- Chapter 1. An Abbreviated History of Medical 3D Printing
- Introduction
- 1980s—3D Printing Pioneering Work and Earliest 3D Printing in Medicine
- 1990s—3D Printed Anatomic Models and Personalized Implants
- 2000s—Digital Design, Additive Metals, and Foundations for Future Virtual Work
- 2010s—Virtual Surgery and Templates, Hospital-Based 3D Printing, the FDA, Reimbursement
- Chapter 2. Medical Imaging Technologies and Imaging Considerations for 3D Printed Anatomic Models
- Computed Tomography
- Magnetic Resonance Imaging
- Ultrasound
- Imaging Considerations for 3D Printed Anatomic Models
- Discussion
- Chapter 3. Image Segmentation and Nonuniformity Correction Methods
- Introduction
- Nonuniformity Correction for Accurate MRI Segmentation
- Segmentation Software
- After Segmentation
- Chapter 4. Computer-Aided Design Principles for Anatomic Modeling
- Introduction
- CAD Principles
- Design Operations
- Model Analysis and Simulation Through CAD
- Integrating 3D Printing with Simulation Models
- Conclusions
- Chapter 5. 3D Printing Principles and Technologies
- Introduction
- Vat Photopolymerization
- Material Extrusion
- Material Jetting
- Binder Jetting
- Powder Bed Fusion
- Discussion
- Conclusions

- Chapter 6. 3D Printed Anatomic Models and Guides
- Introduction
- Anatomic Models
- Anatomic Guides
- Discussion
- Future Insight
- Chapter 7. Quality Assurance of 3D Printed Anatomic Models
- QA in Radiology
- QA of 3D Printed Parts in Medicine
- Bridging the Gap Between Radiology and Manufacturing
- Verification of the 3D Printed Model
- Caliper Measurements
- Conclusion
- Chapter 8. Documentation and Reimbursement for 3D Printed Anatomic Models and Guides
- Introduction
- Documentation
- Reimbursement
- RSNA-ACR 3D printing registry
- Conclusions
- Chapter 9. Regulatory Perspectives for 3D Printing in Hospitals
- Introduction
- Medical Device Regulations
- Chapter 10. 3D Printing in Radiology Education
- Introduction
- Historical Perspective on 3D Modeling for Medical Education
- 3D Printing in Anatomy Education
- 3D Printed Models as a Tool in Clinical Radiology Training
- 3D Printed Models for Radiological Procedural Planning
- Introducing Training in 3D Printing to Resident Education
- Sample Curriculum for a Hands-On Resident Minicourse in 3D
  Printing and Visualization
- Conclusions
- Chapter 11. 3D Printing in Interventional Radiology
- Introduction
- 3D Printing Workflow
- Clinical Use Cases of 3D Printing in IR
- 3D Printing for IR Training
- 3D Printing for Patient Education

- The Future of 3D Printing in IR
- Chapter 12. 3D Printing in Nuclear Medicine and Radiation
  Therapy
- Introduction
- Nuclear Medicine
- 3D Printing Techniques to Optimize Radiopharmaceutical Chemistry
- Radiation Therapy
- 3D Printing for Radiation Therapy
- 3D Printed Bolus
- 3D Printed Tissue Compensators
- 3D Printed Immobilization Devices
- 3D Printing for Brachytherapy
- Surface Treatments
- 3D Printing of Anthropomorphic Phantoms
- Conclusion
- Chapter 13. 3D Printing in Forensic Radiology
- Introduction
- Historical Overview
- Forensic Radiologic Imaging
- 3D Anatomical Modeling in Forensic Radiology
- Forensic 3D Printing Use Case Scenarios
- Blunt Trauma
- Penetrating Trauma
- Blunt Force Polytrauma
- Nonaccidental (Penetrating and Blunt) Trauma
- Homicide
- Future Directions and Challenges
- Chapter 14. 3D Printed Imaging Phantoms
- Introduction
- Material Properties Pertinent to Major Medical Imaging Modalities
- Imaging Phantoms with Conventional Materials in 3D Printed Containers
- Imaging Phantoms with Conventional Materials Formed in 3D Printed Molds
- 3D Printing for Vascular Flow Phantoms
- Mimicking Tissue with 3D Printed Materials
- Summary

- Chapter 15. Considerations for Starting a 3D Printing Lab in the Department of Radiology
- Introduction
- Financial Plan
- Training
- Software Considerations
- 3D Printing Operational Considerations
- Conclusions
- Chapter 16. The Future of Medical 3D Printing in Radiology
- Introduction
- Emerging Medical 3D Printing Technologies
- The Case for In-Hospital 3D Printing
- A Word on Sterilization and Quality Manufacturing at the Hospital
- The Next 5Years
- 5–10Years Into the Future
- 10-20Years Into the Future
- 20-30Years Into the Future
- Radiology of the Future
- THE RADIOLOGIST OF THE FUTURE
- Reference Index
- Subject Index