Appendix B

The Curriculum in Cytotechnology for Entry-level Competencies

Preface Information:

This Curriculum in Cytotechnology was developed by the CPRC with input from cytopathology professionals to establish the minimum competencies that new cytotechnology graduates must be able to demonstrate upon entering the profession. The entry-level competencies are divided into six major categories based on the overall knowledge and/or skill set encompassed within: Screening and Interpretation, Basic Laboratory Techniques, Laboratory Operations, Application of Companion Technologies, Evidence-based Medicine, and Professionalism.

Upon completion of a cytotechnology program, graduates should have a sound background in the sciences.

CPRC Cytotechnology Entry-Level Competencies

Upon completion of a cytotechnologist program, the graduate must have successfully completed the following entry-level competencies:

I. SCREENING AND INTERPRETATION

A. Gynecologic Cytology

1. Prior to screening gynecologic cytology specimens, the graduate will review the patient's medical history and gather relevant clinical information.

2. When given conventional and/or liquid-based gynecologic specimens, the graduate will be able to microscopically identify, discriminate and explain the significance of the following entities in the context of a given patient:
    a. specimen adequacy
    b. cellular components within the negative for intraepithelial lesion or malignancy category
    c. non-neoplastic findings including cellular changes associated with infections/organisms, reactive and reparative changes associated with inflammation, effects of therapy, effects of devices/instrumentation and presence of glandular cells in noteworthy circumstances
    d. epithelial squamous abnormalities, including atypical squamous cells of undetermined significance, atypical squamous cells cannot exclude HSIL, low grade squamous intraepithelial lesion, high grade squamous intraepithelial lesion, and squamous cell carcinoma
    e. glandular cell abnormalities including atypical glandular cells, endocervical adenocarcinoma in-situ and endocervical and endometrial adenocarcinoma and their differential diagnoses
    f. other epithelial and non-epithelial malignant neoplasms
    g. extra-uterine malignant neoplasms.

3. The graduate will be able to demonstrate ability to use Pap test computer-assisted screening system(s).

4. When given gynecologic cytology specimens, the graduate will be able to detect, select, and appropriately mark the cells most representative of the nature of any pathological process if present.

5. The graduate will be able to perform a morphologic correlation of cytologic findings with relevant (concurrent/prior) histologic material.

6. The graduate will be able to prepare a report using a contemporary, reproducible, uniform reporting system of interpretive terminology.

7. The graduate will be able to independently evaluate gynecologic cytology specimens with sufficient competence to issue the final report for negative gynecologic specimens.

8. The graduate will appropriately triage gynecologic cytology specimens for high risk HPV testing.

9. The graduate will be able to evaluate gynecologic cytology specimens with a high level of accuracy as defined by the program.

   Although paramount, accuracy should be combined with the realization that timely reporting of results also contributes to patient care.

   *At **minimum**, the* graduate *should be able to manually evaluate an average of 7 non-imaged gynecologic slides per hour (or average of full slide-equivalents per hour for computer-assisted review).*

B. Non-gynecologic Cytology

1. Prior to screening any non-gynecologic cytology specimen, the graduate will review the patient's medical history and gather relevant clinical information.

2. When given samples from any non-gynecologic cytology specimen, including fine needle aspirations, the graduate will be able to microscopically identify, discriminate and explain the significance of the following entities in the context of a given patient:
   a. specimen adequacy
   b. cellular components within normal limits
   c. microbiologic entities and associated cytomorphology
   d. cellular features of degeneration
   e. benign cellular changes
   f. cellular features of benign neoplasms
   g. cellular features of malignant neoplasms
   h. cellular effects of radiation, chemotherapy and other modalities, when available
   i. altered cellular morphology due to collection methods.

3. When given any non-gynecologic cytology specimen, the graduate will be able to detect, select, and appropriately mark the cells most representative of the nature of any pathological process if present.

4. The graduate will be able to triage non-gynecologic cytology specimens for ancillary studies (to include when appropriate-microbiology, flow cytometry, cytogenetics, and molecular analysis) using appropriate transport media.

5. On detection of cellular features of disease, the graduate will be able to develop a differential diagnosis based on synthesis of appropriate data from:
   a. corresponding cell block
   b. morphologic correlation with relevant (concurrent/prior) histologic material
   c. routine special stains including interpretation of positive and negative controls
   d. immunohistochemical stains including interpretation of positive and negative controls, scoring of IHC intensity, and staining pattern (cytoplasmic, nuclear, membranous).

6. The graduate will be able to prepare a report using a contemporary, reproducible, uniform reporting system of interpretive terminology.

7. The graduate will be able to evaluate cellular preparations with a high level of accuracy as defined by the program.

C. FNA Cytology (includes touch preparations)

1. Prior to on-site adequacy assessment and/or cytologic screening of any FNA specimen, the graduate will review the patient's medical history and gather relevant clinical information.

2. The graduate will be able to explain the principles of FNA performance, including indications and characteristics of different image-guided modalities (e.g., transcutaneous, endoscopic U/S-guided, endobronchial U/S-guided).

3. The graduate will be able to perform on-site adequacy assessment of FNA specimens and communicate results of this assessment.

4. The graduate will demonstrate a working knowledge of telecytology as it applies to on-site adequacy assessment.

5. The graduate will be able to triage FNA cytology specimens for ancillary studies (to include when appropriate- cell block preparation, microbiology, flow cytometry, cytogenetics, and molecular analysis) using appropriate transport media.

6. When given any FNA cytology specimen, the graduate will be able to microscopically identify, discriminate and explain the significance of the following entities in the context of a given patient:
    a. specimen adequacy
    b. target specific cellular components within normal limits
    c. microbiologic entities and associated cytomorphology
    d. cellular features of degeneration
    e. benign cellular changes
    f. cellular features of benign neoplasms
    g. cellular features of malignant neoplasms
    h. cellular effects of radiation, chemotherapy and other modalities
    i. altered cellular morphology due to collection methods.

7. When given any FNA specimen, the graduate will be able to detect, select, and appropriately mark the cells/entities most representative of the pathological process if present.

8. The graduate will have a working knowledge of how to identify FNA cytology specimens for further work up following cytologic screening (to include when appropriate-special stains, IHC, molecular analysis).

9. On detection of cellular features of disease, the graduate will be able to develop a differential diagnosis based on synthesis of appropriate data from:
    a. corresponding cell block
    b. relevant (concurrent/prior) histologic material
    c. routine special stains including interpretation of positive and negative controls
    d. immunohistochemical stains including interpretation of positive and negative controls, scoring of IHC intensity, and staining pattern (cytoplasmic, nuclear, membranous).

10. The graduate will be able to prepare a report using a contemporary, reproducible, uniform reporting system of interpretive terminology.

11. The graduate will be able to evaluate cellular preparations with a high level of accuracy as defined by the program.

II. BASIC LABORATORY TECHNIQUES

1. Upon presentation of a cytologic specimen to the laboratory, the graduate will be able to:
    a. explain and apply the basic principles for specimen acceptance and rejection
    b. have knowledge of different preparation and staining techniques, their advantages and disadvantages, and the impact of each on cell morphology
    c. select and perform the preparation and staining technique(s) that is most appropriate for a given specimen(s)
    d. identify and apply principles of quality assurance and quality control as they relate to specimen preparation including, but not limited to:
        - accreditation/regulatory requirements
        - equipment performance and maintenance
        - staining methods
        - stain and technical quality of preparation
    e. solve problems in staining and preparation methods
    f. identify errors that can occur during specimen handling and processing including but not limited to, preparation, staining and instrumentation and apply and implement the most effective resolution.

2. The graduate will be able to use the microscope or other instruments to properly visualize the specimen for systematic morphologic review and interpretation with knowledge of proper use and care, to include troubleshooting.

3. The graduate will be able to use basic laboratory skills and techniques, including universal precautions, aseptic technique, reagent preparation, sample preparation, filtration, centrifugation, and pipetting and micropipetting.

III. LABORATORY OPERATIONS

1. The graduate will be able to explain quality control and quality assurance requirements of applicable accrediting/regulatory agencies including, but not limited to requirements related to competency assessment and proficiency testing.

2. The graduate will demonstrate knowledge of the appropriate slide evaluation limits as outlined by regulatory agencies and demonstrate the ability to document daily workload.

3. The graduate will be able to explain the principles and practices defined by HIPAA.

4. The graduate will be able to explain the requirements and provide documentation that supports maintenance of certification/licensure to practice cytology.

5. The graduate will have a basic understanding of informatics and demonstrate the ability to effectively use the laboratory information system (LIS) including but not limited to viewing patient history, entering results and signing out cases.

6. The graduate will be able to comply with laboratory safety measures and regulations.

7. The graduate will have a basic awareness of emergency preparedness as a member of the healthcare workforce.

8. The graduate will be able to explain and use applicable contemporary ICD and CPT codes for cytologic specimens.

IV. APPLICATION OF COMPANION TECHNOLOGIES

1. The graduate will be able to explain the theory, principles and indications of:
    a. flow cytometry
    b. molecular signal detection (GC/CT,PCR)
    c. molecular diagnostic oncology (e.g., EGFR, ALK, BRAF, KRAS)
    d. computer-based image-analysis and its applications in ancillary tests applied to diagnostic cytopathology.

2. The graduate will be able to explain the theory, principles, indications, technical aspects and troubleshooting of*:
    a. HPV DNA testing
    b. immunocyto-histochemistry (IHC/ICC)
    c. FISH/CISH (fluorescent and chromogenic in-situ hybridization)
    d. standard laboratory digital pathology equipment and procedures, such as, but not limited to digital cameras and photography, digital whole slide imaging scanners, image management, web-screen sharing, and slide viewing

**Does not require performance or proficiency*

V. EVIDENCED-BASED MEDICINE

1. The graduate will be able to demonstrate the ability to critically evaluate medical literature for its pertinence and reliability.

VI. PROFESSIONAL DEVELOPMENT

1. The graduate will be able to explain the importance of continuing education for maintenance of on-going competence.

2. The graduate will be able to demonstrate knowledge of the consequences of specimen evaluation on patient management.

3. The graduate will be aware of cytotechnologist opportunities within professional societies and the cytology community at-large (e.g., patient advocacy, volunteerism, education, research).

4. The graduate will be able to demonstrate knowledge of the ethical role and responsibilities of the cytotechnologist by practicing honesty and integrity in professional duties.

5. The graduate will be able to demonstrate knowledge of the ethical role and responsibilities of the cytotechnologist by practicing the principles of good professional relationships with patients, peers, staff, faculty, and the public.