PREFACE

This book provides a unique blend of carefully presented and structured information covering a broad array of relevant breast cancer related issues. The first eight chapters cover breast cancer epidemiology, etiology, breast cancer subtypes, current and emerging surgical innovations to treat and image breast cancer, a description of noninvasive lymphedema assessment methods to detect and track this important treatment complication and the potential role of platelets and galectins in breast cancer metastasis. The last five chapters are devoted to the description of forward-looking albeit potential breast cancer treatment possibilities.

Breast cancer has become the most diagnosed cancer globally, surpassing lung and prostate cancers. Part of this increase may be attributed to improved detection but may also be due to changes in female fertility patterns along with lifestyle changes. Although developed countries have the highest incidence of breast cancer the mortality rates vary widely from global region to region but are highest in socio-economically low areas. However even in developed countries, there appears to be a disproportionately higher mortality rate among black women than white. Chapter 1 delves deeply into these and other issues from a global perspective.

The etiology of breast cancer is attributed to a complex interaction between various modifiable and non-modifiable factors that is determined by genetics, environmental, nutritional, hormonal, and heritable elements. Risk factors include prior history of breast cancer, positive family history, obesity, tall stature, smoking, alcohol consumption, early menarche, late menopause, sedentary lifestyle, nulliparity and hormone replacement therapy. Factors associated with decreased risk of breast cancer include multiparity, history of breastfeeding, physical activity, weight loss, and prophylactic surgical and medical interventions. Chapter 2 provides a targeted overview of these issues with a further description of breast cancer subtypes in chapter 3.

With the use of standardized staging and data collection, evidence-based management of breast cancer has evolved to limit treatments to what is necessary but sufficient to allow tissue preservation and control of treatment-specific morbidity. Surgery is an important component in the management of treatable breast cancer and in chapter 4 innovative surgical approaches that focus on tissue preservation, restoration of physical function and appearance are presented and discussed.

Breast cancer treatment-related lymphedema (BCRL) is a dreaded complication that presents as swelling in the arm, hand, trunk, or breast at varying times after completion of breast cancer treatment. The incidence of BCRL varies widely depending on the type and extent of the treatment, pre-treatment risk factors, and the criteria used to define its presence. Of clinical importance are the various quantitative measures used to specify lymphedema thresholds for its detection and tracking over time and during treatment. Chapter 5 discusses these issues and describes available non-invasive quantitative assessment methods with breast imaging methods discussed in chapter 6.

Because metastasis is a major determinant of breast cancer related mortality, factors that influence this process are exceedingly important. In chapter 7 the

roles of platelets in this process and current research regarding their potential as a breast cancer therapeutic target are extensively described. Galectins that are expressed in all breast cancer types are discussed in terms of their involvement in the breast cancer metastasis process are discussed in chapter 8.

In the remaining chapters novel and evolving potential therapeutic modalities are described based on their molecular properties and perceived therapeutic potential. The molecular features of the multifunctional protein ubiquitin-specific peptidase and its role in breast cancer are presented in chapter 9. Chapter 10 offers a discussion of the potential role of carbon nanomaterials, such as graphene, fullerenes, carbon nanotubes, nano diamonds, and carbon dots for breast cancer treatment. Ribosomal protein S6 kinase beta-1 (S6K1) as a potential therapeutic target for breast cancer is discussed in chapter 11. The potential for proteolysis-targeting chimeras (PROTACs) to diminish the pro-tumor activity of estrogen receptor-alpha-positive is discussed in chapter 12. The final chapter discusses lysosome properties, its role as a cellular death mediator and considers the possibility of lysosomes as a useful anti-cancer target.

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