



PROSTATE CANCER IMAGING

AN ENGINEERING AND CLINICAL
PERSPECTIVE

edited by

Ayman El-Baz

Gyan Pareek

Jasjit S. Suri



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Prostate Cancer Imaging

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Dedication

This book is dedicated with love and affection to my mother and father, whose loving spirit sustains me still.

Ayman El-Baz

This book is dedicated to my late parents, whose love will always be in my heart.

Jasjit S. Suri

This book is dedicated to Natwar Kumar Pareek—a great urologist, father and mentor, and to my loving wife Gina and two children Niki and Sonya.

Gyan Pareek



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Preface

This book covers novel strategies of the state-of-the-art approaches for automated noninvasive systems for early prostate cancer diagnostics. Prostate cancer is the most frequently diagnosed malignancy after skin cancer and the second leading cause of male cancer-related deaths in the United States after lung cancer. However, early detection of prostate cancer increases chances of patients' survival. Generally, CAD systems analyze the prostate images in three steps: (i) prostate segmentation; (ii) prostate description or feature extraction, and (iii) classification of the prostate status.

Current diagnosing of prostate carcinoma combines digital rectal examination (DRE), prostate-specific antigen (PSA) blood test, and needle biopsy. Each of these techniques have their own shortcomings. The biopsy is the most precise, but is a highly invasive, expensive, and painful method for detecting prostate cancer and determining its aggressiveness. Therefore accurate, highly sensitive and specific, but noninvasive diagnostic techniques are in significant demand. Today's CAD systems analyze images from various modalities, such as ultrasound, computed tomography (CT), and MRI, to detect and localize prostate cancer, as well as evaluate its size and extent.

The main aim of this book is to help advance scientific research within the broad field of early detection of prostate cancer. This book focuses on major trends and challenges in this area, and it presents work aimed at identifying new techniques and their use in biomedical image analysis.

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