

# Gynecologic Cytology

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## I. Gyn Cytology

### A. Squamous cells

- Superficial cells are from the superficial level of squamous epithelium (that nearest the surface). These cells are characterized by a pale pink cytoplasm. Mature squames usually stain pink with the acid stain eosin and are therefore called eosinophilic (eosin-loving). Superficials are flat, thin, angular cells with a tiny black nucleus (a pyknotic nucleus.) Pyknosis is the condensation of chromatin which occurs in dead or dying cells. Superficials are actually dying cells which are about to be exfoliated or sluffed off the surface. They are the final stage of squamous maturation – a protective, tough cell layer.
- Intermediate cells are from the intermediate layers of squamous epithelium. These are the most commonly seen squames. They usually stain a pale blue-green. These have a larger, vesicular nucleus in contrast to the pyknotic nucleus of the superficial. A vesicular (active, granular) nucleus is indicative of cell activity. The intermediates are also flat cells and have the angularity of superficials. However, the intermediates appear more wrinkled than the superficial and they have a tendency to form clusters. Variation in size and shape may occur.
- Parabasal cells are from the deepest layers of squamous epithelium. These cells are the most active or immature squamous type. They form the reproductive layer and sometimes may be seen in mitosis. True basal cells are rarely seen in cytology as they actually line the basement membrane and form the bottom of the squamous layers in the epithelium. Parabasals are really the outer-layer basals which are slightly larger and more mature. Parabasals and basal cells are both considered basophilic or cyanophilic. They stain blue-green.
- In any group of cells, the overlapping or piling may cause a staining artifact to occur – the thick areas may stain pink or orange. Thus, color is not reliable in determining squamous maturation.
- Cytolysis (lysing of the cytoplasm) may occur due to Döderlein's bacilli. These small rod-shaped bacteria are the normal background flora found in most pap smears. They metabolize the glycogen present in the intermediates (primarily) and produce an acid which serves to maintain the vaginal pH at approximately 4.5. This prevents the

growth of harmful organisms such as trichomonads which flourish at a more basic pH. Cytolysis is easy to spot because of the many stripped nuclei which result from the breakdown of the cytoplasm.

- Cocci look like tiny dots in the background and when they are heavy they produce a fuzzy quality to a smear. This bacteria is usually associated with some infectious process, by contrast to the normal Döderlein's bacilli.
- Annucleated squames which stain a yellow color may represent contamination from the vulva (where squames normally mature to this stage) or they may indicate an abnormal keratinizing condition in the vagina, such as leukoplakia.

### **B. Endocervical cells**

- Because of their metabolism, these cells will have a more vesicular or "active" nucleus than most squares, except those from the lowest epithelial levels. Endocervical nuclei may resemble that of the parabasal or basal; definite chromatin detail is seen and nucleoli are usually quite evident. The cytoplasm of these columnar is delicate and foamy by contrast to the heavier squamous quality. Another point to keep in mind is the perpendicular orientation of columnar cells to the basement membrane. Squames are oriented horizontally and stack up in flattened layers, while endocervicals grow tall and vertically in only one or two layers. Endocervicals commonly present in "picket-fence" and "honeycomb" arrangements. If you see cilia or a terminal bars, the columnar is normal.

### **C. Endometrial cells**

- These small columnar cells line the corpus (or body) of the uterus. Endometrials are shed during the menstrual period along with fragments of the underlying endometrial stroma or connective tissue. Blood, inflammatory cells and histiocytes are also found. Endometrial cells are normally present only until day 12 of the menstrual cycle. They are usually considered an abnormal finding later than day twelve, and are especially suspect in postmenopausal women. With the use of brushes, normal endometrial cells occasionally occur after day 12.
- Endometrial cell nuclei are the same size as an intermediate cell nucleus and the cross diameter of a neutrophil. Endometrials usually are much more hyperchromatic appearing than endocervicals. This quality is intensified due to their usual degeneration as they travel down the endocervical canal and accumulate in the vaginal pool. Because of this, endometrials are often dark and shrunken – indicating degeneration and pyknosis. In contrast to endocervicals, endometrials tend to form tight,

three-dimensional rounded balls of cells. The cytoplasm in these clusters may appear nonexistent or very scanty. Because of the rounded, clustered quality of endometrial groups, the straight edge seen in endocervical groups is almost never seen – which is one way of distinguishing between them.

#### **D. Histiocytes**

- Histiocytes commonly occur in gynecologic cytology. They are a delicate pleomorphic type of cell in comparison to the more definite epithelial cells. Their cytoplasm is usually lacy and vacuolated because of their phagocytic function. Also, because of this function, their shape is constantly changing and presents a variable picture when fixed and stained for cytology. Their nucleus is usually very active with several chromocenters or nucleoli in evidence. Histiocytes often stain amphophilic – somewhere between the blue or pink of squames – and usually have a clear or lightly stained cytoplasm – more like a columnar. Multinucleated histiocytes appear to resemble endometrial clusters – but there are several differences. Multinucleated histiocytes are one big cell because of the rounded cytoplasmic border enclosing the nuclei together. Usually the nuclei are jumbled together at one area of the cell. Endometrials have far less cytoplasm and lack the smooth border of the giant histiocyte.

#### **E. Hormonal patterns**

- Because the squames mature in a fairly direct relation to the blood estrogen level, it is possible to estimate this effect by the degree of squamous maturation. However, it is well to remember that exogenous estrogen is commonly taken and the administration of other hormones such as progesterone, androgens, adrenal cortical steroids or anterior pituitary hormones may bring about some degree of squamous stimulation – depending on how the epithelium was previously primed.
  - The most accurate estrogen indices are obtained from the lateral vaginal wall scrape. The cervical smears are often inaccurate for this test. Endocervicals, inflammatory cells, mucous and metaplasia may interfere with a clear squamous picture. Also, the epithelium near the os is not as responsive to estrogen stimulation as the vaginal wall
1. These are instances in which hormonal cytology is of value
    - a. Assessment of ovarian function in hysterectomized women
    - b. Assessment of ovarian function on patients with menstrual disorders
    - c. Assessment of prognosis and guidance of therapy in pregnancy

- d. Diagnosis of follicular persistency
- e. Assessment of proper admixture of administered multihormonal agents
- f. Diagnosis of hormone producing tumors in young children and postmenopausal women

## **F. Background**

1. **Candida species** – a common fungus seen in pap smears. It is especially prevalent in pregnant women and must be identified because it may cause an infection in newborn infants. It also causes an exudate and irritation in the infected women. They have thin ruler-like hyphae with segments. Tiny spores may be seen budding from the hyphae. Candida often tightly binds squamous cells together (flowers-in-a-lei).
2. **Trichomonads** are common protozoa which often occur with an elevated vaginal pH. Trichomonads are small, pear-shaped organisms with a faint nucleus in the center. They usually stain greenish-blue and appear rather fuzzy. There is usually some red granules visible in the cytoplasm. Changes associated with trich are: inflammation, metaplasia, possible bleeding, elevated estrogen effect, active nuclei, and degeneration. These changes may or may not be seen depending on the strain of trichomonads and the patient or host response.  
**Leptothrix** is a bacteria that appears like strands of spaghetti and is usually associated with trichomonads.
3. Another background component which is comparatively rare, is the virus **Herpes simplex**. Herpes can effect either the squamous or glandular cells. The virus penetrates the nucleus and forms an irregular intranuclear inclusion surrounded by a halo or cleared space. The nuclei often become multinucleated and lobulated. Before the inclusion is formed, the nuclei may assume a glassy quality.
4. **Chlamydia** is associated with a wide range of genital tract disease and is reaching epidemic levels as a sexually transmitted pathogen. They have biological and biochemical characteristics of both viruses and bacteria. They are virus-like because they are obligate intracellular parasites.
  - a. The organisms are similar to gram-negative bacteria because of their coccoid appearance, anaerobic existence and rigid cell wall. It has now been determined that they are bacteria but because of their peculiar life cycle they have been placed in their own order – Chlamydia with two species – *Chlamydia psittaci* and *Chlamydia trachomatis*.
  - b. Cytologic picture

- 1) Nuclei slightly enlarged, hyperchromatic, and nucleoli usually not present
  - 2) Cytoplasm-dense, cyanophilic, finely granular appearance with sharp cytoplasmic borders
  - 3) Usually affects squamous metaplastic cells and endocervical cells
  - 4) Diffusely scattered throughout the cytoplasm are eosinophilic and cyanophilic coccoid structures. The larger of these early inclusion bodies are surrounded by membrane-bound clear zones. Later the inclusions take on a prominent appearance and become cyanophilic. Look for the clear zones.
5. **Gardnerella vaginalis** may cause vaginitis and may be identified in the cell when clue cells are found. The cytologic picture is few pus cells, lack of lactobacilli, background of many small rods, and “clue” cells which are epithelial cells covered with adherent small bacilli uniformly spaced and of a grainy appearance.

### **G. Squamous metaplasia**

- Squamous metaplasia is the replacement of fragile columnar by the tougher squamous cells. In gynecological cytology, this usually occurs at the squamocolumnar junction of the endocervical canal but it could occur elsewhere. This change is often a reaction to injury or infection and seems to provide a protective layer of epithelium – one more resistant to injury. Metaplasia may occur anywhere in the body where there is columnar epithelium. Because squamous metaplasia often precedes and/or accompanies carcinoma in situ, it is essential for cytologists to understand metaplasia.
1. The characteristic cytological changes which will be shown are
    - a. Poorly differentiated cytoplasm
    - b. Amphophilic staining
    - c. Active nuclei (chromocenters present)
    - d. Pleomorphism
    - e. Bizarre cells
    - f. Small cells (in relation to the normal squamous counterpart, although metaplastic cells may sometimes be large)
    - g. Variation of shape of cells – cookie-cutter arrangement

### **H. Dysplasia**

- Dysplasia is a histological term meaning abnormal tissue growth. The cytological term for the same thing on a cellular level is dyskaryosis. A dyskaryotic cell is one with an abnormal nucleus. Many dyskaryotic cells present on a smear reflect the condition of dysplasia. This condition often follows metaplastic changes in the endocervical canal.

- Dysplasia may be mild (atypical) to severe (suspicious), depending on the degree of nuclear abnormality present. Some dysplasia regress and others progress to cancer. In other words, dysplasia is often part of a series of changes leading to malignancy. Under the Bethesda system, these changes are classified as either a low-grade squamous intraepithelial lesion (mild dysplasia) or high-grade squamous intraepithelial lesion (moderate and severe dysplasia and cis)
1. The most common features of dysplasia as seen in dyskaryotic cells are
    - a. Nuclear enlargement and irregularity (multinucleation is common)
    - b. Hyperchromasia
    - c. Uniform finely chromatic pattern
    - d. Chromocenters may be present
    - e. Increased N/C ratio
    - f. Pleomorphism
    - g. Dyskeratosis
    - h. Bizarre cells

### **I. Condylomata acuminata**

- Koilocytic atypia shows a pattern of nuclear abnormalities with vacuolization and ballooning of the cells of the upper layers of the epithelium. The epithelial lesion has some resemblance to the common wart of condyloma acuminata.
  - Squamous papillary lesions of the cervix and vagina can be divided into two groups: (1) Condyloma acuminata, (2) Solitary squamous papillomas. Condyloma acuminata or venereal warts, are sexually transmitted papillomas which are caused by the HPV virus of the papova group. They are usually multiple and numerous and involve the skin of the perineal area and the vulva in the female, or the glans penis in the male. Histologically the lesions are composed of a connective tissue lined by squamous epitheliums arranged in numerous papillary folds.
1. The epithelial lining of the condyloma acuminata is usually composed of large squamous cells with
    - a. Clear cytoplasm
    - b. Perinuclear clear zone (perinuclear cavitation)
    - c. Rather prominent, enlarged, often binucleated hyperchromatic nuclei
    - d. Mitotic activity
    - e. Elongated squamous cells with hyperchromatic nuclei
    - f. May exfoliate singly but are often seen in sheets or clusters

### **J. Carcinoma in situ**

- Carcinoma in situ is cancer in the epithelium, only it has not progressed beyond the basement membrane. This

lesion commonly occurs at the squamocolumnar junction and usually develops from a metaplastic and/or dysplastic site. Because carcinoma in situ is part of a series of regressive changes involving both metaplasia and dysplasia, it can be extremely difficult to differentiate between severe dysplasia and carcinoma in situ. Hence, the Bethesda system places both as high grade lesions.

- The histologic picture shows a loss of normal stratification and polarity. The cells appear jumbled and disorderly. There is a loss of cytoplasm which creates crowding. The nuclei are cytologically malignant, ie, the chromatin pattern is coarse and irregular, and nuclei vary in size and shape. These changes effect the entire thickness of epithelium. There is no invasion of the underlying stroma. No nucleoli are present.
- Depending upon the collection technique utilized, abnormal cells originating in carcinoma in situ may be either isolated or arranged in aggregates. Aggregates of abnormal cells are observed more commonly in samples obtained by scraping the uterine cervix, whereas isolated cells are more frequently present in specimens obtained by aspirating the contents of the endocervical canal or posterior vaginal fornix. Aggregates of abnormal cells are referred to as a syncytial arrangement. In such an arrangement, the component cells are irregularly arranged in relationship to one another and have indistinct cell borders. This is called syncytial cell carcinoma in situ.

### **K. Invasive squamous carcinoma**

- The outstanding feature is the overall smear pattern which is usually degenerate, bloody and inflammatory. The diagnostic malignant cells are often in poorly differentiated groups with fairly prominent nucleoli. Many dyskaryotic and dyskeratotic cells may be present; these cells help to differentiate the tumor as squamous but are not in themselves always diagnostic of malignancy.
1. Characteristics of invasive squamous carcinoma are
    - a. Poorly differentiated groups
    - b. Nucleoli (not as prominent as in adenocarcinoma)
    - c. **Many** malignant cells
    - d. Background – bloody, inflammatory, degenerate
    - e. Bizarre cells (tadpoles and fiber cells)
    - f. Pleomorphism
    - g. Dyskeratosis
    - h. Abnormal keratinization (orangeophilia)

### **L. Adenocarcinoma**

- By far the most common adenocarcinoma seen in GYN cytology is endometrial adenocarcinoma. However, adenocarcinoma is not particularly variable from different primaries. The characteristic adeno features are usually

seen in all glandular tumors. Endocervical Adenocarcinoma is extremely rare and has larger cells than endometrial carcinoma. Ovarian carcinoma may also be seen and sheds big, classic vacuolated cells with prominent nucleoli. The background is usually clean.

1. Characteristics of adenocarcinoma are
  - a. Prominent nucleoli
  - b. Vacuolization
  - c. Glandular formations (balls, acing, papillary structures)
  - d. **Groups** (as well as single cells)
  - e. Delicate cytoplasm
  - f. Usually **hypochromasia** (rather than hyper)
  - g. Nuclear pleomorphism
2. The **vaginal pool** smear is often the most significant in older women.

### **M. Radiation effect**

- Radiation treatment on the normal cells of the cervix and vagina may be suggestive of malignancy if the criteria for interpreting radiation effect is not understood. This cellular reaction may last for many years.
  - Tumor cells are also affected and may appear extremely bizarre after irradiation; however, these obviously affected tumor cells provide no reliable diagnosis of persistent cancer, because they are no longer capable of reproduction. Only those carcinoma cells which are unaffected (or only slightly affected) by radiation are significant in reflecting the presence of persistent or recurrent tumor. It is of interest that these diagnostic cells are often the small, subtle in-situ type cells. In other words, after radiation, the tumor often recurs (or begins) again as a carcinoma in situ or persistent carcinoma. But the main point is that diagnostic tumor cells after radiation treatment must be free of radiation effect.
  - Cellular changes usually result from the stimulating (ionizing) effect of radiation and represent various aspects of response or growth. Radiation also causes degeneration because of its direct effect. The cellular reaction is degeneration. Atrophy is also part of the picture, as radiation of the pelvic area causes sterilization. Parabasal sheets often appear bizarre and “metaplastic.”
1. The following are radiation effects.
    - a. Vacuolization of the cytoplasm (mainly a parabasal change)
    - b. Increased cell size and pleomorphism
    - c. Bizarre cells
    - d. Prominent nucleoli-reparative change
    - e. Multinucleation and nuclear wrinkling
    - f. Double staining cytoplasm – two tone
    - g. Nuclear vacuolation

- h. Background – network of mucus and neutrophils
  - Vacuolization and neutrophils are regarded as early radiation effect and often disappear after a few months. Other changes may persist forever.
  - (Irregular chromatin detail, hyperchromasia and increased N/C ratio are not radiation effects.)

**N. Reparative change**

1. Repair is the replacement of dead or damaged cells by new healthy cells. Cells derived from reparative processes are epithelial cells with varying degrees of differentiation, the origin of which can be ascribed to either columnar squamous or metaplastic epitheliums and connective tissue. The benign process described gives rise to cells characterized by some of the morphologic features of an invasive neoplastic process.
2. Repair usually represents cells which are in the process of reacting or responding to one of many noxious external stimuli including
  - a. Inflammation
  - b. Radiation
  - c. Post hysterectomy
  - d. Recent cauterization or biopsy
3. The general characteristics of repair are
  - a. Sheets of cells presumably or usually which are endocervicals
  - b. Cyanophilic and sometimes vacuolated cytoplasm
  - c. Background – fresh blood and inflammation
  - d. Uniformly finely granular chromatin or less commonly coarsely granular
  - e. Eosinophilic macronucleoli – single or multiple
  - f. Variability in nuclear size
  - g. Cytoplasm characterized by ribbon-like extensions (tail-like cytoplasm)
  - h. Mitotic figures may also be present
    - The previously mentioned characteristic may make it very difficult to differentiate repair from endocervical adenocarcinoma and large cell in-situ carcinoma.

| <b>Repair</b>                   | <b>Endocervical adenocarcinoma</b>              |
|---------------------------------|---|
| Macronucleoli                   | Micronucleoli                                   |
| Finely granular chromatic       | Coarse chromatin                                |
| Cell aggregates                 | Isolated – or syncytial                         |
| Inflammatory exudate            | Clean background                                |
| Often well defined cell borders | Overlapping of cells with little cytoplasm      |
| <b>Repair</b>                   | <b>Large cell in-situ</b>                       |
| Aggregates                      | Isolated  |
| Fine chromatic                  | Coarse chromatic                                |
| Macronucleoli □ Cell borders    | Less common □ Less distinct cell border or none |

## **II. Ask Me About ASCUS**

- All you really wanted to know about ASCUS but were afraid to ask us

### **A. ASCUS**

- Somewhere on the road between reactive and SIL is ASCUS
- Ill-defined; has led to misuse/overuse
- Interlaboratory use subject to marked variation
- 1. How to improve:
  - a. Seminars to discuss/agree on appropriate criteria
  - b. “ASCUS panel” consensus diagnosis on cases by the Dream Team
  - c. Two-pathologist review on all ASCUS cases

### **B. Criteria**

1. Nucleus 2-3x cross diameter of intermediate cell nucleus; darker
2. Chromatin: increased, even, no granularity
3. Number of affected cells 3-5
4. Miniature polygonal squamous cells with dense, organeophilic an/or acidophilic cytoplasm with small pyknotic nuclei (parakeratosis) is usually a benign reactive surface process **not ASCUS** (often associated with tric, candida, etc.)
5. If no history of previous abnormality and/or patient under 40, be conservative.
6. In ASCUS possible dysplasia – variation in size of nuclei

### **C. Differential diagnoses**

1. Inflammatory reaction (tric, candida, etc.)
2. Reactive metaplastic cells
3. Reactive/reparative endocervicals
4. Parabasal cells
5. Atrophic cells
6. Dysplasia
7. Degeneration

### **D. A general rule of thumb**

- ASCUS rates should be about twice the percentage of abnormal rates (Usually ASCUS 3%, abnormal 1-2% where abnormal equal low-grade or above))
- If ASCUS is over 5%, **overuse** of term.

### III. Bethesda System

#### Bethesda: Specimen Adequacy

|                                      |  |
|--------------------------------------|--|
| <b>Satisfactory for evaluation:</b>  | Appropriate labeling and identifying info<br>Relevant clinical data<br>Adequate cells (covers over 10% slide surface)<br>Adequate transformation zone cells (2 clusters of 5 or more cells)<br>Endocervicals or a lot of metaplastics              |
| <b>Satisfactory, but limited by:</b> | Lack of pertinent info <input type="checkbox"/> Partially obscuring blood, inflammation, thick area (precludes interpretation of 50-75% of cells) <input type="checkbox"/> Lack of endocervical component  |
| <b>Unsatisfactory:</b>               | Total lack of patient ID <input type="checkbox"/> Broken, unrepairable slide <input type="checkbox"/> Insufficient cells (less than 10% of slide with cells) <input type="checkbox"/> Greater than 75% of cells obscured or inadequately preserved |

#### A. Adequacy of the specimen

- Satisfactory for evaluation
- Satisfactory for evaluation but limited by (Specify reason)
- Unsatisfactory for evaluation (Specify reason)

#### B. General categorization (optional)

- Within normal limits
- Benign cellular changes: see descriptive diagnosis
- Epithelia cell abnormality: see descriptive diagnosis

#### C. Descriptive diagnoses

1. Benign cellular changes
  - a. Infection
    - *Trichomonas vaginalis*
    - Fungal organisms morphologically consistent with *Candida spp*
    - Predominance of coccobacilli consistent with shift in vaginal flora
    - Bacteria morphologically consistent with *Actinomyces spp*
    - Cellular changes associated with Herpes simplex virus
    - Other
  - b. Reactive changes
  - c. Reactive cellular changes associated with:
    - Inflammation (includes typical repair)
    - Atrophy with inflammation (so called “atrophic vaginitis”)
    - Radiation
    - Intrauterine contraceptive device (IUD)
    - Other
2. Epithelia cell abnormalities
  - a. Squamous cell
    - Atypical squamous cells of undetermined significance. Qualify

- Low grade squamous intraepithelial lesion (SIL) encompassing HPV, mild dysplasia/CIN 1
- High grade squamous intraepithelial lesion, encompassing moderate and severe dysplasia, CIS, CIN 2 and 3
- Squamous cell carcinoma
- b. Glandular cell
  - Endometrial cells, cytologically benign, in a postmenopausal woman
  - Atypical glandular cells, of undetermined significance (qualify)
  - Endocervical adenocarcinoma
  - Endometrial adenocarcinoma
  - Extrauterine adenocarcinoma
  - Adenocarcinoma, NOS
- 3. Other malignant neoplasms; (specify)
- 4. Hormonal evaluation (applies to vaginal smears only)
  - Hormonal pattern compatible with age and history
  - Hormonal pattern incompatible with age and history; (specify)
  - Hormonal evaluation not possible due to: (specify)

## **IV. One Last Look**

### **A. GYN**

- Atrophic smear
- Endocervical cells
- Condyloma
- Microinvasive carcinoma
- Leptothrix
- Menstrual smear
- Follicular cervicitis
- Endocervical adenocarcinoma
- Trichomonas
- Dysplasia
- Psammoma bodies
- Squamous metaplasia
- Herpes
- Chlamydia
- Air drying artifact
- Repair
- Endometrial cells
- Folate/radiation changes
- Clue cells (*Gardnerella vaginalis*)
- IUD reaction
- Endometrial adenocarcinoma
- Oral contraceptives
- CIS
- Vaginal adenosis
- Actinomyces
- Parakeratosis

- Donovan bodies
- Hematoidin crystals
- Malignant transitional cells
- (Vesico-vaginal fistula)
- Molluscum
- ASCUS

**B. Respiratory cytology**

- Herpes
- CMV
- Saliva
- Creola bodies
- Coccidioides
- Alveolar proteinosis
- Squamous cell carcinoma
- Large cell carcinoma
- Chemotherapy
- Normal bronchial cells with terminal bars
- Curschman's spirals
- Charcot-Leydin crystals
- Blastomyces
- Squamous metaplasia
- Tuberculosis
- Histoplasmosis
- Atypical squamous metaplasia
- Small cell carcinoma
- Giant cell carcinoma

**C. Thyroid**

- Hurthle cell neoplasm
- Papillary carcinoma
- Normal thyroid
- Hashimoto's

**D. Breast**

- Apocrine metaplasia
- Infiltrating duct carcinoma
- Duct papilloma
- Breast carcinoma in a rib
- Foam cells – modified duct lining cells
- Lobular
- Fibroadenoma

**E. CSF**

- Metastatic carcinoma – lung and breast most common
- Metastatic melanoma
- Squamous cell carcinoma
- Cryptococcus
- Meningioma
- Leukemia

**F. Fluids**

- Histiocytes

## *Cytology Review Course*

- Mesothelial cells (normal and reactive)
- Adenocarcinoma
- Liver cells
- Clear cell carcinoma
- Breast
- Ovarian carcinoma
- Signet ring adenocarcinoma
- Lymphoma
- Small cell carcinoma
- Papillary carcinoma with psammomas
- Multiple myeloma
- Eosinophils
- Granulosa cell

### **G. GI**

- Benign gastric cells
- Giardia – duodenum
- Colonic adenocarcinoma
- Benign colon cells
- Malignant gastric cells
- Reactive gastric cells
- Carcinoid

### **H. Urine**

- Squamous cell carcinoma
- Transitional cell carcinoma
- Atypism
- Eosinophilic inclusion
- Giant cell
- Clear cell carcinoma
- Malakoplakia
- Multinucleation
- Chemotherapy changes
- Iliac conduit
- Umbrella cells
- Seminal vesicle
- Uric acid crystals

### **I. Salivary glands**

- Warthin's

### **J. Lymph nodes**

- Hodgkin's

### **K. A second last look**

1. Squamous cell CIS(s)
2. Trich(s)
3. Abnormal endocervicals(s)
4. Invasive squamous cell CA(s)
5. Endometrial carcinoma
6. Vacuolated metaplastic cells
7. Normal Pap
8. Trich

9. Chlamydia
10. Necrotic background of malignancy
11. Normal endocervical cells
12. ASCUS
13. Air drying
14. Exodus
15. Hyperkeratosis
16. Malignant vulvar lesion
17. Normal salivary gland
18. Normal bronchial epithelium
19. Normal prostate
20. Benign gastric mucosa
21. Benign mesothelial cells
22. Carcinoid
23. Barrett's esophagus
24. Squamous cell carcinoma of esophagus
25. Adenocarcinoma of esophagus
26. Rheumatoid arthritis in fluid (pleural)
27. Pneumocystis
28. Seminoma, thymus
29. Squamous cell carcinoma of lung
30. Large cell carcinoma of lung
31. Mesothelioma
32. CMV (urine)
33. Dermoid cyst
34. Reactive bronchial cells
35. Branchial cleft cyst
36. Glioblastoma
37. Rectal contaminant on prostatic biopsy
38. Choroid plexus
39. Myeloid leukemia, CSF
40. Blastomyces
41. Pollen
42. Schistosomiasis
43. Renal cell carcinoma
44. Urine with red intracytoplasmic inclusion
45. Transitional cell carcinoma
46. Cecal aspirate, 11-year-old, reactive and reparative
47. Prostate with granulomas (answer: BCG therapy)
48. Fibroadenoma(s)
49. Ductal carcinoma(s)
50. Ovarian granulosa cell(s)
51. Mesothelioma(s) (answer: exception type transudate)
52. Papillary adenocarcinoma(s)
53. Metastatic breast carcinoma in fluid
54. Papillary carcinoma of the thyroid
55. Hashimoto's
56. Hepatoma(s) (answer: alpha-fetoprotein)
57. Well-differentiated pancreatic adenocarcinoma(s)

## *Cytology Review Course*

58. Prostatic hyperplasia(s)
59. Burkitt's(s)
60. Neurilemmoma(s)
61. Lymphoma, salivary gland(s)
62. Reactive lymph node(s)
63. Repair, GYN
64. Granulosa cell, ovary
65. Hematoidin crystals, Pap