
The Handbook of Biomarkers

Kewal K. Jain

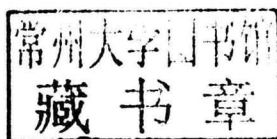


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The Handbook of Biomarkers

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The Handbook of Biomarkers

Preface

This book is an overview of the state of the art of biomarkers. A biomarker is a characteristic that can be objectively measured and evaluated as an indicator of a physiological as well as a pathological process or response to a therapeutic intervention. Although there is nothing new about biomarkers such as glucose for diabetes and blood pressure for hypertension, the current focus is on molecular biomarkers, which have taken the center stage in the development of molecular medicine. Molecular diagnostic technologies have enabled the discovery of molecular biomarkers and are helping in the definition of their role in the pathomechanism of disease. Biomarkers form the basis of development of diagnostic assays as well as targets for drug discovery. Effect of drugs, in clinical trials as well as in practice, can be monitored by biomarker assays.

There is a tremendous amount of literature on biomarkers, but there is no comprehensive source of information on the topic. Of the thousands of biomarkers that are being discovered, relatively few are being validated for further applications, and it is difficult to evaluate the potential of a biomarker. This book describes different types of biomarkers and their discovery using various “-omics” technologies such as proteomics and metabolomics along with the background information for evaluations of biomarkers as well as the procedures for their validation and use in clinical trials. Biomarkers are first described according to technologies and then according to various diseases. An important feature is the correlation between diseases and classifications of biomarkers, which provides the reader with a guide to sort out current and future biomarkers.

This book would be an important source of information on biomarkers for scientists as well as physicians and those involved in drug discovery and development. Many of the regulatory issues concerning biomarkers are related to proteomics, molecular diagnostics, and pharmacogenomics/pharmacogenetics. By facilitating the combination of therapeutics with diagnostics, biomarkers will play an important role in the development of personalized medicine, which is an important emerging trend in health care.

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List of Abbreviations

2D GE	2-dimensional gel electrophoresis
AD	Alzheimer disease
BNP	B-type natriuretic peptide
CHF	congestive heart failure
CNS	central nervous system
CRADA	cooperative research and development agreement (between a US federal laboratory and one or more non-federal parties)
CRP	C-reactive protein
CSF	cerebrospinal fluid
CT	computer tomography
EGFR	epithelial growth factor receptor
ELISA	enzyme-linked immunosorbent assay
EST	expressed sequence tags
FDA	Food and Drug Administration, USA
FISH	fluorescent in situ hybridization
FMRI	functional magnetic resonance imaging
GC	gas chromatography
GFAP	glial fibrillary acidic protein
GWAS	genome-wide association study
Hs-CRP	high-sensitivity C-reactive protein
IHC	immunohistochemistry
IL	interleukin
LC	liquid chromatography
LCM	laser capture microdissection
LDH	lactic dehydrogenase
Lp-PLA2	lipoprotein-associated phospholipase A2
MALDI	matrix-assisted laser desorption/ionization
MALDI-MS	matrix-assisted laser desorption mass spectrometry
MCP-1	monocyte chemoattractant protein-1
miRNA	microRNA
MRI	magnetic resonance imaging
MS	mass spectrometry
mtDNA	mitochondrial DNA

NCI	National Cancer Institute
NIH	National Institutes of Health, USA
NMR	nuclear magnetic resonance
NO	nitric oxide
PCR	polymerase chain reaction
PET	positron emission tomography
PKC	protein kinase C
POC	point of care
PPAR	peroxisome proliferator-activator receptor
PSA	prostate-specific antigen
PSMA	prostate-specific membrane antigen
RCAT	Rolling circle amplification technology
RNAi	RNA interference
RT-PCR	real-time PCR
SELDI-TOF	surface-enhanced laser desorption and ionization-time of flight
sICAM-1	soluble intercellular adhesion molecule-1
SNP	single nucleotide polymorphisms
SPR	surface plasma resonance
USPTO	United States Patent & Trademark Office

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