University of Minnesota
Cytopathology Fellowship
Goals and Objectives

Introduction: The Cytopathology Fellowship at the University of Minnesota Medical School is a one year ACGME accredited training program. Cytopathlogy fellows work closely with faculty at four different sites, University of Minnesota Medical Center, Hennepin County Medical Center, Abbott Northwestern and United Hospital. This diversity of training allows fellows to experience a full range of cytology and fine needle aspiration. The procedure for work-up of cases varies with the type of case. Gynecologic cases are prepared and screened by staff cytotechnologists. The fellow works closely with the cytopathology staff in signing out these slides.

Interactions between the cytopathology fellow and services devoted to necropsy, clinical pathology, and surgical pathology are most commonly based on follow-up of patients who have been previously studies 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 fellow.

As the fellow gains experience, the teaching responsibilities increase. This includes supervision of residents in case preparation and evaluation, as well as introducing residents to the technique of fine needle aspiration. In the second one-half of the year, there is ample opportunity to engage in formal teaching of cytotechnology students and pathology residents. In the second one-half of the training program, the fellow has primary sign-out privileges. Non-gynecologic, non-aspiration cases are addressed in a similar manner. Fine needle aspirations of palpable masses are performed by the fellow, following several months of supervised activity in this field. Preparation of smears, application of the initial rapid stain, and communication of rapid diagnoses are all accomplished by the fellow.

Radiographically guided aspirations of deep masses are attended by the fellow, who prepares the smears, applies a rapid stain and gives a preliminary interpretation of specimen adequacy. Based on the diagnostic possibilities suggested by the combined clinical radiographic and rapid cytologic findings, the fellow makes decisions about specimen allocation to the various media

required for cell blocks, electron microscopy, immunocytochemistry, cytogenetics, flow cytometry, and microbiologic culture.

In all cases, the patient's previous pathology and cytology specimens are available for review. The current clinical history is considered as the case is evaluated. Frequent contact with the physicians on clinical services insures rapid and accurate correlation of all pertinent information. As the fellow prepares and evaluates cases in the manner just described, the cytopathology staff is available for consultation. This includes bedside assistance with difficult aspirations. Regularly scheduled conferences insure that all significant abnormal findings are ultimately seen by several individuals at all levels of the service. This insures both high-quality teaching, and constant review of diagnostic patient material.

During interactions with the clinical staff, the fellow is encouraged to take an active role, not only in obtaining detailed information about material currently being studied, but in educating other physicians about applications of cytology and its advantages in specific situations. This includes recognizing situations in which cytologic evaluations (particularly fine needle aspiration) are not appropriate. This exchange of information occurs informally as cases are discussed at the microscope, in written form through results reporting, and in multidisciplinary patient-care conferences.

Fellowship Goals

These training goals for the cytopathology fellowship organized by ACGME core competency area are listed below.

Patient Care:

- Competently perform procedures to obtain samples.
- Communicate with patients and family members with compassion and courtesy.
- Gather appropriate and accurate clinical information in both pathology and cytopathology settings.
- Interpret diagnostic information and test results within the clinical context for effective patient management.
- Use clinical decision-making concepts and techniques and interpret results.
- Advise clinicians on the choice of clinically appropriate, cost-effective tests.
- Advise clinicians on appropriate follow up for unexpected test results.

Medical Knowledge:

- Demonstrate knowledge of common clinical and diagnostic procedures and their medical

application and correlation.
- Understand specialized diagnostic procedures, including special staining techniques, electron microscopy, immunofluorescence and immunohistochemistry, and cytologic fine needle aspiration.
- Collect and accurately evaluate medical evidence relevant to cytopathology.
- Effectively use a variety of resources to investigate clinical questions.

Practice-Based Learning and Improvement:

- Effectively and quickly access the relevant literature scientific evidence when reading.
- Develop of a personal strategy to regularly maintain and update medical knowledge.
- Regularly review reading performance and over-reads by attendings to identify areas for further practice and attention.
- Effectively teach residents, cytotechnologists and other professionals.

Communication Skills:

- Counsel and educate patients and family members in a clear and effective manner.
- Function effectively as a member of the clinical care team with fellow clinicians, nursing and laboratory staff, and administrative personnel.
- Use appropriate modes of communication (direct, telephone, email, written) in a timely manner.
- Communicate clearly and effectively in written documents (including legible handwriting).
- Prepare and deliver effective presentations.

Professionalism: The cytopathology fellow will demonstrate:

- Knowledge and understanding of ethical and confidential issues affecting patient care.
- Knowledge of issues concerning cultural diversity in the patient population.
- Respectful behavior towards all patients and medical personnel, including punctuality and courtesy.
- Maintain a professional demeanor in appearance and interactions with others, including acceptance of responsibility, responding effectively to criticism, and taking initiative.

Systems-Based Practice:

- Understanding of the role of the diagnostic clinician and the health care system, and the importance of reliable, cost-effective, and timely results in clinical decision-making.
- Ability to work with clinicians, administrators, and others to determine the role of diagnostic testing in specific situations to optimize patient outcomes.
- Understand the CLIA, CAP, JCAHO, and HIPAA/Data Security requirements for practice management.

- Understand the basic reimbursement mechanisms and regulatory requirements, including kickbacks and compliance with the Medicare/Medicaid "fraud and abuse" avoidance requirements.
- Understand effective managerial practices.

Learning Objectives:

Fine Needle Aspiration:

- Fellows will 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.

A. Lymph nodes:

- Perform fine needle aspiration of palpable lymph nodes, appropriately triaging the specimens for ancillary studies.
- Through FNA of lymph nodes, diagnose: metastatic carcinoma, metastatic melanoma, lymphoma, granulomatous inflammation, acute suppurative lymphadenitis, benign reactive changes, Mycobacterial infection, branchial cleft cyst
- Recognize when a specimen should be judged non-diagnostic
- Suggest appropriate clinical follow-up for the above diagnoses

B. Breast:

- Describe the sensitivity and specificity of diagnosing carcinoma by fine needle aspiration.
- Perform fine needle aspiration of the breast
- Know when a specimen is non-diagnostic
- Through FNA of breast tissue, diagnose: carcinoma, ductal atypia, fibroadenoma, benign ductal cells, fat necrosis, mastitis.
- Suggest appropriate clinical follow-up for the above diagnoses

C. Thyroid

- Safely perform a fine needle aspiration of the thyroid
- Know what constitutes a diagnostic specimen
- Diagnose the following: anaplastic carcinoma, Papillary carcinoma, medullary carcinoma, follicular neoplasm, nodular goiter, Hashimoto's thyroiditis, Hürthle cell neoplasm
- Suggest appropriate clinical follow-up for the above diagnoses

D. Salivary gland

- Perform a fine needle aspiration of salivary gland
- Know what constitutes an adequate specimen
- Diagnose: sialadenitis, pleomorphic adenoma, Warthin's tumor, oncocytoma, acinic cell carcinoma, adenoid cystic carcinoma, monomorphic adenoma, mucoepidermoid carcinoma, adenocarcinoma

E. Lung

- Assist in the performance of CT guided lung FDA
- Recognize a diagnostic specimen
- Suggest appropriate ancillary studies
- Diagnose the following: reactive lung and mesothelial cells, granulomatous inflammation, squamous cell carcinoma, adenocarcinoma, small cell carcinoma, metastatic malignancy, carcinoid tumor

F. Liver

- Assist in CT guided liver aspiration
- Be familiar with findings in benign liver aspiration
- Diagnose the following: granulomatous disease, abscess, hepatocellular carcinoma, metastatic carcinoma, adenocarcinoma (including characteristics of colonic adenocarcinoma, squamous cell carcinoma, small cell carcinoma

<u>Gynecologic Cervical Cytology</u>:

- Accurately diagnose cervical cytology specimens and understand the clinical significance of cervical cytology findings.
- Stain a slide using Papanicolaou stain
- Explain the cellular fixatives which can be used for the Pap statin
- Explain the value of the hematoxylin, OG and EA dyes
- Explain regressive and progressive staining methods
- Explain the CLIA '88 regulations as they apply to gynecologic cytology in laboratories.
- Know the Bethesda 2001 nomenclature system for gynecologic cytology and be able to describe similarities and differences to previous nomenclature systems (Bethesda I and II, the CIN system-CIN I, CIN II, CIN III, and Papanicolaou numerical classification).
- Define what constitutes an adequate Pap test according to the Bethesda 2001 system.
- Describe and recognize the normal cellular elements in the cervical Pap test
- Describe the significance of normal endometrial cells in the cervical Pap test, according to age
- Recognize spermatozoa; know how a Pap smear is handled for forensic purposes, and when sperm should be reported.
- Recognize and describe the diagnostic patterns in hormonal cytology
- Describe how a Pap test should be taken for hormonal evaluation

- Describe the commonly used indices (KPI and MI)
- Describe the expected patterns associated with the various stages of hormonal variance and change.
- Describe when the estrogen proliferation test is useful and tell how it should be done.
- Recognize common infections which can be diagnosed by Pap test and describe in general terms the sensitivity, specificity and clinical significance of the specific diagnoses.

Human Paplilloma Virus (HPV):

- Recognize and describe the cytologic features diagnostic of HPV infection.
- Discuss the prevalence of HPV infection revealed by different assays (hybrid capture, ISH, PCR, Invader assay)
- Discuss the association of specific HPV genotypes with neoplasia
- Discuss the role of HPV testing as a triage method for equivocal results, as a primary screening method and as a QA tool.
- Recognize and describe preneoplastic changes of squamous cells in terms of nuclear size and contour, chromatin patterns, cytoplasm, cell size and cell number, and liquid-based preparation background.
  - Atypical squamous cells of undetermined significance (ASC-US)
  - Atypical squamous cells , can not exclude high grade SIL (ASC-H)
  - Low grade squamous intraepithelial lesions(LSIL)
  - LSIL, can not exclude high grade SIL (LSIL-H)
  - High grade squamous intraepithelial lesions (HSIL)
  - Microinvasive carcinoma
  - Invasive carcinoma

- Describe and identify the cytologic features of adenocarcinoma in the cervical Pap test.
- Describe the features of adenocarcinoma in situ and how it can be distinguished from some of its mimics.
- Describe how to distinguish reactive endocervicals from adenocarcinoma
- Describe and identify the cytological features of endometrial and extrauterine adenocarcinomas in the Pap test.
- Identify the distinguishing features of endocervical and endometrial adenocarcinoma
- Identify the distinguishing features of extrauterine adenocarcinoma
- Discuss the effectiveness of the cervical Pap test in diagnosis of malignant and premalignant lesions.
- Discuss the appropriate management of abnormal Pap test results and cervical biopsy results according to the ASCCP guidelines and the management of women over 30 with normal Pap test results with positivity of high-risk HPV, when HPV testing is used in primary screening in conjunction with the Pap test (ACOG guidelines).

University of Minnesota Medical Center (UMMC): UMMC is the primary teaching facility where fellows attend all conferences, perform the greatest number of cytology accessions, GYN procedures and fine needle aspirations.

Hennepin County Medical Center: The Cytopathology fellows spend 3-4 months working with faculty at Hennepin County Medical Center (HCMC). This experience in the Cytology Laboratory at Hennepin County Medical Center is in a moderate volume lab with an emphasis on gynecologic cytology and fine needle aspiration that cover the broad spectrum of neoplastic and non-neoplastic disease. The institution's patient population ensures that a number of infections conditions, including those of immigrants and the disadvantaged, are encountered in this practice. The experience at HCMC provides the fellows with a large exposure to fine needle aspirations of both deep and superficial palpable & non-palpable lesions. However, in keeping with contemporary regulatory directives, the faculty is always in attendance even when the fellow performs the procedure entirely without assistance. The fellow performs in a similar manner rapid interpretations of material aspirated from deep sites either in radiology or in the practice of endoscopic ultrasound-guided aspiration of abdominal and mediastinal lesions.

- Further develop skills in FNA of palpable lesions.
- Further develop skill in the FNA of non-palpable lesions.
- Develop skill in the cytology of infectious conditions.
- Develop the ability to rapidly and accurately evaluate samples obtained through radiologic guided procedures.
- Develop the ability to accurately and quickly evaluate samples taken through endoscopic methods.

Abbott-Northwestern Hospital/Allina Health System: Cytopathology fellows spend three months of required training at Abbot Northwestern Hospital. At Abbott the fellow experiences a very high volume of efficiently examined and reported cases. Another feature of this institution is that very few aspirations are performed by pathologists, so that the fellow acquires an in-depth understanding of the implications and limitations of receiving smears from patients not personally examined. This experience provides significant exposure to gynecologic pathology and abnormal Pap tests. Fellows also gain exposure to non-gynecologic cytopathology through examination of CSF, fluids, urine, and fine needle aspirations.

- Continue to develop skills in fine needle aspiration
- Perform urine cytology
- Recognize major types of findings in cytology of urine
- Perform cytology of cerebral spinal fluid
- Recognize major abnormalities that appear in cytology of CSF
- Continue to develop skills in reading samples
- Provide guidance to referring clinicians on sample adequacy and acquisition.
- Access relevant clinical information from patient record to make accurate diagnoses.
- Communicate results and information to referring clinicians quickly and effectively.

- Continue to develop skills and performance to function effectively in a high volume environment.
- Effectively use electronic communication methods to report findings and communicate with referring providers.
- Work effectively with laboratory personnel.

Recommend Reading

- DeMay, Richard M, The Art and Science of Cytopathology, ASCP Press, Chicago, 1996.
- DeMay, RM, Practical Principles of Cytopathology, ASCP Press, Chicago, 1999.
- Atkinson, Barbara (Ed.), Atlas of Diagnostic cytopathology, WB Saunders, Philadelphia, second edition, 2003.
- Cibas, ES and Ducatman, BS, Cytology: Diagnostic Principles and Clinical Correlates, WB Saunders, Edinburough, second edition, 2003.
- McKee, GT, Cytopathology, Mosby-Wolfe, London, 1997
- Ramzy, I (Ed.),clinical Cytopathology and Aspiration Biopsy: fundamental Principles and Practice, second edition, Appleton and Lange, Norwalk, CT, 2000.
- Bibbo, Marluce, Comprehensive Cytopathology, WB Saunders, 1991.
- Koss, Diagnostic Cytopathology and It's Histopathologic Basis.

Fellow Assessment: Fellow performance is assessed during each clinical rotation by the supervising attending. The results of these global assessments are discussed with the program director on a quarterly basis. Additionally, fellow performance will be assessed by residents and technologist with whom they work.

ACS—Progressive Evaluation of Competency (PEC): Cytopathology Fellows participate in the American Society of Cytopathology (ACS) Progressive Evaluation of Competency (PEC). The PEC includes three online exams over the fellowship year that track a fellow's baseline, mid-year and final level of knowledge, and overall competency in cytopathology. Topics covered will include: Gynecological, Non-Gynecological, FNA, Ancillary and Laboratory Operations.

Each exam is available for a specified period of time during which each registered fellow will take the exam online. The results will be returned to the Program Director for review with each fellow. General and comparative statistics will be generated with field validation of the questions occurring over time. The Pre-Exam is in the middle of July. The Mid-Exam is scheduled for the middle of January followed by the Post-Exam at the end of May.