starts with an overview of cardiorenal syndromes and introduces newer markers of renal injury and function, for example neutrophil gelatinase-associated lipocalin and cystatin C, with potential future applications in heart failure. The final section introduces novel markers, including adrenomedullin, copeptin, galectin-3 and ST-2.

Sample excerpt

Criteria for a clinically useful biomarker were outlined as follows:

- “The assay should be accurate and reproducible with good stability of the analyte, fast turnaround time, and a reasonable cost profile. Second, the biomarker should provide information that improves upon existing data and tests, as evidenced by multiple studies confirming an association between the marker and the outcome or disease, and with validated decision cut-points. Finally, use of the biomarker should in some way contribute to improved patient care.” (chapter 1, page 1).

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Box 1. List of contents.

Section 1: Markers of Cardiac Risk

1. Daniels LB. Overview of Markers of Cardiac Risk.
2. Taleb A, Tsimikas S. The OxPL/apoB Assay: A Predictor of Cardiovascular Disease and Events.

Section 2: Markers of Cardiac Ischemia

3. Tuy T, Peacock WF. Diagnosis and Risk Stratification in Acute Coronary Syndrome.
4. Wu AHB. Laboratory Perspective on Biomarkers for Acute Coronary Syndromes.
5. Jaffe AS. Hypersensitive Troponins.
6. Kohli PK, Morrow DA. Evolving Biomarkers for Cardiac Ischemia.

Section 3: Natriuretic Peptides for Heart Failure

7. Xue Y, Iqbal N, Fard A, Maisel AS. Natriuretic Peptides in Patients with Shortness of Breath.
8. Fard A, Taub PR, Iqbal N, Maisel AS. Natriuretic Peptides in the Hospital Risk Stratification and Treatment Titration.
9. McDivitt A, Slavin L, Richards M, Maisel AS. Natriuretic Peptides in the Outpatient Setting.

Section 4: Biomarkers in Cardiorenal Disease

10. Cruz DN, Kaushik M, Ronco C, Maisel AS. Cardiorenal Syndromes.
11. Fard A, Iqbal N, Mehta RL, Xue Y, Maisel AS. Assessing Kidney Injury in Heart Failure: The Role of Biomarkers.

Section 5: Looking towards the Future

12. Parissis JT, Maisel AS, Filippatos GS. Adrenomedullin.
13. de Boer RA, Meissner M, van Veldhuisen DJ. Galectin-3.
14. Gaggin HM, Januzzi JL Jr. ST-2.
15. Morgenthaler NG. Copeptin.

Some reading impressions

The chapters are easy to read, and the figures are well-designed and permit a better understanding of the text. References are recent and plentiful. The authors are definitely experts in their topics. The chapters on acute coronary syndromes could have been written with an even stronger focus on how to use markers in everyday clinical practice with more detailed suggestions on decision limits, sampling regimens and algorithms for routine use despite continuing uncertainties in this field.

Good citations

- “Except for the presence of left arm pain, a history of typical chest pain was not helpful in the diagnosis for patients older than 75 years of age who suffered from acute coronary syndromes.” (chapter 3, page 45);
- “The exclusion of MI does not complete the evaluation in patients with potential unstable angina, which by definition has no marker evidence of necrosis.” (chapter 3, page 55);
- “A major problem for commercial troponin I assays is lack of standardization. Results between testing platforms were proportionally biased by as much as 30-fold.” (chapter 4, page 67);
- “The novel hypersensitive troponin assays will also likely identify additional patients not detected by the contemporary assays.” (chapter 5, page 79);
- “The increased sensitivity of hypersensitive troponin assays will inevitably give rise to an increased number of chronic elevations and more acute elevations not due to acute ischemic heart disease as well.” (chapter 5, page 81);
- “Natriuretic peptides have revolutionized the evaluation of patients with acute dyspnea.” (chapter 7, page 126);
- “To optimally use natriuretic peptides in practice, the clinician must be aware of the differential diagnosis of natriuretic peptide elevations.” (chapter 8, page 135);
- “Patients <75 year old with reduced LVEF appear to have a significant survival benefit from NP-guided outpatient therapy.” (chapter 9, page 146);
- “Patients who are at highest risk of cardiorenal syndromes are the ones who are

receiving suboptimal therapy and experience poor control of risk factors.” (chapter 10, page 157);

- *“Despite their widespread use, BUN and creatinine are far from ideal and can lead to inaccuracies.”* (chapter 11, page 171);
- *“Of the novel renal biomarkers being researched today, NGAL seems to have the strongest body of evidence and the greatest potential.”* (chapter 11, page 174).

Conclusion

Overall, the editor has succeeded in compiling an excellent book on cardiac biomarkers and has achieved the book’s goal of helping “make good doctors better” after reading it.

It is an important addition to the libraries of those who wish to gain a deeper understanding on the use of contemporary and future cardiac biomarkers. It also reviews relevant aspects for the clinical chemist.

Financial & competing interests disclosure

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No writing assistance was utilized in the production of this manuscript.