Cytopathology, Hennepin County Medical Center

Contemporary cytopathology is viewed as a clinically oriented subspecialty that aims to rapidly diagnose significant patient problems with atraumatically collected material. The goal is improved patient care through highly skilled application of the methods available in our discipline. This includes educating our clinical colleagues to the possibilities and advantages of cytologic evaluations, as well as realizing the full application of newer diagnostic modalities to cytologic material. The laboratory’s philosophy features an active, interventional stance for the modern cytopathologist through performing aspirations in the clinic, participating in radiographically directed aspirations, and acting as a consultant to the clinical staff.

The laboratory and its educational missions are hierarchically structured. This ascends from the students of cytotechnology, through staff cytotechnologists, resident physicians in pathology, the cytopathology fellow and subspecialty certified cytopathologists. The cytopathology fellow works closely with trainees in the general pathology program. This includes opportunities for teaching at the microscope, as well as bedside demonstrations/teaching of fine needle aspirations, a leadership role in conferences, and formal didactic exercises offered both to residents and cytotechnology students.

Interactions between the cytopathology resident and services devoted to necropsy, clinical pathology, and surgical pathology are most commonly based on follow-up of patients who have been previously studied by cytologic means. Staging of malignancies initially diagnosed in histologic biopsies is often addressed by fine needle aspiration. In the setting of certain types of disease, cytologic specimens are collected for cytogenetic, immunophenotypic, flow cytometric, or hormone receptor analysis. Communication with the laboratories responsible for these studies is an important component of complete evaluation of some cytology cases. Follow-up of cytology cases in surgical pathology is a daily activity, as a part of quality control, and in preparation of teaching sets. Both of these are important areas of activity for the resident.

Institutional Site Director
Stuart E.H. Cameron, MD

Coordinating Teaching Faculty Member
Steven M. Debol, MD, PhD, Phone: 612-873-5669

Teaching Faculty Members
Stuart E.H. Cameron, MD
Gretchen S. Crary, MD
Steven M. Debol, MD
Bradley M. Linzie, MD
Lead Technical and Support Personnel
Barb Kiesner, Teaching and administrative areas
Mary Greene, Teaching in preparatory area
Andrew Topp, Teaching in preparatory area
Hilda Rosai, Multiheaded microscope review of interesting cases

Training Site:
Hennepin County Medical Center - Lower Level, Purple Building

Duration of Rotation:
One month each, two rotations required

Post Graduate Level of Residents Involved
PGY 1-5

Supervisory Guidelines for Patient Care and Specimen Handling
Patient procedures (Fine Needle Aspiration): Residents assist and/or perform all fine needle aspiration procedures performed by the Cytology service. This includes bedside aspirations of palpable lesions, as well as radiology-performed aspirations of deep seeded lesion with CT or ultrasound guidance. In all cases, a rapid stain is performed and an immediate assessment of specimen adequacy or diagnosis is rendered. Prior to performing needle aspirations, residents will have been instructed in the preparation of smears for microscopic examination and the basic mechanics of the procedure by aspiration of inanimate objects.

Supervision for resident specimen processing and interpretation: Residents participate in preparation of specimens using the methods outlined previously. The goal of this activity is primarily to achieve a clear understanding of cytopreparatory options and limitations. Technical competence in these methods is not a major focus of the pathologist’s education. Thus, the residents function in a largely observer capacity in this area of the laboratory.

Supervision for direct resident decision making in the laboratory: In cytopathology, the major decisions that must be made center around selection of specimen processing modalities or submission of special samples for various ancillary studies. Residents, students, technologists, and the faculty discuss these issues in a case by case basis. Emphasis is placed in generating the greatest amount of clinically useful information. This features cost effective and efficient use of ancillary techniques and timely results reporting.

Overview of Daily Duties and Responsibilities
1. Be available during the day to perform fine needle aspirations on short notice
2. Review all current fine needle aspirations and formulate the differential diagnosis
3. Contact clinicians and review electronic medical records for pertinent history
4. Discuss diagnoses with clinicians and demonstrate microscopic findings if requested
5. Review all current non-gynecologic material
6. Attend and/or present at the monthly Ob-Gyn Pap test and cervical biopsy correlation conference.
7. Use the glass slide study sets, organizing your studies by organ system.
8. Follow-up on subsequent surgical specimens and contribute cases of interest to the study set.
9. Attend anatomic pathology conferences and present a cytology-based conference one time/month.
10. Review abnormal pap smears from current clinical material and screen slides each day, asking questions to clarify findings or diagnoses which you don't understand.
11. Review the cervical cytology glass study set slides, asking questions to clarify findings and diagnoses you don't understand.

In cytopathology, the primary opportunity for graded responsibility occurs as residents acquire greater skill and experience with fine needle aspiration. While the current regulatory environment requires that the faculty be in attendance at these procedures, residents are allowed greater freedom in selecting sites for aspiration, performing the procedure, and preparing the material as their experience increases.

Gynecologic cytology reports are generated largely by pre-established computer codes, so that familiarity with the Bethesda system and with the range of codes available in our computer system constitutes report generating capability for the resident. In fine needle aspirations, a surgical pathology-style report is generated which describes the patient's condition, the details of procedure performance, the type of slides prepared, the microscopic findings, and a diagnosis with any qualifying comments. These reports are generated by residents who enter the findings prior to review by the faculty and are either amended with the resident or signed out as necessary.

Residents and fellows work closely together on the service. An effort is made to minimize the extent to which one dilutes the experience of the other. Careful coordination of schedules is the approach taken to this philosophy. Experienced fellows provide considerable teaching of residents. This includes technical matters as discussed previously, as well as description of cases at the microscope. Fellows take a strong supervisory role. These individuals are usually more advanced in their general anatomic pathology training than most residents. Thus, they provide a valuable educational resource for the residents. Residents are given less freedom in performing fine needle aspirations than are fellows. This is especially true later in the year when fellows have acquired considerable hands-on clinical experience.

Goals and Objectives

Non-Gynecologic Cytology
Goals: To learn to accurately diagnose non-gynecologic cytology specimens, and develop an appreciation for the clinical significance of the findings.

Objectives: After completing the rotation, the resident should be able to accurately diagnose and describe appropriate processing for the following:

1. Body fluids
   a. Pleural
   b. Peritoneal
   c. CSF
   d. Breast secretion
   e. Cyst fluid from ovary, kidney and breast
   f. Pericardial
   g. Synovial
2. Urine
   a. Reactive changes in instrumented and non-instrumented samples
   b. Low and high grade transitional cell carcinoma
   c. Viral changes
3. Pulmonary specimens (BAL, sputum, washes, brushings)
   a. Small cell and non-small cell carcinoma
   b. Viral changes
   c. Fungus
   d. Pneumocystic
   e. Other parasites

Gynecologic Cervical Cytology

Goals: Learn to accurately diagnose cervical cytology specimens and understand the clinical significance of cervical cytology findings.

Objectives: Upon completion of this rotation, residents should be able to:

1. Stain a slide using pap stain:
   a. Explain the cellular fixatives which can be used for the pap stain
   b. Explain the value of the hematoxylin, OG and EA dyes
   c. Explain regressive and progressive staining methods
2. Explain the CLIA '99 regulations as they apply to gyn cytology laboratories.
3. Know the Bethesda nomenclature system for gyn cytology, and be able to describe similarities and differences to previous nomenclature systems (CIN I, CIN II, and Cin III, and Pap numerical classification).
4. Define what constitutes an adequate pap smear according to the Bethesda system.
5. Describe and recognize the normal cellular elements in the cervical smear:
   a. Describe the significance of normal endometrial cells in the cervical smear
   b. Recognize "exodus"
c. Describe the significance of navicular cells, decidual cells, trophoblastic cells, and Arias-Stella cells

d. Describe the significance of histiocytes

e. Recognize spermatozoa, know how a pap smear is handled for forensic purposes, and when sperm should be reported

6. Recognize and describe the diagnostic patterns in hormonal cytology:
   a. Describe how a smear should be taken for hormonal evaluation
   b. Describe the commonly used indices (KPI and MI)
   c. Describe the expected patterns associated with
      i. Menstrual cycle
      ii. Prepuberty
      iii. Pregnancy
      iv. Postpartum
      v. Post menopause
   d. Describe when the estrogen proliferation test is useful and tell how it should be done

7. Recognize common infections which can be diagnosed by pap smear, and describe in general terms the sensitivity, specificity and clinical significance of the specific diagnoses:
   a. Bacterial vaginoses, including Gardnerella
   b. Actinomyces
   c. Leptothrix
   d. Herpes simplex
   e. Chlamydia
   f. Candida
   g. Trichomomonas

8. Recognize benign cellular changes associated with the following:
   a. Acute inflammation
   b. Repair
   c. Hyperkeratosis
   d. Folic acid deficiency
   e. Intrauterine device
   f. Follicular cervicitis
   g. Radiation effect
   h. Atrophic cervicitis
   i. Tubular metaplasia of endocervical cells

9. Recognize and describe the cytologic features diagnostic of HPV infection.
   a. Discuss the prevalence of HPV infection revealed by different assays
   b. Discuss the association of specific HPV strains with neoplasia

10. Recognize and describe proneoplastic changes of squamous cells in terms of nuclear size and contour, chromatin pattern, cytoplasm, cell size and cell number, and smear background.
   a. Atypical squamous cells of undetermined significance
   b. Low grade squamous intraepithelial lesions
   c. High grade squamous intraepithelial lesions
11. Describe and identify the cytologic features of adenocarcinoma in the cervical Pap smear.
   a. Describe the features of adenocarcinoma in situ and how it can be distinguished from some of its mimics
   b. Describe how to distinguish reactive endocervicals from adenocarcinoma
12. Describe and identify the cytological features of endometrial and extrauterine adenocarcinomas in the Pap smear.
   a. Distinguishing features of endocervical and endometrial adenocarcinoma
   b. Distinguishing features of extrauterine adenocarcinoma
13. Discuss the effectiveness of the cervical Pap smear in diagnosis of malignant and premalignant lesions.
   a. Significance of the atypical pap smear
   b. Interobserver reproducibility
   c. Screening accuracy
   d. Correlation with histopathology, and possible reasons for discrepancies
   e. Relative rates of cervical carcinoma in screened and unscreened populations
14. Suggest appropriate clinical follow-up for abnormal pap smear findings

Fine Needle Aspiration Cytology

Goals: Learn to perform fine needle aspiration of palpable masses and to diagnose the majority of commonly encountered lesions. Develop an appreciation for the value and limitations of fine needle aspiration.

Objectives: Residents will be expected to study the following organ systems and achieve the following objectives:

1. Lymph nodes
   a. Competently perform fine needle aspiration of palpable lymph nodes, appropriately triaging the specimens for ancillary studies.
   b. Diagnose
      i. metastatic carcinoma
      ii. metastatic melanoma
      iii. lymphoma
      iv. granulomatous inflammation
      v. acute suppurative lymphadenitis
      vi. benign reactive changes
      vii. Mycobacterial infection
      viii. Branchial cleft cyst
   c. Recognize when a specimen should be judged non-diagnostic
   d. Suggest appropriate clinical follow-up for the above diagnoses
2. Breast
a. Describe the sensitivity and specificity of diagnosing carcinoma by fine needle aspiration
b. Be familiar with technique of performance of fine needle aspiration of the breast
c. Know when a specimen is non-diagnostic
d. Diagnose the following
   i. carcinoma
   ii. ductal atypia
   iii. fibroadenoma
   iv. benign ductal cells
   v. fat necrosis
   vi. mastitis
e. Suggest appropriate clinical follow-up for the above diagnoses

3. Thyroid
   a. Safely perform a fine needle aspiration of the thyroid
   b. Know what constitutes a diagnostic specimen
c. Diagnose the following
   i. anaplastic carcinoma
   ii. papillary carcinoma
   iii. follicular neoplasm
   iv. nodular goiter
   v. Hashimoto's thyroiditis
   vi. Hurthle cell neoplasm
   vii. normal thyroid tissue
d. Suggest appropriate clinical follow-up for the above diagnoses

4. Salivary gland
   a. Perform a fine needle aspiration of salivary gland
   b. Know what constitutes an adequate specimen
c. Diagnose the following
   i. sialadenitis
   ii. pleomorphic adenoma
   iii. Warthin's tumor
   iv. oncocytoma
   v. acinic cell carcinoma
   vi. monomorphic adenoma
   vii. muco-epidermoid carcinoma
   viii. adenocarcinoma

5. Lung
   a. Assist in the performance of CT guided lung FNA
      i. recognize a diagnostic specimen
      ii. suggest appropriate ancillary studies
   b. Diagnose the following:
      i. reactive lung and mesothelial cells
      ii. granulomatous inflammation
      iii. squamous cell carcinoma
iv. adenocarcinoma
v. small cell carcinoma
vi. carcinoid

6. Liver
   a. Assist in CT guided liver aspiration
   b. Be familiar with findings in benign liver aspiration
   c. Diagnose the following:
      i. granulomatous disease
      ii. abscess
      iii. hepatocellular carcinoma
   iv. metastatic carcinoma
      a. adenocarcinoma (including characteristics of colonic adenocarcinoma)
      b. squamous cell carcinoma
      c. small cell carcinoma
d. carcinoid

Core Techniques and Methods Covered

1. Accessioning, labeling, staining, and archiving of gynecologic cytology smears
2. Preparation of routine Papanicolaou and Diff Quick stains
3. Overview of hand cover slipping
4. Familiarity with cover slipping machines
5. Basic operating procedures and troubleshooting for Papanicolaou staining machine
6. Preparation of thin prep slides from specimens submitted in liquid fixative
7. Preparation of cytocentrifuge slides
8. Preparation of direct smears
9. Preparation of smears from material concentrated by centrifugation
10. Preparation of paraffin embedded cell block samples
11. Performance of rapid staining procedures on site in the radiology suite
12. Triage of aspirated samples through various special studies depending on clinical diagnostic possibilities
13. Discussing fine needle aspiration procedures with patients and physicians
14. Competent performance of fine needle aspirations from a variety of body sites
15. Preparation of aspirated material as smears, cell block sections, or samples for special studies

As noted previously, emphasis is placed on evaluating patients and performing fine needle aspirations. This includes not only the actual puncture, but also preparation of material, coordination of ancillary studies, and discussions with the clinical residents and faculty.

Opportunities to Function as Consultant to Other Physicians

Patient problems are discussed with physicians in other departments either before, at the time of, or after fine needle aspirations or after evaluation at the microscope of other samples.
submitted directly to the laboratory. In some cases these consultations are as simple as whether or not a particular cytologic method has application to the clinical problem at hand. In other instances, direct suggestions for patient care, further studies, or additional samples that might be needed are the focus of the pathology resident’s consultation with physicians in other departments.

Directly related to patient care decision making, residents in pathology function largely as consultants. Their most frequent role is interpretation of cytologic findings in the light of other clinical circumstances. The primary role in patient care decision making results largely from an advisory role regarding the meaning of various cytologic findings and the need for any additional testing.

Consultative interactions with physicians from other departments takes place on an informal basis as groups of physicians come by the laboratory during rounds or problem solving sessions. It is our philosophy that the resident in pathology should be the first ones to interact with these teams. This allows the resident to test his or her understanding of cytologic interpretations currently being rendered in the laboratory. This also includes a role in recommending additional testing or diagnostic limitations that may attend a particular cytodiagnostic interpretation.

In cytopathology, we do not round with other departments. However, we frequently host guests from other departments who are themselves making their own working rounds. This usually involves review and discussion of current cases. The clinical ramifications of the diagnosis being offered as well as the need for any additional testing are often the focus of these discussions.

Correlating laboratory results with clinical findings happens frequently during the clinical discussions just described. In cytopathology, a major follow-up method is review of subsequently obtained or previously available surgical samples in a surgical pathology laboratory. Special circumstances in which other laboratory data or clinical findings may be important are also discussed fully. For example, the possibility of aspiration pneumonia might be the focus when a bronchoalveolar lavage specimen is submitted for oil Red O staining. A frequent activity is review of pertinent radiographs including CT scans. This often provides available supplementary information especially when one considers the difficult diagnoses of malignancy.

Subsequently obtained histologic material is reviewed whenever possible. This includes fine needle aspiration specimens, cervicovaginal smears, and non-gynecologic preparations. Furthermore, cervical biopsies are signed out with a record of all previous pap smears. Those that are abnormal and have led to the cervical biopsy procedure are reviewed and a statement is rendered in the report regarding the degree to which these do or do not correlate. At this time, additional studies may be recommended.

**On-Call Duties**
The resident is expected to be available to laboratory personnel and our clinical colleagues, either in person or by pager, throughout the working day. The residents at Hennepin County Medical Center are provided with a pager and are expected to be available for questions which arise on the Cytology Service by a variety of clinical services. The cytopathology staff person on-call is available at all times for review of questions and recommendations for further action. During this rotation, the residents will on average have one out of every seven days free of hospital duties. Due to the at-home nature of call and the limited number of emergencies, the call duties are generally constructed in the following fashion. The on-call periods last from 7:00 a.m. on Monday morning through the following weekend, ending at 7:00 a.m. on the subsequent Monday. While on-call, residents are supervised by a teaching faculty member, who is available at all times, either via their office phone, pager, or home phone. The resident is expected to be available for weekend procedures as they arise. Any interaction with the clinical services regarding hematopathology issues is to be reviewed with the appropriate hematopathology staff on-call, prior to interaction with the clinical services. The cytology resident shares on-call duties with the other anatomic pathology services, including surgical, autopsy, and hematopathology on a rotating basis. During the on-call period, the resident is responsible for handling clinical requests that arise during off hours, emergent operating room consultations, emergency off-hour autopsies with the approval of the on-call staff pathologist, and autopsies which present before 12:00 noon on the weekends.

**Communication with On-Duty Faculty**

Teaching faculty members on service are physically present during standard operating hours (7:30 AM - 5:00PM); specific faculty members when not physically present in the laboratory are available by phone or pager. No diagnosis is communicated to clinicians before a faculty member has evaluated the case.

**Structured Education in Management of the Cytopathology Laboratory**

Residents rotating in cytopathology are exposed to laboratory operations and equipment, maintenance and operation, as previously described. During this rotation, the residents will attend scheduled quality assurance, laboratory safety, and other appropriate staff meetings as they relate to laboratory management. As opportunity provides, residents will be allowed to participate in CAP laboratory accreditation inspections of the laboratory, both self-inspection and inspection of other laboratories.

**Required Conference/Seminars**

- **Mondays** - ENT Conference, 7:30 - 8:30 am, monthly. Residents attend a clinicopathologic correlation working conference involving ENT, radiology, oncology, and pathology. This conference provides a regular avenue for trainee peer teaching. This clinical correlation conference provides trainees with the opportunity to present pathologic findings for correlation and discussion.
• **Tuesdays** - Hennepin County Medical Center/Abbott Northwestern Hospital Unknown Conference, 7:30-8:30 a.m., weekly. This conference alternates hospital sites each week. Weekly challenge of 5 current (difficult or classic) cases from HCMC and 5 cases from Abbott-NW Hospital for review and diagnosis by the residents. This conference provides a weekly forum for trainee and faculty discussion of difficult and unusual cases. Each resident gives a diagnosis in round robin fashion with questioning and discussion by moderating faculty (Brad Linzie MD and John Jones MD) from each institution.

• **Wednesday** - University of Minnesota Laboratory Medicine and Pathology Grand Rounds, 8:00-9:00 a.m., weekly. Conference is held on the University of Minnesota Medical School Campus.

• **Thursdays** - Tumor conference, 12:00 - 1:00 pm, weekly case based discussion presented by Faculty of Surgical Oncology, Radiology, Pathology, Radiation Oncology, Medical Oncology. This conference provides a regular avenue for trainee peer teaching. This clinical correlation conference provides trainees with the opportunity to present pathologic findings for correlation and discussion.

• **Fridays** - Rosai/Sinard Conference, 7:15-8:00 a.m., weekly, residents present a variety of real cases on a theme related to a recent or up-coming the faculty Resident's Conference. Conference is held on the University of Minnesota Medical School Campus. This conference provides a regular avenue for trainee peer teaching with feedback given by the Chief Resident's Subcommittee.

• **Fridays** - Resident's Conference, 8:00-9:00 a.m., weekly, residents attend conferences on a variety of scheduled pathology topics. Conference is held on the University of Minnesota Medical School Campus.

• **Mondays** - Residents' Specialty Conference, 7:00 - 8:00 a.m., weekly; residents attend conferences put on by a staff pathologist, presenting cases from their specific specialty area.

• **Wednesdays** - Residents' Unknown Conference, 7:00 - 8:00 a.m. (@ 3 weeks/month)

• **Wednesdays** - Residents' Journal Club, 7:00 - 8:00 a.m. (1 week/month)

**Interdepartmental Conferences**

1. Renal pathology conference, monthly interdisciplinary conference with pathology faculty and residents and nephrology faculty and residents. This conference provides a weekly forum for trainee and faculty discussion of difficult and unusual cases. This conference provides a regular avenue for trainee peer teaching. This clinical conference provides trainees with the opportunity to present pathologic findings for correlation and discussion.

2. Neuromuscular conference, Wednesday, weekly presentation of cases by faculty neuromuscular pathologists to residents, technologists and other pathologists. This conference provides a weekly forum for trainee and faculty discussion of difficult and unusual cases. This clinical conference provides trainees with the opportunity to correlate and discuss pathologic findings.
3. Urologic Pathology Conference, weekly. This conference provides a regular avenue for trainee peer teaching. This clinical conference provides trainees with the opportunity to present pathologic findings for correlation and discussion.

4. Ob-Gyn Conference, monthly. This conference provides a regular avenue for trainee peer teaching. This clinical conference provides trainees with the opportunity to present pathologic findings for correlation and discussion.

5. Dermatology Conference, weekly. This conference provides a regular avenue for trainee peer teaching. This clinical conference provides trainees with the opportunity to present pathologic findings for correlation and discussion.

Scholarly Activities and Research During Rotation

The current cytopathology literature is discussed in the light of diagnostic problems that occur at the microscope. Pertinent literature is made available to the resident and the findings are discussed. Particular emphasis is placed on the areas of diagnostic limitation or difficulty.

Residents are frequently asked to do literature research into various problems that arise in the laboratory. They are encouraged not only to use the library in a traditional fashion, but also to use Internet-based resources as means of rapidly surveying a large amount of literature and finding most precise possible details relating to the specific problem at hand.

Residents are encouraged to look for similarities or contrasts between different types of cases and to look for ways in which groups of cases might be assembled into reports useful for clinical research projects.

Basis and Method of Resident Evaluation

Residents will be evaluated on performance of daily activities (described previously), participation in required meetings and conferences, and presentations to the staff on assigned cases. The residents are provided with continuous feedback on their performance during the rotation. In general, only deficiencies are noted in writing. Residents are evaluated on their demonstrated ability to provide informative consultation to the clinical service teams, their medical knowledge, their application of this knowledge to efficient/quality patient care, and their diagnostic, technical and observational skills. Residents are also evaluated on their interpersonal skills, professional attitudes, reliability, and ethics with members of the teaching faculty, peers, laboratory staff, and clinicians. They are further evaluated on their initiative in fostering quality patient care and use of the medical literature, as it relates to their assigned cases. Their timely completion of assigned interpretive reports is another component of the evaluation. Residents on probation receive a written mid-rotation evaluation.

Educational Resources Available

Books

Journals

1. Acta Cytologica; All Volumes 6. Arch Pathol Lab Med; All Volumes
2. Cancer Cytopathology; All Volumes 7. Cancer; All Volumes
3. Am J Clin Pathol; All Volumes 8. Diag Cytopath; All Volumes
4. Am J. Surg Pathol; All Volumes 9. Hum Pathol; All Volumes
5. Anal Quat Cytol Histo; 1988 - current 10. Modern Pathology; All Volumes

Study Sets

**Exfoliative Cytology**

- 448 cases of Female Genital Tract
- 36 cases of Male Genital Tract
- 76 cases of Urinary Tract
- 201 cases of Respiratory Tract
- 10 cases of Gastrointestinal Tract
- 128 cases of Body Cavity Fluids
- 73 cases of Cerebrospinal Fluid

**Fine Needle Aspirations**

- 102 cases of Thyroid
- 233 cases of Breast
- 105 cases of Lymph Nodes
• 70 cases of Liver
• 47 cases of Kidney
• 12 cases of Ovary
• 106 cases of Lung
• 10 cases of Malignant Melanoma
• 45 cases of Salivary Gland

Other Materials

• 1 Tutorials of Cytology
• Long-Standing Subscriptions: CheckPath Samples
• Long-Standing Subscriptions: ASCP Teleconferences

Computer Information Systems for Resident Education and Service Duties

The integrated Cerner System for both Anatomic and Clinical Pathology provides residents access to archival clinical and anatomic pathology data, quality control results, and the status of pending cases and special studies. Information on additional studies such as flow cytometry or cytogenetic analyses are also available on these same terminals.

As noted previously, our residents are encouraged to take a hands-on approach to the current cytopathology literature. Real time hands-on searching of multiple medical literature data bases is available with desktop PCs using institutional subscriptions managed by the Medical Center library personnel.