Biomarkers in Disease: Methods, Discoveries and Applications

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In the past decade there has been a sea change in the way disease is diagnosed and investigated due to the advent of high throughput technologies, such as microarrays, lab on a chip, proteomics, genomics, lipomics, metabolomics, etc. These advances have enabled the discovery of new and novel markers of disease relating to autoimmune disorders, cancers, endocrine diseases, genetic disorders, sensory damage, intestinal diseases, etc. In many instances these developments have gone hand in hand with the discovery of biomarkers elucidated via traditional or conventional methods, such as histopathology or clinical biochemistry. Together with microprocessor-based data analysis, advanced statistics and bioinformatics these markers have been used to identify individuals with active disease or pathology as well as those who are refractory or have distinguishing pathologies. Unfortunately techniques and methods have not been readily transferable to other disease states and sometimes diagnosis still relies on single analytes rather than a cohort of markers. Furthermore, the discovery of many new markers have not been put into clinical practice, partly because of their cost and partly because some scientists are unaware of their existence or the evidence is still at the preclinical stage. In some cases the work needs further scientific scrutiny. There is thus a demand for a comprehensive and focused evidenced-based text and scientific literature that addresses these issues. Hence the formulation of *Biomarkers in Disease: Methods, Discoveries and Applications*. The series covers a wide number of areas including for example, nutrition, cancer, endocrinology, cardiology, addictions, immunology, birth defects, genetics and so on. The chapters are written by national or international experts and specialists.

**Series Titles**

1. General Methods in Biomarker Research and Their Applications
2. Biomarkers in Cancer
3. Biomarkers in Cardiovascular Disease
4. Biomarkers in Kidney Disease
5. Biomarkers in Bone Disease
6. Biomarkers in Liver Disease

More information about this series at [http://www.springer.com/series/13842](http://www.springer.com/series/13842)
Biomarkers in Cardiovascular Disease

With 213 Figures and 138 Tables
In the present volume, *Biomarkers in Cardiovascular Disease*, we have sections on

- **General Aspects**
- **Circulating and Body Fluid Biomarkers**
- **Specific Diseases and Conditions**
- **Molecular, Cellular, and Histological Variables**
- **Functional and Structural Variables**

While the Editors recognize the difficulties in assigning particular chapters to particular sections, the book has enormously wide coverage and includes the following areas, analytes, and conditions: testing pharmacological profiles, multiple biomarkers, use in functional foods, the extracellular matrix and collagen, PCSK9, vasoactive peptide urotensin II, fetuin-A, cholinesterase, triglycerides, high density lipoprotein-c, heart-type fatty acid binding protein (H-FABP), uncarboxylated matrix Gla protein, microRNAs, troponin, vascular endothelial growth factor-1, macrophage metalloprotease (MMP)-12, homocysteine, neutrophil gelatinase associated lipocalin (NGAL), testosterone and dihydrotestosterone, leukotrienes, 8-isoprostane, irisin, adiponectin, lipids and lipoproteins, gamma glutamyltransferase (GGT), plasma factor VIII levels, RhoA/Rho-associated kinase, polymorphisms in the vitamin D pathway, nitric oxide regulating proteins, genomics and proteomics, stem cells, virtual histology (VH), coronary plaque composition, pulse pressure and pulse pressure amplification, ventricular activation time, neutrophils, computed tomography, histology, blood flow velocity, myocardial blood, cerebral blood flow, functional transcranial Doppler ultrasound, epicardial fat thickness, electrocardiographic markers, J wave and fragmented QRS formation, intravascular ultrasound, and magnetic resonance, atrial fibrillation, chronic heart failure, abdominal aortic aneurysm, arrhythmias, resynchronization therapy, venous thromboembolism, carotid artery stenting, coronary artery disease, sudden cardiac death, diabetes, cirrhosis, and portal hypertension.

There are also many other analytes and conditions described within this volume.

Finally, the last chapter is devoted to locating resource material for biomarker discovery and applications.
The chapters are written by national or international experts and specialist. This book is specifically designed for clinical biochemists, cardiologists, cardiovascular health scientists, epidemiologists, and doctors and nurses, from students to practitioners at the higher level. It is also designed to be suitable for lecturers and teachers in health care and libraries as a reference guide.

April 2015
London

Vinood B. Patel
Victor R. Preedy
In the past decade, there has been a sea change in the way disease is diagnosed and investigated due to the advent of high-throughput technologies and advances in chemistry and physics, leading to the development of microarrays, lab-on-a-chip, proteomics, genomics, lipomics, metabolomics, etc. These advances have enabled the discovery of new and novel markers of disease relating to autoimmune disorders, cancers, endocrine diseases, genetic disorders, sensory damage, intestinal diseases, and many other conditions too numerous to list here. In many instances, these developments have gone hand in hand with the discovery of biomarkers elucidated via traditional or conventional methods, such as histopathology, immunoassays, or clinical biochemistry. Together with microprocessor-based data analysis, advanced statistics, and bioinformatics these markers have been used to identify individuals with active disease as well as those who are refractory or have distinguishing pathologies.

Unfortunately, techniques and methods have not been readily transferable to other disease states, and sometimes diagnosis still relies on a single analyte rather than a cohort of markers. Furthermore, the discovery of many new markers has not been put into clinical practice partly because of their cost and partly because some scientists are unaware of their existence or the evidence is still at the preclinical stage. There is thus a demand for a comprehensive and focused evidenced-based text and scientific literature that addresses these issues. Hence the book series **Bio-markers in Disease: Methods, Discoveries and Applications**. It imparts holistic information on the scientific basis of health and biomarkers and covers the latest knowledge, trends, and treatments. It links conventional approaches with new platforms. The ability to transcend the intellectual divide is aided by the fact that each chapter has:

- **Key Facts (areas of focus explained for the lay person)**
- **Definitions of Words and Terms**
- **Potential Applications to Prognosis, Other Diseases, or Conditions**
- **Summary Points**

The material in **Potential Applications to Prognosis, Other Diseases, or Conditions** pertains to speculative or proposed areas of research, cross-transference to
other diseases or stages of the disease, translational issues, and other areas of wide applicability.

The Series is expected to prove useful for clinicians, scientists, epidemiologists, doctors, and nurses, and also academicians and students at an advanced level.

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Victor R. Preedy
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Dr. Vinood B. Patel, B.Sc., Ph.D., FRSC is currently a Reader in Clinical Biochemistry at the University of Westminster and honorary fellow at King’s College London. He presently directs studies on metabolic pathways involved in liver disease, particularly related to mitochondrial energy regulation and cell death. Research is being undertaken to study the role of nutrients, antioxidants, phytochemicals, iron, alcohol, and fatty acids in the pathophysiology of liver disease. Other areas of interest are identifying new biomarkers that can be used for diagnosis and prognosis of liver disease, understanding mitochondrial oxidative stress in Alzheimer’s disease, and gastrointestinal dysfunction in autism. Dr. Patel graduated from the University of Portsmouth with a degree in Pharmacology and completed his Ph.D. in Protein Metabolism from King’s College London in 1997. His postdoctoral work was carried out at Wake Forest University Baptist Medical School studying structural-functional alterations to mitochondrial ribosomes, where he developed novel techniques to characterize their biophysical properties. Dr. Patel is a nationally and internationally recognized liver researcher and was involved in several NIH-funded biomedical grants related to alcoholic liver disease. Dr. Patel has edited biomedical books in the area of nutrition and health prevention, autism, and biomarkers and has published over 150 articles, and in 2014 he was elected as a Fellow to The Royal Society of Chemistry.

Victor R. Preedy B.Sc., Ph.D., D.Sc., FRSB, FRSH, FRIPH, FRSPH, FRCPath, FRSC is a senior member of King’s College London (Professor of Nutritional Biochemistry) and King’s College Hospital (Professor of Clinical Biochemistry; Honorary). He is attached to both the Diabetes and Nutritional Sciences Division and the Department of Nutrition and Dietetics. He is also founding and
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