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Diagnostic Pathology

# Soft Tissue Tumors

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**Lindberg**



THIRD EDITION



Diagnostic Pathology

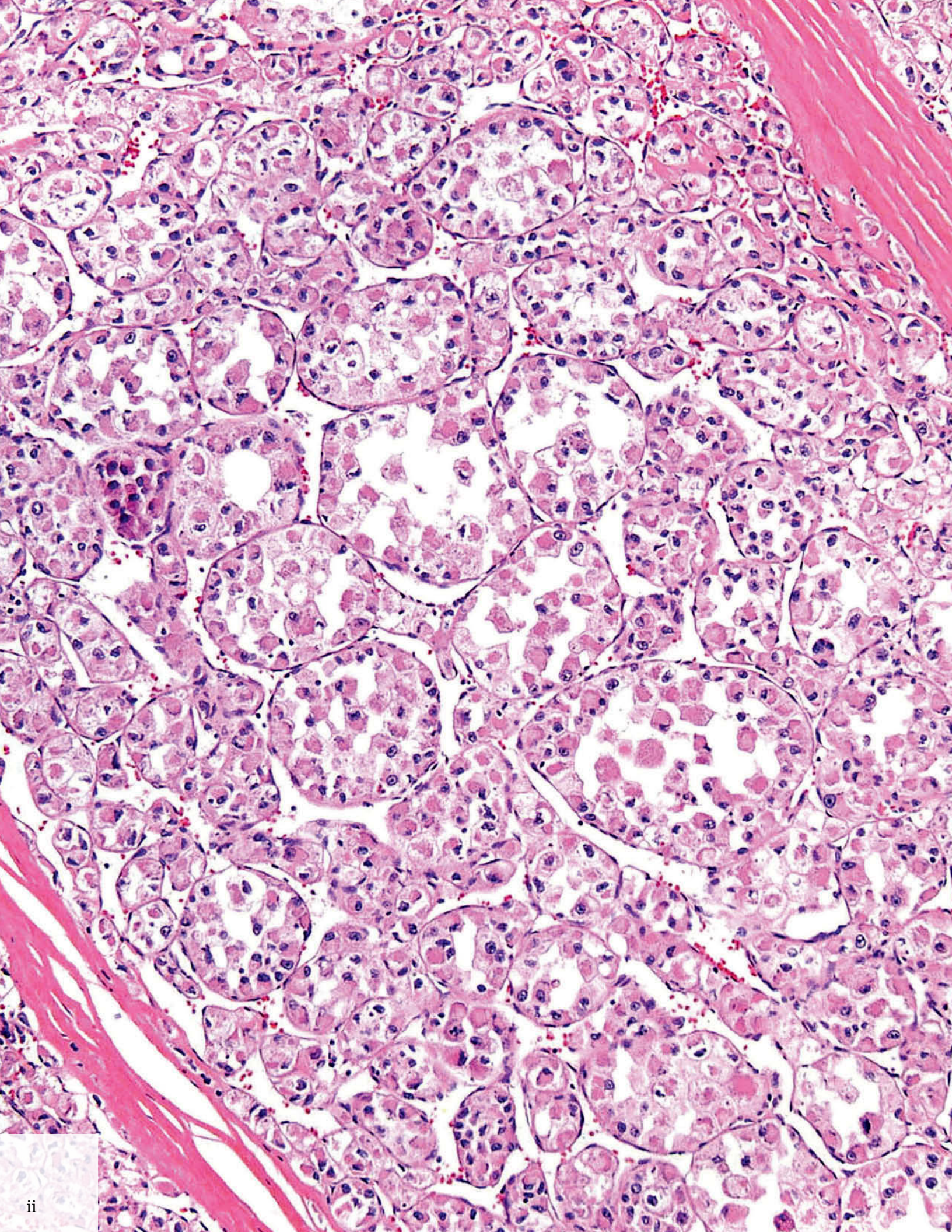
# Soft Tissue Tumors

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**Lindberg**



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Diagnostic Pathology

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Third Edition

**Matthew R. Lindberg, MD**

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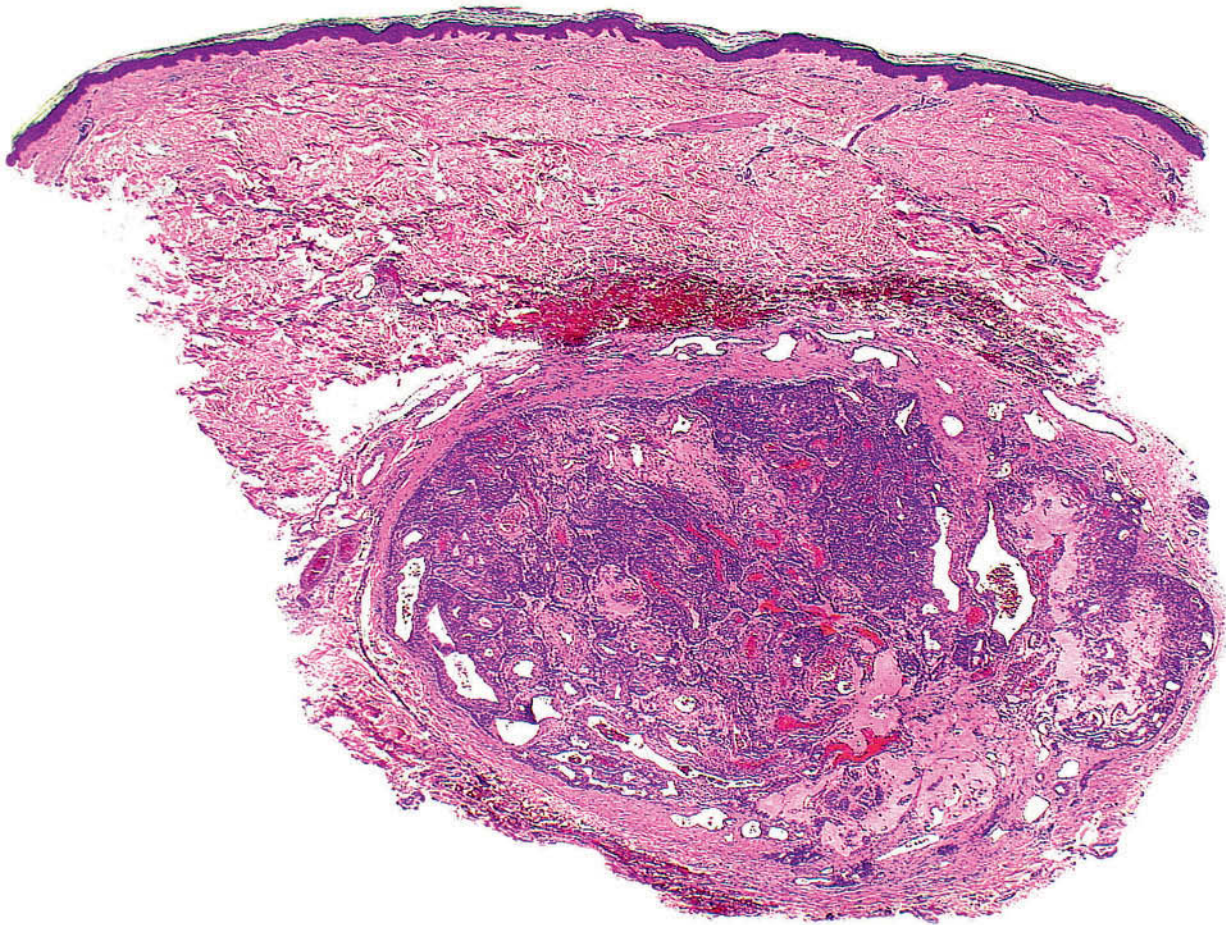
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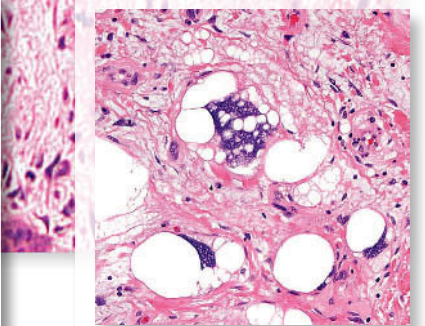
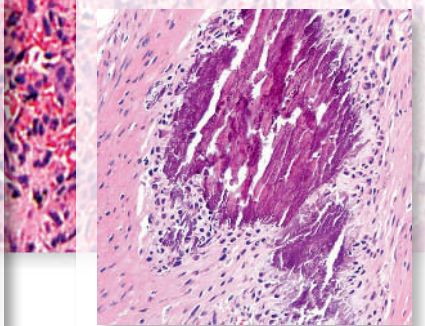
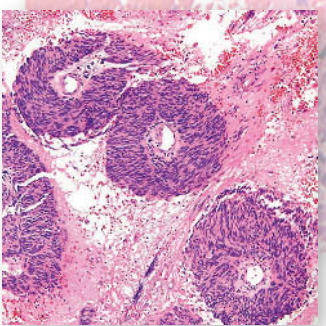
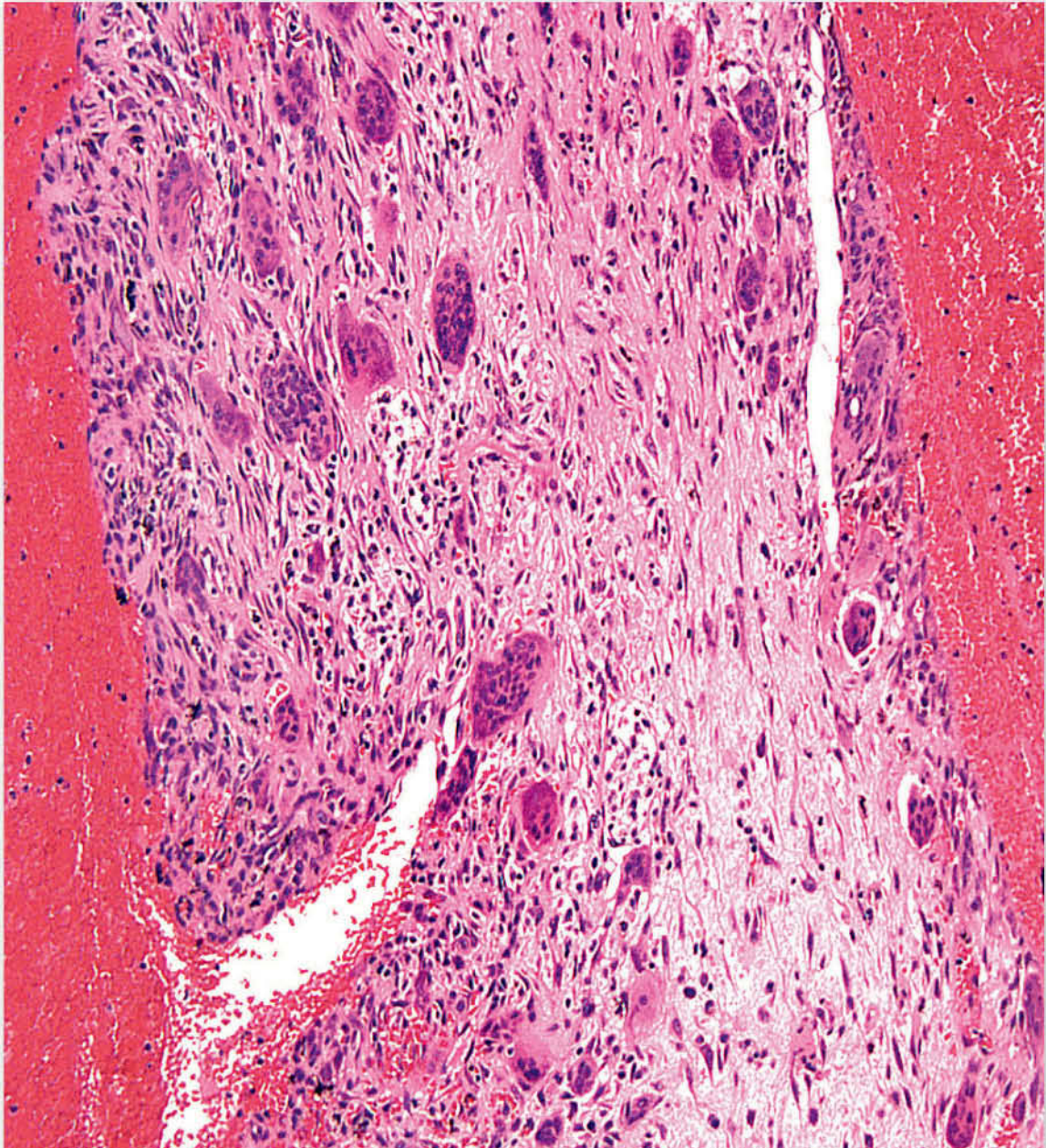


# Dedication

*To my wonderful wife, Rani, for her love, support, and infinite patience during the course of putting together this book. Also, to the excellent team of editors and coauthors with whom I have been very privileged to work. Many, many thanks for your hard work and high standards.*

**MRL**





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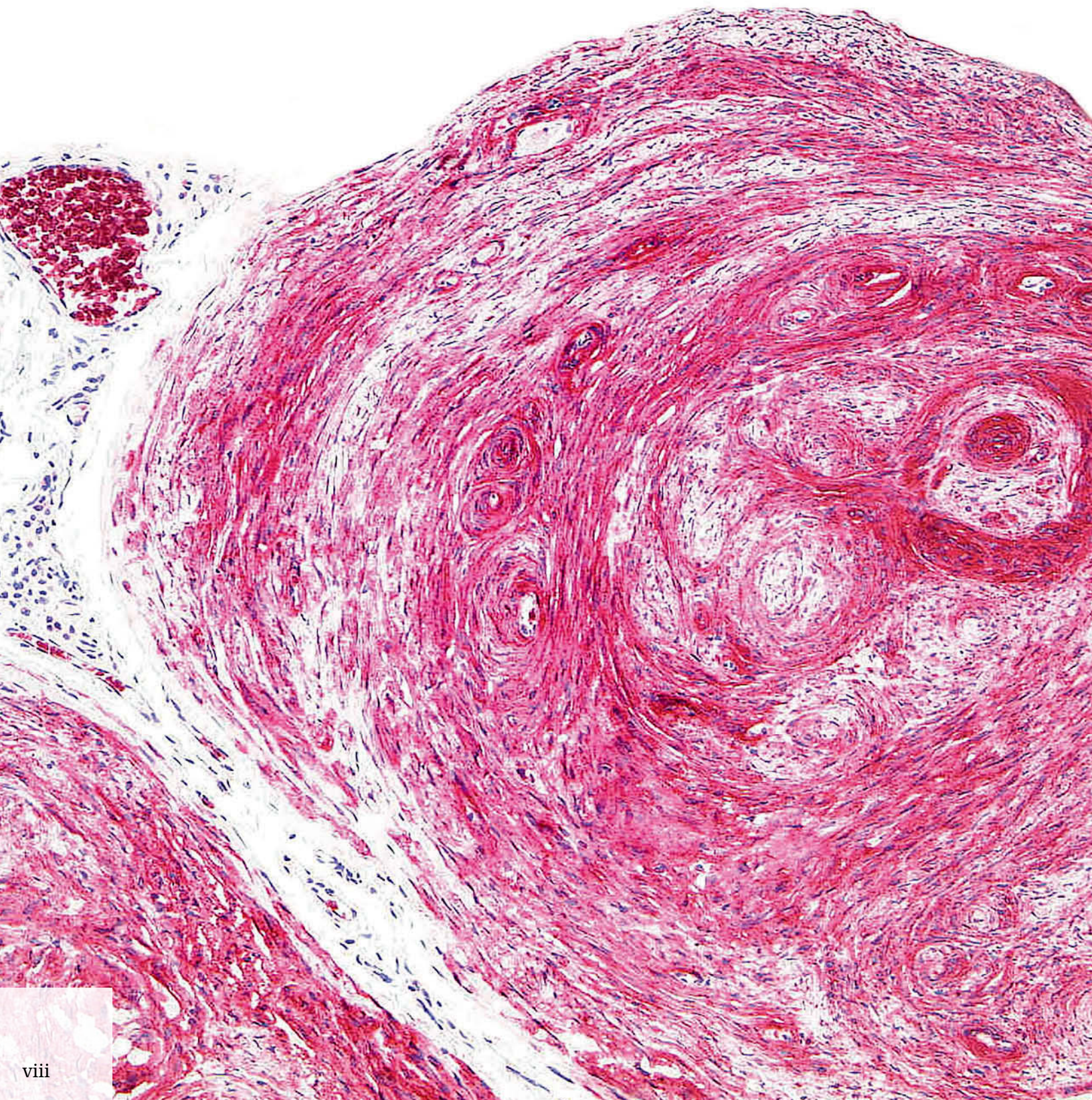
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# Preface

The field of soft tissue pathology continues to grow and change, with new diagnostic entities, immunohistochemical antibodies, and molecular tests introduced seemingly every month. The 3rd edition of *Diagnostic Pathology: Soft Tissue Tumors* strives to incorporate this new knowledge in the form of new chapters, updated text, and additional high-quality histologic images.

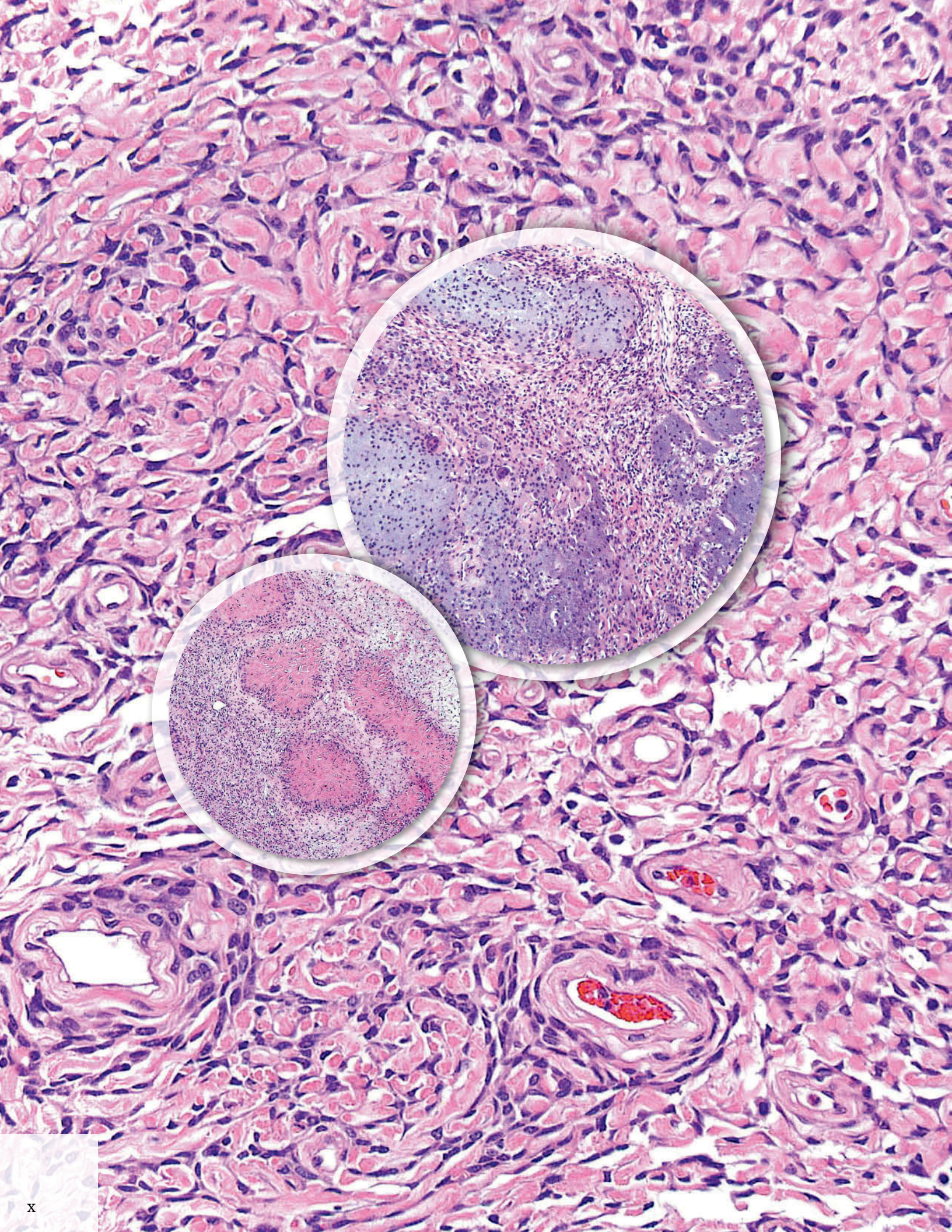
Since the publication of the 2nd edition, several new entities have been described in the scientific literature, including atypical spindle cell lipomatous tumor, superficial CD34-positive fibroblastic tumor, and *BCOR*-rearranged sarcoma. Chapters dedicated to each of these entities (as well as others) have been added in this new edition. Existing chapters devoted entirely to immunohistochemistry and molecular testing have also been updated to reflect recent discoveries in this span, and many individual chapters have seen a variety of text and gallery improvements. In particular, several galleries have been modified by swapping in new images that better reflect the extensive morphologic spectrum of soft tissue pathology.

As before, the 3 innovative “Approach to Diagnosis” chapters are still included in this new edition. Using a combination of clinical information, overall histologic pattern, and specific histologic findings, these chapters can aid the struggling pathologist in developing a thoughtful differential diagnosis for even some of the more challenging or unusual soft tissue cases. I hope you find these unique additions helpful in your own practice, both now and for many years to come.

Lastly, as always, owners of *Diagnostic Pathology: Soft Tissue Tumors*, 3rd edition, receive online access to all information and images contained in this text, plus much more. Enjoy!

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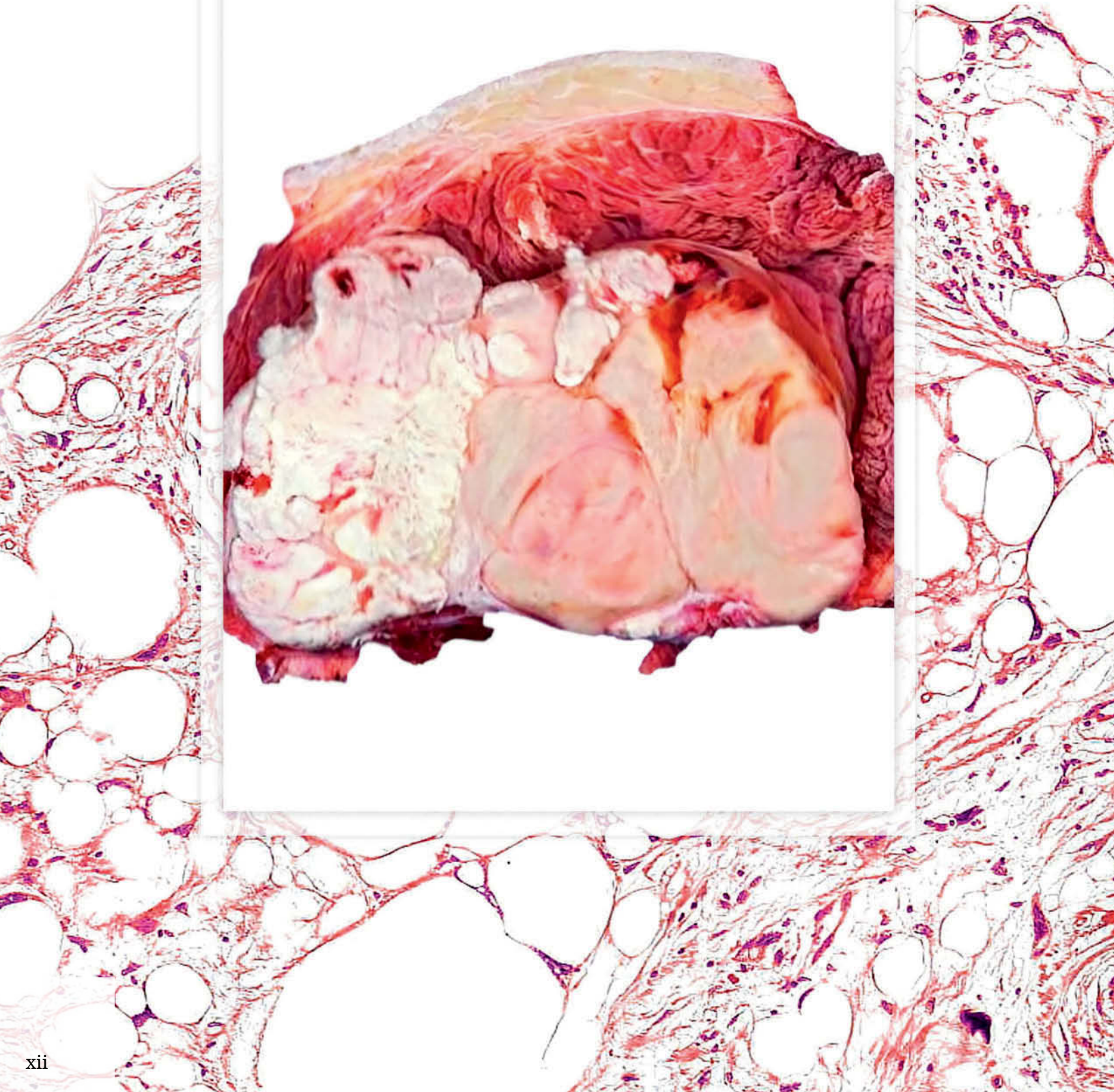
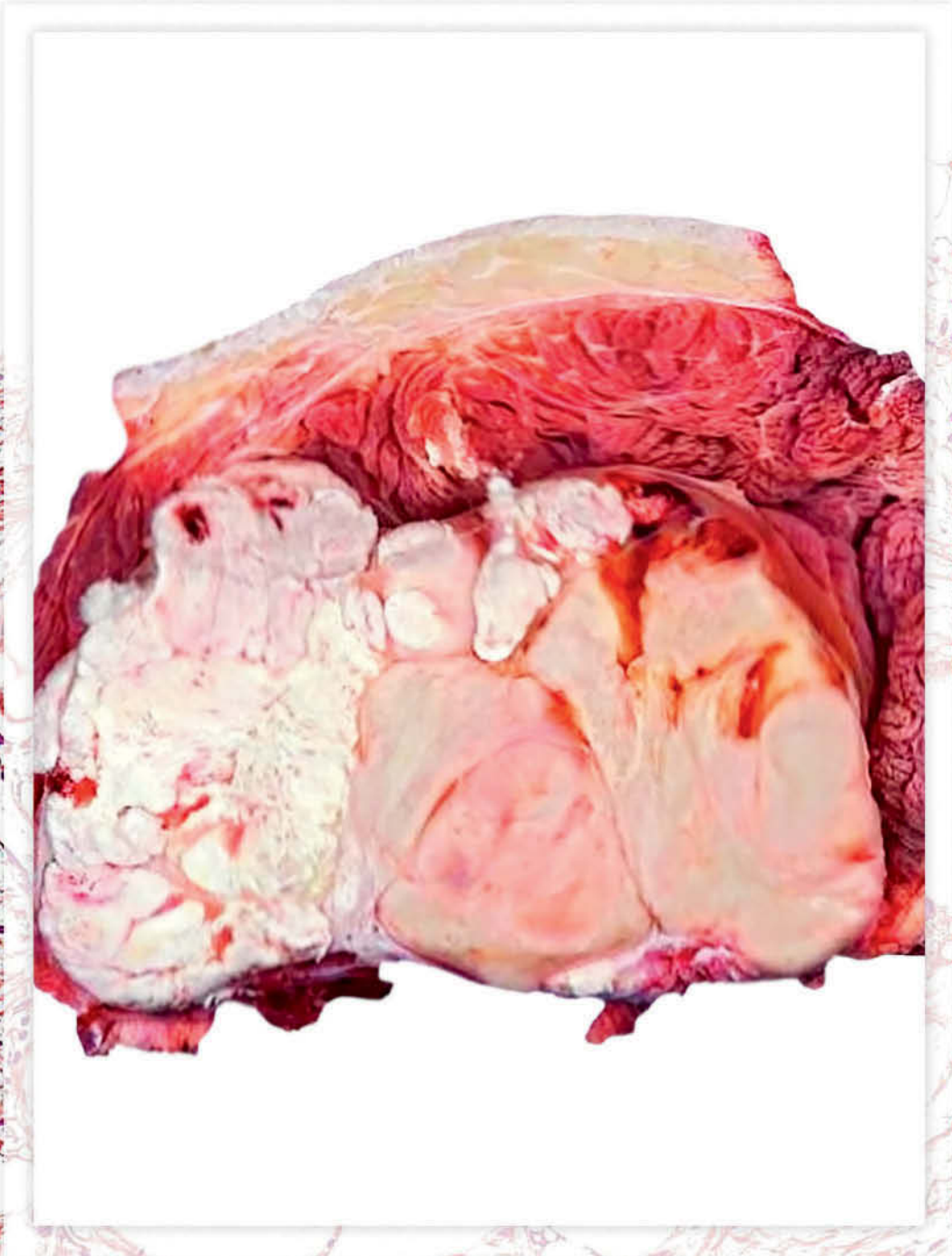
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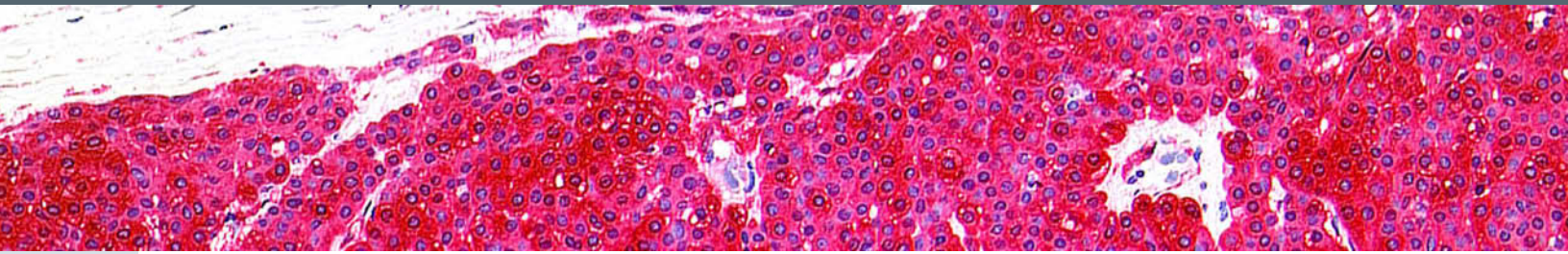




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Diagnostic Pathology

# Soft Tissue Tumors

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**Lindberg**



THIRD EDITION



# SECTION 1

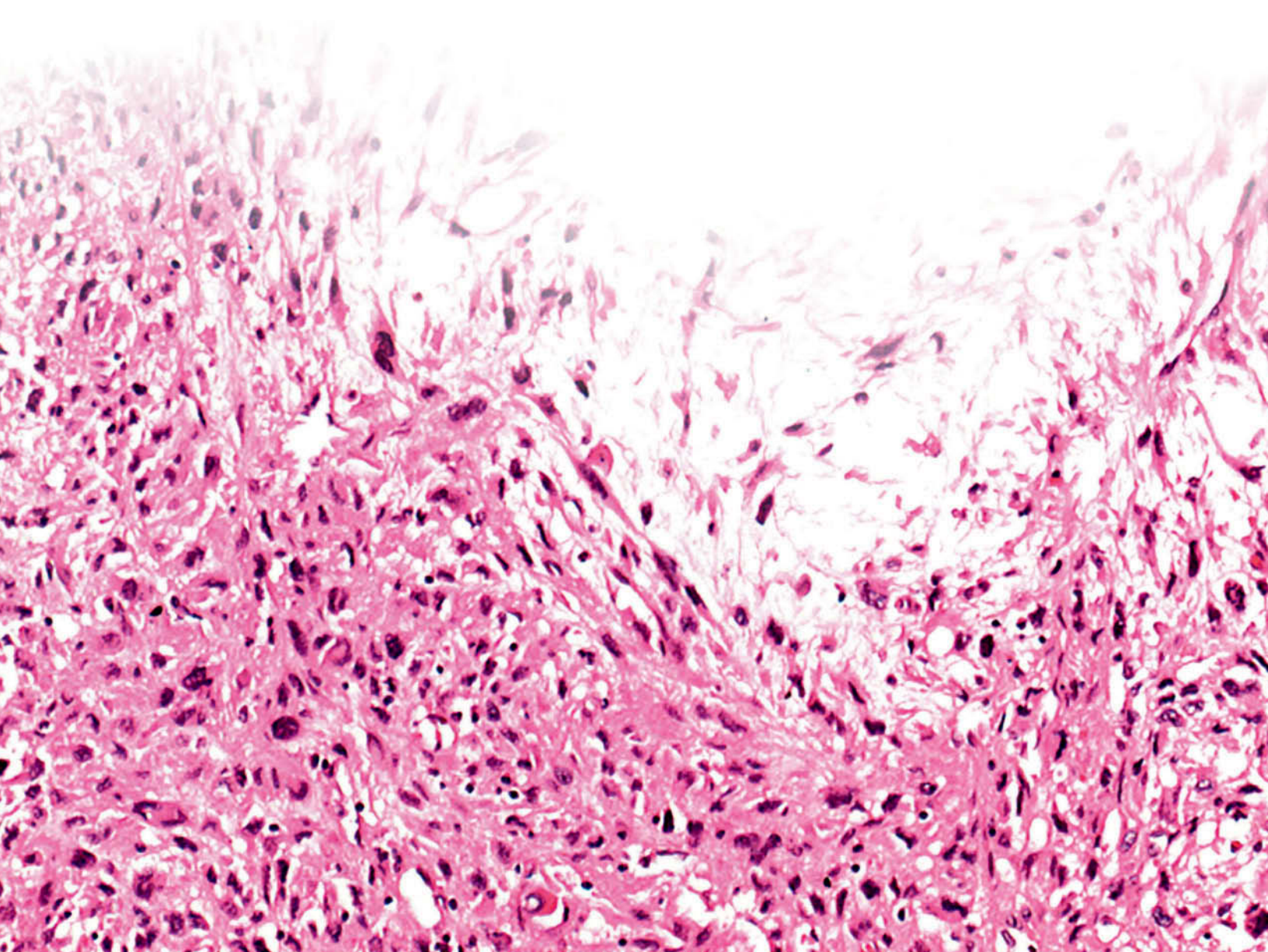
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## INTRODUCTION

### Overview

- Thorough but focused gross examination is vital component of overall evaluation and diagnostic work-up of soft tissue tumors
- Common errors (e.g., undersampling, inappropriate sampling, not inking margins) can severely hamper or preclude accurate diagnosis, pathologic staging, and subsequent clinical planning
- Review of patient clinical history and information prior to gross examination is strongly recommended

## CLINICAL FINDINGS

### History

- Review any available clinical notes or operative report
  - Note age of patient and clinical presentation of tumor
  - Note if patient has prior history of tumor in same anatomic location, nearby, or elsewhere
- Determine whether tumor has been previously biopsied or treated or if there is established diagnosis

### Imaging

- Review any pertinent radiographs, CT, or MR scans
  - Determine if tumor is homogeneous or heterogeneous
  - Identify any notable structures involved (e.g., large nerve trunk)
  - Determine whether radiologist favors benign or malignant process
- Note anatomic location (e.g., thigh, neck, retroperitoneum, finger)
- Note tissue plane (i.e., superficial/subcutaneous vs. deep/intramuscular)

## GROSSING PROCEDURE

### External Examination

- Specimen should be weighed and measured in 3 dimensions
- Describe external appearance and shape of mass

- Note any orientation provided by surgeon (e.g., stitches, strip of overlying skin, large nerves)
  - Skin is often excised to remove previous biopsy tract with rest of specimen
- Ink peripheral margins of specimen
  - Oriented tumors often require inking with up to 6 different colors
  - Unoriented tumors may be inked in 1 color

### Sectioning and Internal Evaluation

- Serially section ("bread loaf") mass in 1-cm thick sections, perpendicular to long axis of specimen
- Lay out all slabs of tumor and examine cut surfaces
- Describe appearance of cut surface and note areas of different coloration &/or texture
  - Common colors: Tan, white, gray, red, brown
  - Common textures: Firm/fibrous, fleshy, gelatinous/glistening, fatty
- Note any areas of hemorrhage &/or necrosis
  - Quantify necrosis (none,  $\leq 50\%$ , or  $> 50\%$ )
  - Highly necrotic tumors should be placed in formalin to fix and to minimize fragmentation
- Take representative fresh tissue for possible ancillary techniques or treatment protocols (may be snap frozen)

### Sampling

- Standard approach is to take 1 section per cm of greatest tumor dimension (margin sections counted separately)
  - e.g., 16-cm tumor gets 16 blocks with 1 tissue piece in each or 8 blocks with 2 tissue pieces in each
  - Fewer sections may be submitted for large tumors with diffuse homogeneous appearance
- Inked margins, specifically close ( $< 2$  cm) margins, should be sampled with perpendicular sections
- Sections should be taken from all distinctive areas (e.g., fibrous, gelatinous, fleshy, etc.)
  - Sections taken at interface between different areas can provide very useful histologic information
- Obviously necrotic areas should be minimally sampled
  - These areas often represent high-grade morphologies and are generally less useful diagnostically

### External Examination

**(Left)** The gross appearance of a soft tissue tumor specimen varies depending on the type of surgery, but many tumors (especially sarcomas) are removed with at least a thin rim of surrounding soft tissue. If the tumor has been previously sampled by core biopsy, the biopsy tract and skin strip are often removed as well. **(Right)** Although known benign soft tissue tumors are often excised without orientation by the surgeon, sarcomas often arrive oriented by stitches and require inking, as depicted, for satisfactory margin evaluation.



### Specimen Inking

