Atlas of Gynecologic Cytopathology
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Atlas of Gynecologic Cytopathology

With Histopathologic Correlations
We dedicate this book to our mentors, whose knowledge we were given to share.
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Foreword

The practice of cytopathology is an art and a science that depends on meticulous observation of morphologic features of cytologic material, and correlating the images with recognized histopathologic characteristics and the presenting clinical findings. In this scenario, the interaction between the pathologist and the treating physician is critical in order to ensure optimal care for our patients who demand, and deserve, nothing less. Nowhere is this more notable than in gynecologic diseases, where an open communication among cytopathologists, colposcopists, and gynecologic oncologists/surgeons is of paramount importance. It is a pleasure to pen a foreword to this outstanding work, which achieves these goals in a remarkable way.

Atlas of Gynecologic Cytopathology With Histopathologic Correlations draws from the vast library of material at Johns Hopkins, an institution that is renowned worldwide in the fields of cytopathology and gynecologic pathology. The entire spectrum of gynecologic diseases that a pathologist may encounter in the day-to-day practice is presented in a well-organized format. The volume is divided into 12 chapters along the lines of the Bethesda System for Reporting Gynecologic Cytology, the standard accepted by the profession in the United States and most of Europe. Carefully selected high-resolution images illustrate the cytomorphic characteristics and the differential diagnostic problems associated with cervical lesions. The clarity, color reproduction, and field selection of these exquisite figures achieve the difficult goal of conveying the three-dimensional (3-D) images seen though the actual lens of a microscope in a 2-D image format. Drs. VandenBussche, Ali, and Rosenthal, internationally recognized experts in the field, who have the experience of practicing the discipline and the talent of transmitting the information as mentors, have authored this valuable and elegant text. The collaboration of Dr. Vang, a notable gynecologic pathologist, in authoring this volume enriches our understanding of the histologic correlations. The newer automated processing and screening devices are well represented in this atlas, a definite advantage to the volume. Experience with these techniques, the introduction of new molecular testing, and our understanding of the evolution of cervical diseases have dramatically changed over the last decade. This dictated a parallel change of management and prevention protocols for cervical neoplasia. The inclusion of a chapter on the new guidelines of the American Society for Colposcopy and Cervical Pathology (ASCCP) for managing cervical lesions makes it an excellent up-to-date resource for pathologists, and helps them to understand the implication of their diagnosis on management.

Despite a plethora of atlases and textbooks on cytopathology, Atlas of Gynecologic Cytopathology With Histopathologic Correlations is clearly a most welcome addition to the cytopathology literature. It is a practical, succinctly written, and superbly illustrated volume. The inclusion of colposcopic and histopathologic correlation enhances its value to cytopathologists and surgical pathologists alike, regardless of the extent of their experience. The authors should be commended on this excellent work.

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Preface

The Pap test has had a remarkable history, essentially in establishing the field of cytopathology and greatly contributing to the prevention of cervical cancer worldwide. In spite of numerous controversies and challenges throughout the decades, the Pap test remains one of the most utilized and successful cancer screening tests and has been adapted to meet the needs of modern patients and physicians. Although it is uncertain how the development of human papillomavirus testing and vaccination will affect the future use of the Pap test, pathologists and trainees must remain intimately familiar with the cytomorphologic characteristics of the cervicovaginal cytology samples as well as their histopathologic correlates. Educational curricula for cytomorphology criteria, laboratory methodologies, and quality assurance/quality control processes learned over the years from the Pap test form a foundation on which the rest of cytopathology expands.

The intention of this atlas is to expose the reader to high-quality images that represent the various morphologies seen within each diagnostic category. The images are coupled with captions that direct the reader’s attention to important histomorphological features and provide high-yield, updated information about each entity. The atlas may be used as a study guide or as a quick reference next to the microscope.

The authors humbly dedicate this book to their mentors. Christopher VandenBussche thanks his mentors, from whom he continues to learn: Drs. Syed Ali, Yener Erozan, and Dorothy Rosenthal. Dr. Syed Ali owes his entire academic success to the most wonderful teachers he had the privilege to be trained with: Drs. Dorothy Rosenthal, Yener Erozan, and Steven Hajdu. Dr. Dorothy Rosenthal was mentored by George Wied and Leopold Koss, to whom she owes enormous gratitude for their contributions to her professional education. Russell Vang would like to acknowledge Drs. Robert Kurman and Brigitte Ronnett for their mentoring over the years, as well as continued support and encouragement, and to Evelyn Hinton, his division’s administrative coordinator, for her invaluable assistance.

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Atlas of Gynecologic Cytopathology
Colposcopy

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Colposcopy is performed by applying a 3% acetic acid (vinegar) solution to the cervical mucosa, and viewing through a green filter. The first step is to determine whether one is able to visualize the entire squamocolumnar junction (SCJ). Most human papillomavirus (HPV)-associated lesions occur at the SCJ. As dysplastic cells have a far greater nuclear-to-cytoplasmic ratio than normal mature squamous cells, they dehydrate much more easily than normal cells, thereby becoming opaque (acetowhite). Although many conditions, including inflammation, can increase the nuclear-to-cytoplasmic ratio, dysplastic lesions are typically sharply demarcated, and have pathognomonic patterns of neovascularature: punctuation and mosaicism. If a lesion is subtle, it may be helpful to apply Lugol’s (iodine) solution to the mucosal surface. Glycogen turns black when exposed to iodine. Because dysplastic and malignant cells often lack normal glycogen content, normal cells tend to appear darker than dysplastic or malignant cells. The colposcopist should be aware that the application of Lugol’s solution can cause an artifact in the tissue, which may skew the interpretation of the histology.

Punctuation is the gross appearance of neovascularature that has formed perpendicular to the mucosal surface, typically described as being either “fine” or “coarse.” Mosaicism involves aborization of the neovascularature. The neovascularature associated with cervical intraepithelial neoplasia is relatively uniform in caliber, in contrast to that in inflammatory conditions, in which vessels are tortuous, irregular, and have varying caliber.

![Figure 1.1 — Normal Cervix, Gross Appearance, Green Filter.](image1) The squamocolumnar junction is just inside the cervical os, and is not visible.

![Figure 1.2a — Normal Cervix, No Green Filter.](image2) The entire squamocolumnar junction is visible.

![Figure 1.2b — Normal Cervix, Dilute Acetic Acid Wash, Green Filter.](image3) Same cervix as in Figure 1.2a, but with a green filter. No acetowhite areas are visible.
Chapter 1: Colposcopy

Figure 1.3 — Normal Cervix. Another example of the squamocolumnar junction, visible circumferentially.

Figure 1.4 — Normal Cervix. The squamocolumnar junction is visible 360°, but the transformation zone is just inside the os.

Figure 1.5 — Chronic Cervicitis and Squamous Metaplasia. The endocervical tissue at the transformation zone is slightly friable.

Figure 1.6 — Chronic Cervicitis and Squamous Metaplasia. The acetowhite epithelium has irregular vasculature and is not sharply demarcated.
Figure 1.7 — Chronic Cervicitis and Squamous Metaplasia. Acetowhite areas at the squamocolumnar junction from 7 o’clock to 10 o’clock appear punctate; this represents metaplastic areas surrounding the gland openings. The cobblestone appearance of the acetowhite epithelium from 1 o’clock to 3 o’clock is more representative of low-grade squamous intraepithelial lesion (LSIL).

Figure 1.8 — Chronic Cervicitis and Squamous Metaplasia. This pattern of petechiae is known as “strawberry cervix.” It can be seen in both infectious and noninfectious cervicitis.

Figure 1.9 — Low-Grade Squamous Intraepithelial Lesion (LSIL). Sharply demarcated acetowhite epithelium is identifiable posteriorly, from 4 o’clock to 8 o’clock; the upper limit of the lesion is visible.

Figure 1.10 — Low-Grade Squamous Intraepithelial Lesion (LSIL). This higher magnification image of the cervix depicted in Figure 1.9 shows the anterior squamocolumnar junction, with chronic cervicitis and squamous metaplasia around the gland openings.
Chapter 1: Colposcopy

Figure 1.11 — Low-Grade Squamous Intraepithelial Lesion (LSIL). This image is the posterior squamocolumnar junction of the cervix depicted in Figure 1.9, showing dense acetowhite epithelium with fine mosaicism from 5 o’clock to 7 o’clock. The upper limit of the lesion is visible.

Figure 1.12 — Low-Grade Squamous Intraepithelial Lesion (LSIL). A clear example of fine mosaicism is seen from 10 o’clock to 2 o’clock.

Figure 1.13 — Low-Grade Squamous Intraepithelial Lesion (LSIL) in a Background of Chronic Cervicitis and Squamous Metaplasia. Acetowhite epithelium with diffuse margins is present posteriorly, more sharply demarcated, and with fine mosaicism from 9 o’clock to 1 o’clock.

Figure 1.14 — Low-Grade Squamous Intraepithelial Lesion (LSIL). The ectropion is friable (cervicitis), and a rim of acetowhite epithelium with fine mosaicism is visible anteriorly, from 10 o’clock to 1 o’clock, and posteriorly, from 7 o’clock to 8 o’clock.
Figure 1.15 — Low-Grade Squamous Intraepithelial Lesion (LSIL), Lugol’s Solution. This image is the same cervix depicted in Figure 1.14, showing the anterior portion of the squamocolumnar junction. The discrete margins of the lesion are easily identified.

Figure 1.16 — Low-Grade Squamous Intraepithelial Lesion (LSIL) in a Background of Chronic Cervicitis and Squamous Metaplasia. Posteriorly, the acetowhite epithelium is nearly translucent. Gland openings are easily identified. Anteriorly, nearly out of the frame, more sharply demarcated acetowhite epithelium with fine mosaicism is visible.

Figure 1.17 — High-Grade Squamous Intraepithelial Lesion (HSIL). Sharply demarcated dense acetowhite epithelium is identifiable at the squamocolumnar junction and demonstrates fine mosaicism.

Figure 1.18 — High-Grade Squamous Intraepithelial Lesion (HSIL). Sharply demarcated acetowhite epithelium can be seen with a slightly different pattern of mosaicism.
Figure 1.19 — High-Grade Squamous Intraepithelial Lesion (HSIL). The lesion can be seen between 10 o’clock and 2 o’clock. The more translucent area from 4 o’clock to 9 o’clock is likely to be LSIL.

Figure 1.20 — High-Grade Squamous Intraepithelial Lesion (HSIL). The sharply demarcated acetowhite epithelium demonstrates coarse mosaicism.

Figure 1.21 — High-Grade Squamous Intraepithelial Lesion (HSIL). The lesion can be seen posteriorly and extends from the squamocolumnar junction to the portio.

Figure 1.22 — High-Grade Squamous Intraepithelial Lesion (HSIL). Dense acetowhite epithelium with coarse punctation is present.
Figure 1.23 — High-Grade Squamous Intraepithelial Lesion (HSIL). The lesion is circumferential and multifocal.

Figure 1.24 — High-Grade Squamous Intraepithelial Lesion (HSIL). This lesion is sharply demarcated, with easily identifiable fine mosaicism, circumferentially.

Figure 1.25 — Squamous Cell Carcinoma. The lesion is raised, irregular, and friable. The vasculature is tortuous.