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Expert laboratory and clinical researchers from around the world review how to design and evaluate studies of tumor markers and examine their use in breast cancer patients. The authors cover both the major advances in sophisticated molecular methods and the state-of-the-art in conventional prognostic and predictive indicators. Among the topics discussed are the relevance of rigorous study design and guidelines for the validation studies of new biomarkers, gene expression profiling by tissue microarrays, adjuvant systemic therapy, and the use of estrogen, progesterone, and epidermal growth factor receptors as both prognostic and predictive indicators. Highlights include the evaluation of HER2 and EGFR family members, of p53, and of UPA/PAI-1; the detection of rare cells in blood and marrow; and the detection and analysis of soluble, circulating markers.

Despite significant advances in cancer treatment and measures of neoplastic progression, drug effect (or early detection, overall cancer incidence has increased, pharmacodynamic markers), and markers that measure cancer-associated morbidity is considerable, and overall prognosis as well as predict responses to specific therapy. cancer survival has remained relatively flat over the past All these biomarkers have the potential to greatly augment several decades (1,2). However, new technology the development of successful chemoprevention therapies, allowing exploration of signal transduction pathways, but two specific types of biomarkers will have the most identification of cancer-associated genes, and imaging of immediate impact on successful chemopreventive drug tissue architecture and molecular and cellular function is development—those that measure the risk of developing increasing our understanding of carcinogenesis and cancer invasive life-threatening disease, and those whose mo- progression. This knowledge is moving the focus of cancer lation can “reasonably predict” clinical benefit and, therapeutics, including cancer preventive treatments, to therefore, serve as surrogate endpoints for later-occurring drugs that take advantage of cellular control mechanisms clinical disease. Thus far, the biomarker that best measures to selectively suppress cancer progression. these two phenomena is intraepithelial neoplasia (IEN) Carcinogenesis is now visualized as a multifocal, because it is a near obligate precursor to cancer.

Tools, techniques, and progress in cancer biomarkers discovery The completion of a number of gene sequencing projects, recent advances in genomic and proteomic technologies, and the availability of powerful bioinformatics tools have led to promising new avenues and approaches in the search for cancer biomarkers. This book provides a comprehensive overview of current methodologies and technologies. It discusses biomarker discovery as a whole, rather than focusing on one specific marker or cancer. With information on both existing and potential biomarkers, Cancer Biomarkers: Analytical Techniques for Discovery: * Provides insights into the current technological platforms for biomarker discovery, including mass spectrometry combined with multidimensional chromatography, DIGE, and various chip technologies * Includes a detailed discussion of protein networks and protein phosphorylation in cancer * Details the use of imaging mass spectrometry, laser capture microdissection, serial analysis of gene expression, enzyme-linked immunosorbent assays, protein microarrays, antibody-based microarrays, and bioinformatics * Covers the emerging role of surface-enhanced laser desorption ionization (SELDI) and various tagging and labeling strategies * Discusses related regulatory and ethical issues With a wealth of information that can be applied to a broad spectrum of biomarker research projects, this is a core reference for biomarker researchers, scientists working in proteomics and bioinformatics, pharmaceutical scientists, oncologists, biochemists, biologists, and chemists.

This book offers a comprehensive introduction to translational efforts in breast cancer, addressing the latest approaches to precision medicine based on the current state of understanding of breast cancer. With the latest developments in breast cancer research, our understanding of the genomic changes and the oncogenic signaling cascade of breast cancer has made considerable strides. Further, the immuno-environment has been demonstrated as the barrier to clinical cancer. In addition, major advances in cancer biology, immunology, genomics and metabolism have broken new ground for designing therapeutic approaches and selecting appropriate treatments on the basis of more precise information on the individual patient. As a result of these two trends, a clearer picture of the molecular landscape of breast cancers has facilitated the development of diagnostic, prognostic and predictive biomarkers for clinical oncology. All these aspects are addressed in this volume, which offers a comprehensive resource for researchers, graduate students and oncologists in cancer research.

Developments in radiation oncology have been key to the tremendous progress made in the field in recent years. The combination of optimal systemic treatment and local therapy has resulted in continuing improved outcomes of cancer therapy. This progress forms the basis for current pre-clinical and clinical research which will strengthen the position of radiation oncology as an essential component of oncological care. This book summarizes recent advances in radiotherapy research and clinical patient care. Topics include radiobiology, radiotherapy technology, and particle therapy. Chapters cover a summary and analysis of recent developments in the search for biomarkers for precision radiotherapy, novel imaging possibilities and treatment planning, and advances in understanding the differences between photon and particle radiotherapy. Advances in Radiation Therapy is an invaluable source of information for scientists and clinicians working in the field of radiation oncology. It is also a relevant resource for those interested in the broad topic of radiotherapy in general.

Colorectal cancer (CRC) is a major global health challenge as the third leading cause for cancer related mortalities worldwide. Despite advances in therapeutic strategies, the five-year survival rate for CRC patients has remained the same over time due to the fact that patients are often diagnosed in advanced metastatic stages. Drug resistance is another common reason for poor prognosis. Researchers are now developing advanced therapeutic strategies such as immunotherapy, targeted therapy, and combination nanotechnology for drug delivery. In addition, the identification of new biomarkers will potentiate early stage diagnosis. This book is the second of three volumes on recent developments in colorectal diagnosis and therapy. Each volume can be read on its own, or together. Each volume focuses on different novel therapeutic advances, biomarkers, and identifies therapeutic targets for treatment. Written by leading international experts in the field, coverage addresses the role of diet habits and lifestyle in reducing gastrointestinal disorders and incidence of CRC. Chapters discuss current and future diagnostic and therapeutic options for colorectal cancer patients, focusing on immunotherapeutics, nanomedicine, biomarkers, and dietary factors for the effective management of colon cancer.

Advances in Cancer Research, Volume 150, the latest release in this ongoing series, covers the relationship(s) between autophagy and senescence, how they are defined, and the influence of these cellular responses on tumor dormancy and disease recurrence. Specific sections in this new release include Autophagy and senescence, converging roles in pathophysiology, Cellular senescence and tumor promotion: role of the unfolded protein response, autophagy and senescence in cancer stem cells, Targeting the stress support network regulated by autophagy and senescence for cancer treatment, Autophagy and PTEN in DNA damage-induced senescence, mTOR as a senescence manipulation target: A forked road, and more. Addresses the relationship between autophagy and senescence in cancer therapy Covers autophagy and senescence in tumor dormancy Explores autophagy and senescence in disease recurrence

Prostate cancer is the most frequent genitourinary malignancy that garners significant medical and media attention. Over the past decade significant new discoveries have been made that have enabled substantial improvements in screening, diagnosis and management of this disease. Importantly, there has been constant evolution of the best way to treat these patients. This text will provide a single, comprehensive reference source that incorporates all the latest information regarding prostate cancer. It will serve as an easy reference source for researchers, clinicians, individuals in training, allied health professionals and medical students regarding prostate cancer by focusing on the controversial points of debate. New data regarding PSA screening, prostate cancer biomarkers, diagnostic evaluation techniques, surveillance protocols, and treatment interventions for localized and more advanced disease will be discussed. Gaps in current knowledge and areas for future research will be highlighted. Ongoing important clinical trials which could imminently yield significant new knowledge will be discussed. Uniquely to all of the above will be the clinical scenario-based format of this text. For the practicing physician, the prostate cancer screening and treatment situations will hopefully become better understood. We will incorporate key educational concepts in the framework of patient situations with evidence-based discussions of screening, diagnosis, evaluation, and therapeutic management. To provide even more insight, we plan on a comment section from leaders in the field that will be more “opinion-based” allowing the reader to get access to experienced physicians’ thought processes and practice patterns. All chapters will be authored by experts in their respective fields and incorporate original figures and illustrations to the extent possible. We anticipate that this book will quickly become the ready reference source for professionals and students in various fields with an interest in the management of a complex and multifaceted disease such as prostate cancer. The book will be comprehensive and encompass the entire the spectrum of prostate cancer. The information will be presented in a succinct and easily understandable manner so as to appeal to both scientists and clinicians.

Involved in nearly every therapeutic area, particularly cancer, biomarkers have experienced tremendous advances since the first edition of this book, both in the discovery of biomarkers and in their applications. To aid in this imperative research, Prof. Kewal K. Jain’s Handbook of Biomarkers, Second Edition features a full revision and additional chapters to thoroughly describe many different types of biomarkers and their discovery using various "-omics" technologies, along with the background information needed for the evaluation of biomarkers as well as the essential procedures for their validation and use in clinical trials. With biomarkers described first according to technologies and then according to various diseases, this detailed book features the key correlations between diseases and classifications of biomarkers, which provides the reader with a guide to sort out current and future biomarkers. Comprehensive and cutting-edge, The Handbook of Biomarkers, Second Edition serves as a vital guide to furthering our understanding of biomarkers, which, by facilitating the combination of therapeutics with diagnostics, promise to play an important role in the development of personalized medicine, one of the most important trends in healthcare today.

Early diagnosis of cancer and other non-oncological disorders gives a significant advantage for curing the disease and improving patient’s life expectancy. Recent advances in biosensor-based techniques which are designed for specific biomarkers can be exploited for early diagnosis of diseases. Biosensor Based Advanced Cancer Diagnostics covers all available biosensor-based approaches and comprehensive technologies; along with their application in diagnosis, prognosis and therapeutic management of various oncological disorders. Besides this, current challenges and future aspects of these diagnostic approaches have also been discussed. This book offers a view of recent advances and is also helpful for designing new biosensor-based technologies in the field of medical science, engineering and biomedical technology. Biosensor Based Advanced Cancer Diagnostics helps biomedical engineers, researchers, molecular biologists, oncologists and clinicians with the development of point of care devices for disease diagnostics and prognostics. It also provides information on developing user friendly, sensitive, stable, accurate, low cost and minimally invasive modalities which can be adopted from lab to clinics. This book covers in-depth knowledge of disease biomarkers that can be exploited for designing and development of a range of biosensors. The editors have summarized the potential cancer biomarkers and methodology for their detection, plus transferring the developed system to clinical application by miniaturization and required integration with microfluidic systems. Covers design and development of advanced platforms for rapid diagnosis of cancerous biomarkers Takes a multidisciplinary approach to sensitive transducers development, nano-enabled advanced imaging, miniaturized analytical systems, and device packaging for point-of-care applications Offers an insight into how to develop cost-effective diagnostics for early detection of cancer

Advances in Cancer Research provides invaluable information on the exciting and fast-moving field of cancer research. Here, once again, outstanding and original reviews are presented on a variety of topics.

The Advances in Cancer Research series provides invaluable information on the exciting and fast--moving field of cancer research. This volume stands as the first ever thematic volume in the series, focusing on the topic of genomics in cancer drug development. The chapters included in this book represent the cutting-edge information in the field and span such topics as Mass Spectrometry: Uncovering the Cancer Proteome for Diagnostics; Biomarker Discovery in Epithelial Ovarian Cancer by Genomic Approaches; The Application of siRNA Technology to Cancer Biology Discovery; Ribozyme Technology for Cancer Gene Target Identification and Validation; Cancer Cell-Based Genomic and

Small Molecule Screens; Tumour Antigens as Surrogate Markers and Targets for Therapy and Vaccines; Practices and Pitfalls of Mouse Cancer Models in Drug Discovery; Biomarker Assay Translation from Discovery to Clinical Studies in Cancer Drug Development – Quantification of Emerging Protein Biomarkers; Molecular Optical Imaging of Therapeutic Targets of Cancer; Cancer Drug Approval in the United States, Europe and Japan.

In the past decade there has been a major 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. New analytical methods that have been used to identify markers of disease and is suggested that there may be as many as 40 different platforms. 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. 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. 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.

Research has long sought to identify biomarkers that could detect cancer at an early stage, or predict the optimal cancer therapy for specific patients. Fueling interest in this research are recent technological advances in genomics, proteomics, and metabolomics that can enable researchers to capture the molecular fingerprints of specific cancers and fine-tune their classification according to the molecular defects they harbor. The discovery and development of new markers of cancer could potentially improve cancer screening, diagnosis, and treatment. Given the potential impact cancer biomarkers could have on the cost effectiveness of cancer detection and treatment, they could profoundly alter the economic burden of cancer as well. Despite the promise of cancer biomarkers, few biomarker-based cancer tests have entered the market, and the translation of research findings on cancer biomarkers into clinically useful tests seems to be lagging. This is perhaps not surprising given the technical, financial, regulatory, and social challenges linked to the discovery, development, validation, and incorporation of biomarker tests into clinical practice. To explore those challenges and ways to overcome them, the National Cancer Policy Forum held the conference "Developing Biomarker-Based Tools for Cancer Screening, Diagnosis and Treatment: The State of the Science, Evaluation, Implementation, and Economics" in Washington, D.C., from March 20 to 22, 2006. At this conference, experts gave presentations in one of six sessions. In addition, seven small group discussions explored the policy implications surrounding biomarker development and adoption into clinical practice. Developing Biomarker-based Tools for Developing Cancer Screening, Diagnosis, and Treatment: The State of the Science, Evaluation, Implementation, and Economics-Workshop Summary presents the conference proceedings and will be used by an Institute of Medicine (IOM) committee to develop consensus-based recommendations for moving the field of cancer biomarkers forward.

This book offers a comprehensive overview of the development and application of microfluidics and biosensors in cancer research, in particular, their applications in cancer modeling and theranostics. Over the last decades, considerable effort has been made to develop new technologies to improve the diagnosis and treatment of cancer. Microfluidics has proven to be a powerful tool for manipulating biological fluids with high precision and efficiency and has already been adopted by the pharmaceutical and biotechnology industries. With recent technological advances, particularly biosensors, microfluidic devices have increased their usefulness and importance in oncology and cancer research. The aim of this book is to bring together in a single volume all the knowledge and expertise required for the development and application of microfluidic systems and biosensors in cancer modeling and theranostics. It begins with a detailed introduction to the fundamental aspects of tumor biology, cancer biomarkers, biosensors and microfluidics. With this knowledge in mind, the following sections highlight important advances in developing and applying biosensors and microfluidic devices in cancer research at universities and in the industry. Strategies for identifying and evaluating potent disease biomarkers and developing biosensors and microfluidic devices for their detection are discussed in detail. Finally, the transfer of these technologies into the clinical environment for the diagnosis and treatment of cancer patients will be highlighted. By combining the recent advances made in the development and application of microfluidics and biosensors in cancer research in academia and clinics, this book will be useful literature for readers from a variety of backgrounds. It offers new visions of how this technology can influence daily life in hospitals and companies, improving research methodologies and the prognosis of cancer patients.

Cancer is one of the major causes of death worldwide. Despite hundreds of clinical trials currently in progress for cancer patients, the success rate is still very low. Understanding the molecular aspects of cancer development, the discovery of new molecular targets and rational drug design on this molecular basis should help in discovering early cancer biomarkers as well as novel therapeutic drugs. This book describes various cancer topics on a molecular level and integrates information on the relationship between causes of cancer, cancer cell biology, metastasis, cancer prevention and drug design. This book should prove to be an extraordinary reference text for students, physicians and oncologists.

In recent years, thousands of cancer biomarkers have been discovered and described in scientific literature. The promise of personalized medicine, where diseases such as cancer are accurately diagnosed and treatments tailored specifically for individuals, is becoming a reality. Significant advances in biomarker-based research methodologies such as Next Generation Sequencing (NGS) are at the cusp of ushering in a new era of personal medicine. However, unlike the spectacular advances in research technologies for disease biomarker discovery, biomarker-based technologies that can effectively be used in the clinic (or point-of-care) to enable personalized medicine are still lacking. In this book, we feature a selection of emerging technologies which are aimed at enabling clinical applications of personalised medicine. Each of the eight chapters is written by a leading group at the intersection of microfluidics, biology, and nanotechnology. For instance, to accelerate a major bottleneck in the development of clinically useful protein diagnostics, we discuss the application of yeast-derived single chain Fragment variable (scFv) antibody-like molecules as a potential low cost alternative to traditional antibody-based diagnostics. Circulating tumour cells (CTCs) are an emerging class of cancer biomarkers and a potential resource for understanding cancer progression; we explore various strategies combining microfluidics with nanotechnology for capturing CTCs. The book includes an evaluation of some current and emerging technologies for detecting clinical DNA methylation, another potential cancer biomarker. As personalized medicine may involve tracking a patient's response to treatment, the application of microfluidics to detect metabolites in biological fluids is also discussed. Finally, the ultimate goal of personalized medicine is targeted therapy. One promising approach is RNAi technology which uses short nucleotides to disrupt cancer pathways. In this book, nanoparticle approaches to deliver these short nucleotides are discussed

The use of biomarkers in basic and clinical research has become routine in many areas of medicine. They are accepted as molecular signatures that have been well characterized and repeatedly shown to be capable of predicting relevant disease states or clinical outcomes. In Role of Biomarkers in Medicine, expert researchers in their individual field have reviewed many biomarkers or potential biomarkers in various types of diseases. The topics address numerous aspects of medicine, demonstrating the current conceptual status of biomarkers as clinical tools and as surrogate endpoints in clinical research. This book highlights the current state of biomarkers and will aid scientists and clinicians to develop better and more specific biomarkers for disease management.

At present there are a growing number of biomolecules under investigation to understand their potential role as cancer biomarker for diagnostic, prognostic and therapeutic purposes. Intriguingly, the state of art on cancer biomarkers research shows interesting and promising results together to clamorous failures. Also from a clinical point of view, there are contradictory results on routine clinical use of the present cancer biomarkers. Some patients may be simply monitored in their course by a periodic blood sample, but sometimes this monitoring shows dramatic limits. A lot of patients show serious and extensive relapses without significant change in serum concentrations of biomarkers tested. Often the physician who should utilize these biomarker does not entirely know their limits and the total potential applications as well and sometimes this knowledge is influenced by economical and marketing strategies. This limited and “polluted” knowledge may have dramatic consequences for patient. The aim of this book is to diffuse all aspects of cancer biomarkers, from their biochemical peculiarities to all clinical implications by passing through their physiology and pathophysiology. This critical approach towards old and new cancer biomarkers should foster a deepened and useful understanding of the diagnostic and prognostic index of these fundamental parameters of laboratory medicine and in the same time facilitating the research of new and more sensitive-specific signals of the cancer cell proliferation.

Colorectal cancer (CRC) is a major global health challenge as the third leading cause for cancer related mortalities worldwide. Despite advances in therapeutic strategies, the five-year survival rate for CRC patients has remained the same over time due to the fact that patients are often diagnosed in advanced metastatic stages. Drug resistance is another common reason for poor prognosis. Researchers are now developing advanced therapeutic strategies such as immunotherapy, targeted therapy, and combination nanotechnology for drug delivery. In addition, the identification of new biomarkers will potentiate early stage diagnosis. This book is the third of three volumes on recent developments in colorectal diagnosis and therapy. Each volume can be read on its own, or together. Each volume focuses on different novel therapeutic advances, biomarkers, and identifies therapeutic targets for treatment. Written by leading international experts in the field, coverage addresses the role of diet habits and lifestyle in reducing gastrointestinal disorders and incidence of CRC. Chapters discuss current and future diagnostic and therapeutic options for colorectal cancer patients, focusing on immunotherapeutics, nanomedicine, biomarkers, and dietary factors for the effective management of colon cancer.

This book describes various novel biomarkers for the early diagnosis of gastrointestinal (GI) cancers. It also highlights recent advances in understanding the role of molecular markers and biomarkers, such as volatile biomarkers, serum biomarkers, predictive and prognostic molecular markers for the early detection of GI cancers. Further, it discusses novel biomarkers, including circulating microRNAs, serum microRNA and plasma microRNA in GI cancer. The book presents breakthrough technologies like ultra-sensitive nano-chips, nanosensors, nanodevices, biosensors, electrochemical biosensors, optical biosensors, DNA biosensors, synthetic biology devices, and 'omics' technologies for the early diagnosis of gastrointestinal cancer. In addition it examines the potential of genome-wide association studies, big data analytics, computation biology, systems biology, and nanotechnology for early diagnostics and therapeutics for gastrointestinal cancer, with a focus on personalized cancer treatment. The book is a valuable source for researchers and clinicians engaged in detection and diagnosis of gastrointestinal cancers.

There has been tremendous progress in cancer diagnosis and treatment methodologies, and this book focuses on major cancers of the cervix, breast, endometrium, and the associated reproductive system affecting women. It focuses on specific diagnostic techniques and treatment strategies including computational tools, Nanomedicine, and the use of Machine Learning (ML), Artificial Intelligence (AI), Big Data, and other latest techniques, including the evolution of these treatments over the years. Oncologists, cancer scientists, and professionals will find using the content on cutting-edge interventions by experts in their field, significantly improving earlier diagnosis and treatment options. Key Features: • Helps to improve quality of life after treatment as the focus of healthcare is shifting from curative methods to primary prevention of diseases, screening methods and early detection and treatment. • Appeals to clinicians and residents interested in exploring cutting-edge technology for early diagnoses and treatment of women associated cancers. • Features a chapter on the Clinician’s perspective on advanced diagnostic and treatment methods.

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Prepared by world leaders on this topic, Biomarkers in Cancer Screening and Early Detection offers a comprehensive, state-of-the-art perspective on the various research and clinical aspects of cancer biomarkers, from their discovery and development to their validation, clinical utility, and use in developing personalized cancer treatment. Offers a comprehensive, state-of-the-art perspective on the various research and clinical aspects of cancer biomarkers Provides immediately actionable information – and hopefully also inspiration – to move discovery and clinical application forward Offers vital knowledge to help develop personalized cancer treatment for individual patients with specific cancers

This book sheds new light on research into liquid biopsy biomarkers for cancer screening. The chapters in the first half address exosomes, circulating cell-free DNA and autoantibodies, and main solid cancers, along with companion biomarkers – all of which serve as the basis for exploring key research questions for future clinical trials in the book’s second half. The study of biomarkers has evolved rapidly thanks to advances in precision medicine. While conventional cancer biomarker research is focused on proteomics or gene analysis of resected tissue, diagnostic markers have since

become significant in terms of gauging the effectiveness of molecularly targeted drugs or the likelihood of a favorable prognosis. In addition, conventional treatment strategy, which draws on archives of resected tissue samples, is now gradually being replaced by monitoring with the use of liquid biopsy, which is poised to become the new mainstream in molecular targeting therapy. The contributing authors discuss in detail biomarkers, molecular targets for treatment, monitoring markers to evaluate treatment responses, prognostic markers, and screening and early diagnosis. Accordingly, this excellent collection of texts will benefit not only oncologists, but also medical and biological researchers and pharmaceutical scientists involved in the latest cancer research.

Recent advances in precision medicine and immuno-oncology have led to highly specific and efficacious cancer therapies such as monoclonal antibodies and immune checkpoint inhibitors (ICIs). This book provides an up-to-date overview of advances in the field of immuno-oncology. Chapters cover such topics as ICIs and how they mount a robust immune response against cancer cells as well as the response of ICIs to treatment predictive biomarkers and their potential immune-related adverse events (irAEs). Additionally, the book includes a comprehensive review of the powerful FDA-approved therapeutic agent doxorubicin, highlighting the molecular mechanisms behind doxorubicin’s drug resistance and critical side effects.

Every patient is unique, and the evolving field of precision medicine aims to ensure the delivery of the right treatment to the right patient at the right time. In an era of rapid advances in biomedicine and enhanced understanding of the genetic basis of disease, health care providers increasingly have access to advanced technologies that may identify molecular variations specific to an individual patient, which subsequently can be targeted for treatment. Known as biomarker tests for molecularly targeted therapies, these complex tests have the potential to enable the selection of the most beneficial treatment (and also to identify treatments that may be harmful or ineffective) for the molecular underpinnings of an individual patient's disease. Such tests are key to unlocking the promise of precision medicine. Biomarker tests for molecularly targeted therapies represent a crucial area of focus for developing methods that could later be applicable to other areas of precision medicine. The appropriate regulatory oversight of these tests is required to ensure that they are accurate, reliable, properly validated, and appropriately implemented in clinical practice. Moreover, common evidentiary standards for assessing the beneficial impact of biomarker-guided therapy selection on patient outcomes, as well as the effective collection and sharing of information related to those outcomes, are urgently needed to better inform clinical decision making. Biomarker Tests of Molecularly Targeted Therapies examines opportunities for and challenges to the use of biomarker tests to select optimal therapy and offers recommendations to accelerate progress in this field. This report explores regulatory issues, reimbursement issues, and clinical practice issues related to the clinical development and use of biomarker tests for targeting therapies to patients. Properly validated, appropriately implemented biomarker tests hold the potential to enhance patient care and improve outcomes, and therefore addressing the challenges facing such tests is critical.

Many cancer patients are diagnosed at a stage in which the cancer is too far advanced to be cured, and most cancer treatments are effective in only a minority of patients undergoing therapy. Thus, there is tremendous opportunity to improve the outcome for people with cancer by enhancing detection and treatment approaches. Biomarkers will be instrumental in making that transition. Advances in biotechnology and genomics have given scientists new hope that biomarkers can be used to improve cancer screening and detection, to improve the drug development process, and to enhance the effectiveness and safety of cancer care by allowing physicians to tailor treatment for individual patients—an approach known as personalized medicine. However, progress overall has been slow, despite considerable effort and investment, and there are still many challenges and obstacles to overcome before this paradigm shift in oncology can become a reality.

miRNA and Cancer, Volume 135, the latest volume in the Advances in Cancer Research series, provides invaluable information on the exciting and fast-moving field of cancer research. This volume presents original reviews on research bridging oncology and gene expression, and includes specific chapters on Non-coding RNAs as Biomarkers of Cancer, The Enigma of microRNA Regulation in Cancer, Animal Models to Study microRNA functions, Non-coding RNAs and Cancer, microRNAs in Cancer Susceptibility, ts-RNAs versus microRNAs, microRNAs and AML, and microRNAs and Epigenetics. Provides information on cancer research Offers outstanding and original reviews on a range of cancer research topics Serves as an indispensable reference for researchers and students alike

Rising occurrences of various diseases and epidemics have pressurized the already-burdened health system across the globe, and this imposes an unprecedented challenge on our current research in identifying disease-specific biomarkers and molecular targets, in particular for cancers, neurological disorders and unexplained infertility. Despite decades of efforts in deciphering the fundamental biology underlying various diseases at discrete levels using an array of advanced technologies, attempts to identify reliable and disease-indicating markers for detection and biomolecules or cellular structures for targeting are still in vain. This monograph describes and discusses the updated findings in this field with a specific aim to compile prior and recent literature and from there to acquire some insights to facilitate future research to expand options of understanding, detecting and treating diseases. Among the many possible areas of biomedical research, this content comprises two themes: disease biomarkers and molecular targets. The book also covers topics that are more advanced in development to emerging scientific discoveries. In particular, this monograph includes concepts on the renovated use of oncofetal molecules in cancer prediction and treatment, the evolving development in cancer biology at the cellular and molecular levels and the recent involvement on new classes of molecules in diseases. This book renews established concepts in the field, and at the same time leads to important insights for research and development of drugs, diagnostics, and interventions for managing diseases of unmet medical needs.

Advances in Cancer Biomarkers Research provides a thorough and detailed description of cancer biomarkers for diagnostic, prognostic, and therapeutics of several cancer types. It presents a compendium of topics related to current advanced research along with fundamental knowledge, in order to help readers fully comprehend the field of cancer biomarkers. The book discusses topics such as the role of genetic mechanisms, epigenetics, DNA, and microRNA in different cancers; signaling pathways; and exosomes. In addition, it discusses biomarker research applied to several cancer types, such as head and neck, urological, lung, bone tumors, hematological and neurological malignancies, and breast cancers. It is a valuable resource for cancer researchers, oncologists, graduate students, and members of biomedical field who are interested in the potential of biomarkers in cancer research and treatment. Provides a unique combination of basic and latest advancements in the field of cancer biomarkers, with a strong interdisciplinary approach Presents an updated roadmap for researchers to enable them to learn the role of different biomarkers in cancer diagnosis and therapy, and easily apply the knowledge gained to their work Discusses the complex mechanisms and pathways associated with cancer biomarkers through case studies, examples, and illustrations to help readers to fully comprehend the content

Identification and development of cancer biomarkers and targets have greatly accelerated progress towards precision medicine in oncology. Studies of tumor biology have not only provided insights into the mechanisms underlying carcinogenesis, but also led to discovery of molecules that have been developed into cancer biomarkers and targets. Multi-platforms for molecular characterization of tumors using next-generation genomic sequencing, immunohistochemistry, in situ hybridization, and blood-based biopsies have greatly expanded the portfolio of potential biomarkers and targets. These cancer biomarkers have been developed for diagnosis, early detection, prognosis, and prediction of treatment response. The molecular targets have been exploited for anti-cancer therapy and delivery of therapeutic agents. This Special Issue of Biomedicines focuses on recent advances in the discovery, characterization, translation, and clinical application of cancer biomarkers and targets in malignant diseases of the digestive system. The goal is to stimulate basic and translational research and clinical collaboration in this exciting field with the hope of developing strategies for prevention and early detection/diagnosis of cancer in digestive organs, and improving therapeutic and psychosocial outcomes in patients with these malignant diseases.

Nanotechnology in Cancer Management: Precise Diagnostics toward Personalized Health Care provides a well-focused and comprehensive overview of technologies involved in early stage cancer diagnostics via the detection of various cancer biomarkers, both in-vitro and in-vivo. The book briefly describes the advancement in cancer biomarker research relating to cancer diagnostics, covering fundamental aspects of various techniques, especially transduction methodologies, such as electrochemical, optical, magnetic, etc. In addition, it describes approaches on how to make options cost-effective, scalable for clinical application, and user-friendly. Advancements in technology related to device miniaturization, performance improvement and point-of-care applications round out discussions. Final sections cover future challenges, the prospects of various techniques, and how the introduction of nanotechnology in cancer management in a personalized manner is useful. Includes smart sensing materials such as smart electro-active nanomaterials, sensitive transducers development, nano-enabled advanced imaging, miniaturized analytical system, and device integration and interfacing for point-of-care applications Describes each component involved in the development of an efficient cancer diagnostics system Focuses on fundamental and applied concepts of the technologies, along with the related mechanisms proposed for diagnostics of cancer Enhances fundamental understandings of the concepts and development of nanotechnology based analytical tools and novel techniques for early stage cancer diagnostics and management

This book provides a comprehensive overview of the fast-evolving subject of clinical application of cancer therapeutic biomarkers. The second edition captures significant progress of cancer immunotherapy and emphasizes the genetic basis for selective cancer treatment. It covers an in-depth insight on biomarkers across a broad area of cancer research and oncology with a wealth of integrated genetic and molecular information about specific therapies by a multidisciplinary team of internationally recognized experts. Each chapter focuses on a class of targeted, immunologic, or chemotherapy agents and their companion biomarkers that predict response, benefit or resistance, and severe adverse event. The book will serve as a handbook for health professionals and scientists on the current applicable biomarkers in the management of cancer. The vision into the systemic classification and statistical consideration of therapeutic biomarkers summarized by the book editors and chapter authors will help advance precision medicine—a precisely tailored cancer treatment strategy for cancer patient care.

Hepatobiliary cancer refers to primary malignant tumors originating in cells of the liver, bile ducts, and gallbladder. Globally, primary liver cancer, which includes hepatocellular carcinoma (~75 % of all cases) and intrahepatic biliary cancer or cholangiocarcinoma (~10-15 % 0f all cases) is the 6th most commonly diagnosed cancer and 3rd leading cause of cancer deaths worldwide. The vast majority of these highly malignant cancers are diagnosed at an advanced stage where treatment options are limited and patient survival outcomes are poor. The biological and therapeutic challenges posed by hepatobililiary cancers such as hepatocellular carcinoma (HCC) and cholangiocarcinoma (CCA) are daunting, emphasizing a critical need to review and assess current and evolving basic, translational, and clinical research focused on addressing the critical obstacles that continue to limit progress towards achieving significant improvements in HCC and CCA clinical management and patient survival outcomes. Towards this goal, this special edition of Advances in Cancer Research is focused on providing a comprehensive, timely and authoritative reviews covering such topics of significant scientific and clinical relevance, including hepatobiliary cancer risk mechanisms and risk-predictive molecular biomarkers; causes and functional intricacies of inter- and intratumor heterogeneity; novel insights into the role of tumor microenvironment and key signaling pathways in promoting hepatobiliary cancer progression, therapeutic resistance and immunosuppression; emerging biomarkers of HCC and CCA prognosis; advances in molecular genomics for personalizing tumor classification and targeted therapies; innovative preclinical cell culture modeling for hepatobiliary cancer drug discovery; and current and emerging trends in hepatobiliary cancer molecular therapeutic targeting and immunotherapies. Up-to date review of hepatobiliary cancers molecular genetics, novel predictive molecular biomarkers, and distinct mechanisms of inter-and intratumor heterogeneity Novel insights into the role of tumor microenvironment as a promoter of hepatobiliary cancer progression and therapeutic resistance, as well as an emerging therapeutic target Current and emerging approaches and strategies for advancing personalized molecular therapeutic targeting and immunotherapy of hepatobiliary cancers

This book brings forth the emerging trends in the areas of diagnosis and treatment of Cancer. The ever growing need for advanced technology is the reason that has fuelled the research in the field of cancer biomarkers and targeted therapies in recent times. This book is a valuable compilation of topics, ranging from the basic to the most complex advancements in this field. Researchers and doctors around the world are studying cancer and devising new and effective therapies to cure it. Such studies and researches have been including in this text. It is a complete source of knowledge on the present status of this field. The extensive content of this book provides the readers with a thorough understanding of the subject.