Preface

The field of endoscopy burgeoned from a simple tube with lenses and a light source that could visualize the gross lining of the stomach to a myriad of different platforms and technologies. The endoscopes themselves have evolved over the generations where now high-resolution endoscopy provides on the order of eight hundred thousand to one million pixels to discriminate finer details. Chromoendoscopy dyes and virtual chromoendoscopy have provided details in the mucosal surface and the superficial vasculature. This quest for detail has delved beyond the gross architecture, to be able to provide an optical biopsy with micro-architectural detail with confocal laser endomicroscopy, optical coherence tomography-based technologies, and endocytoscopy. Other strategies have widened our endoscopic field of view and provide surface area visible to us that may otherwise be hidden in a retroflexed position or behind folds in the colon. Or, new developments may allow access to places where standard scopes may not reach such as in the pancreas or in the bile ducts.

These tools may be used for lesion *detection* in the case of screening. They also may be used for lesion *classification* during screening, surveillance, diagnosis, or therapy. The diagnostic performance characteristics will guide how we can best complement histology when we utilize these imaging modalities including options such as decreasing number of negative biopsies, targeting tissue acquisition, or predicting depth of lesions prior to therapy. In these areas where tissue acquisition yield may be limited or inadequate such as in the bile ducts or pancreatic cysts, the novel imaging modality itself may potentially serve as a surrogate marker for histology in diagnosis.

Novel technologies integrate into clinical practice typically in certain stages. Many new devices first go through assessments of feasibility and safety. The technical aspect of obtaining images often has a relatively quick learning curve. The associated cognitive aspect of interpretation of the images is often a longer and more variable learning curve. The accuracy of image interpretation may also be impacted by the quality of the images and confidence of the interpretation.

It is important to appreciate the goals and limitations of image interpretation compared to standard histology. For example, often the image interpretation often may start with normal versus abnormal and then demonstrate benign versus

classically malignant features. However, there may be limitations in determining grades of dysplasia or depth of invasion in superficial neoplasia in a specific imaging modality. Furthermore, similar to histology, inflammation can play a confounding role in the determination of dysplasia.

Most importantly, one must understand there if there is clinical impact. This often entails not only being able to provide accuracy in image interpretation but providing information which is beyond that what at this time high-resolution endoscopy may provide that can be clinically relevant. As the generations of endoscopes themselves provide a higher resolution, the bar for imaging modalities raises substantially. Finally, cost-effectiveness plays an important role in decision making prior to widespread adoptability. These technologies must be rigorously interrogated with all of the aspects before they can transform from a new technology to a clinically useful tool in endoscopic practice.

The concept of the optical biopsy has reached our endoscopy suites. The world of endoscopic imaging is an evolving bridge between endoscopy and histology. This book outlines the advanced endoscopic imaging modalities currently available and on the horizon. We thank all of contributors who have shared their expertise with us in the preparation of this book.

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