Practical Guide to Specimen Handling in Surgical Pathology

Authors: Robert Lott, Janet Tunnicliffe, Elizabeth Sheppard, Jerry Santiago, Christa Hladik, Mansoor Nasim, Konnie Zeitner, Thomas Haas, Shane Kohl, Saeid Movahedi-Lankarani

COLLEGE of AMERICAN PATHOLOGISTS

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INTRODUCTION

In spite of the abundant guidelines and recommendations published for specimen handling and testing in a clinical pathology laboratory, relatively little literature is available for guidance of specimen handling in a surgical pathology laboratory. This document does not relate to cytologic or clinical pathology samples.

The following comprehensive table is intended to serve as a general guideline for proper specimen handling from the time it is taken from the patient to the time a completed slide of the specimen is given to a pathologist for interpretation.

DISCLAIMER:

This document was created by members of the CAP/NSH Histotechnology Committee and is intended to serve as a guideline ONLY and NOT AN absolute recommendation for specimen handling. Each laboratory is advised to use these guidelines as a starting point and modify certain parameters to fit state and local institutional requirements, as appropriate. Regulatory references, standards, and CAP checklist items cited in the guideline are current at the time of publication of this version of the guideline. It is recommended that the user confirm all references used are the latest version available. The use of the information contained in this guideline does not guarantee compliance with the CAP accreditation requirements or regulations from other accrediting organizations. Some information may be different or more stringent than the published CAP Checklists.

It is the intent of the CAP/NSH Histotechnology Committee to update this document every 2 years or when required and have the updated version of the document available to members on the College of American Pathologists (CAP) and National Society for Histotechnology (NSH) websites.

Version: 12.0 *revised March 2025*

Table of Contents:

VERSION	REVISION DATE	REVISION
2.0	November, 2013	1. Addition of disclaimer on cover page 2. Addition of version control
3.0	November, 2014	1. Revised per comments received from CAP Chair review
4.0	January, 2015	3. Updated references – CAP Checklists: ANP, COM, GEN, 4-21-2014 4. All references reviewed 5. Table of contents added
5.0	September, 2015	1. Updated to reflect LAP Committee 2015 Checklist changes
6.0	November, 2015	1. Updated to reflect corrected formalin solution to tissue ratio with references
7.0	September, 2017	1. Updated to reflect August 21, 2017 CAP Checklist edition changes
8.0	September, 2018	1. Updated to reflect August 22, 2018 CAP Checklist edition changes 2. Updated to reflect review of all references
9.0	April, 2020	1. Updated to reflect June 4, 2020 CAP Checklist edition Changes 2. Updated to reflect review of all references 3. Updated Table of Contents 4. Updated Title Page and organizational logos
10.0	October, 2020	1. Updated organizational logos 2. Updated to reflect September 22, 2021 CAP Checklist edition changes
11.0	September, 2023	1. Updated references 2. Updated to reflect August 24, 2023 CAP Checklist edition changes
12.0	March, 2025	1. Updated to reflect December 26, 2024 CAP Checklist edition changes 2. Updated references

PART I. SPECIMEN COLLECTION and HANDLING

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Collection and Handling A. Patient Identification	• Patient is to be identified in a manner that respects patient privacy with respect to their medical records and medical data. • Patient's identity must be verified at the time of specimen collection. • At least two acceptable patient-specific identifiers are required for patient identification: ○ Full name ○ Assigned identification number (e.g. health record / master index number) ○ Date of birth ○ Photo on government issued or other photo ID card, such as driver's license ○ Other specific personal identifiers	Laboratory General Checklist, GEN.41303 (Patient Confidentiality) Laboratory General Checklist, GEN.40490 (Patient Identification) Laboratory General Checklist, GEN.40491 (Primary Specimen Container Labeling)	Health Insurance and Portability and Accountability Act (HIPAA). Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019. International Standard ISO 15189:2022. Medical Laboratories – Requirements for Quality and Competence; section 7.2 - Pre-examination Processes
Collection and Handling B. Proper Labelling	• Specimen is labeled in the presence of the patient. • Specimen label must contain at least two patient-specific identifiers: ○ Full patient name ○ Assigned identification number (e.g. health record / master index number) ○ Date of Birth • Customizable label elements – additional identifiers that are acceptable: ○ Patient gender ○ Accession or requisition number ○ Ordering physician ○ Source of specimen (e.g. skin) ○ Site of specimen (e.g. left side of chest) • Standardized format for label information should be implemented. ○ Last name, first name ○ Date of Birth DD–MM–YYYY (i.e. 12 MAR 1968)	Laboratory General Checklist, GEN.40490 (Patient Identification) Laboratory General Checklist, GEN. 40115 Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens Laboratory General Checklist, GEN. 40491 (Primary Specimen Container Labeling) All Common Checklist, COM.06100 (Primary Specimen Container Labeling)	Clinical Laboratory Standards Institute CLSI – Auto12-A Specimen Labels: Content and Location, Fonts and Label Orientation: 2011. Brown RW, Della Speranza V, et al. Uniform labeling of blocks and slides in surgical pathology: Guideline from the College of American Pathologists Pathology and Laboratory Quality

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
	○ Gender M, F, U (unknown), T (Transgender), I (Intersex) • Written documentation developed for the correct positioning of the label on the collection container. ○ Do not attach label to the container lid (in whole or part) ○ Do not overlap label resulting in patient data being covered • Written documentation for the correction of labelling errors – to be followed when specimens cannot be replaced. • All subsequent labelling of patient samples (blocks and slides) must follow same patient-specific identifying process. • Submitted slides may be labeled with a single patient-specific identifier but two are preferred.	All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Laboratory General Checklist, GEN.40492 (Specimen Label Correction) Laboratory General Checklist, GEN.40825 (Specimen ID) Laboratory General Checklist, GEN.40491 (Primary Specimen Container Labeling)	Center and the National Society for Histotechnology. *Arch Pathol Lab Med*. 2015;139(12):1515-24.
Collection and Handling B. Proper Labelling i. Barcoding and/or Radio Frequency Identification (RFID)	• All parameters used for standard specimen labelling are to be followed. • The unique specimen bar code or RFID label must be consistent across all applications: specimen container, requisition label, cassette and slide labels. • Barcode and RIFD specifications within a failure rate established by your facility for patient care. • Barcode label stock or RFID chip validated to withstand chemicals and processing used for anatomic pathology specimens. • Bar coding and/or RFID documentation must be validated and maintained. • Automatic identification scanning equipment is validated for accuracy and resistant to chemicals used for anatomic pathology handing. • If used for specimen chain of custody tracking, the barcode or RFID tracking system must have intelligent location capabilities.	Laboratory General Checklist, GEN.40825 (Specimen ID)	Zarbo RJ, Tuthill JM, D'Angelo R, et al. The Henry Ford Production System: reduction of surgical pathology in-process misidentification defects by bar code-specified work process standardization. *Am J Clin Pathol*. 2009; 131:469-477. Clinical Laboratory Standards Institute CSLI – Auto02-A2 Laboratory Automation: Bar Codes for Specimen Container Identification: 2006.

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Collection and Handling
C. Transport Media
i. No media / saline
	• Collection, handling and submission procedures must be made available to all health care workers involved in the collection, labeling, submission and transport of specimens to the pathology laboratory.
	• All specimens must be placed in leak proof container.
	• Specimens should be transported to the laboratory immediately after collection.
	• Specimens that cannot be immediately transferred must be refrigerated until transferred to the Pathology laboratory.
	  • For specimens submitted to the laboratory from remote sites, there is a documented tracking system to ensure that all specimens are actually received.
	• Specimens transferred from distant referral site to pathology lab should be shipped under temperature-controlled conditions to avoid over heating or freezing.
	• Policies regarding courier service should be established.
	• All specimens must be properly packaged and labelled, indicating materials to be transported prior to shipping to a centralized or referral laboratory.
	• To avoid drying of tissues that are not immediately placed into formalin at time of procurement:
	  ○ Wrap solid tissue masses (i.e. lymph node or breast lump) in saline dampened gauze prior to placement in labelled container (certain biopsies may need special handling).
	  ○ Add a small volume of saline to tissue with insufficient naturally occurring fluids (i.e. conceptus for embryopathology/genetic studies).
		Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens)
		All Common Checklist, COM.06000 (Specimen Collection Manual)
		Laboratory General Checklist, GEN.74500 (Specimen Transport Procedures)
		Laboratory General Checklist, GEN.40125 (Handling of Referred Specimens)
		Laboratory General Checklist, GEN.40511 (Specimen Tracking/Labeling)
		Laboratory General Checklist, GEN.40535 (Specimen Transport QM)
		Laboratory General Checklist, GEN.40530 (Specimen Tracking)
		Laboratory General Checklist, GEN.40535 (Specimen Transport QM)
			Clinical Laboratory Standards Institute CLSI – GP33A, Accuracy in Patient and Sample Identification; 2019.
			International Standard ISO 15189:2022 - Medical Laboratories – Requirements for Quality and Competence; section 7.2 Pre-examination Processes.
			Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
			Carson F, Hladik C. Histotechnology A Self-Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Collection and Handling C. Transport Media ii. Different fixatives	• Collection, handling and submission procedures must be made available to all health care workers involved in the collection, labelling, submission and transport of Specimens to the pathology laboratory. • All specimens must be placed in leak proof container. • Specimens must be placed in appropriate fixative as specified in collection/handling and submission procedure. • Volume of fixative to tissue ratio must be included in the collection/handling and submission procedures. i.e. 10% neutral buffered formalin volume should be at least 10 times the volume of the specimen. • Safety Data Sheets (SDS) must be made available to all staff handling fixatives. • All specimen containers containing fixatives must have appropriate OSHA Chemical labels attached. • Specimens transferred from distant referral site to Pathology lab should be shipped under temperature-controlled conditions to avoid over heating or freezing. • Specimen containers should be shipped following appropriate regulations for the shipping and handling of formalin i.e. hard sided container with absorbent packing material.	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens) All Common Checklist, COM.06000 (Specimen Collection Manual) Laboratory General Checklist, GEN.74500 (Specimen Transport Procedures) Laboratory General Checklist, GEN.76100 (Chemical Safety Document Access) Laboratory General Checklist, GEN.40125 (Handling of Referred Specimens) Laboratory General Checklist, GEN.40511 (Specimen Tracking/Labeling) Laboratory General Checklist, GEN.40535 (Specimen Transport QM)	International Standard ISO 15189:2022 - Medical Laboratories – Requirements for Quality and Competence; section 7.2 - Pre-examination Processes. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Carson F, Hladik-Cappellano C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Brown RW. et. al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009. Clinical Laboratory Standards Institute CLSI – GP 17-A3, Clinical Laboratory Safety, 3rd edition; 2012. Occupational Health and Safety Administration. Occupational Safety & Health Standards 1910.1200 toxic and Hazardous Substances. http://www.osha.gov/dsg/hazcom/index.html
Collection and Handling D. Completion of Requisition i. Patient identifiers	• Written procedures on how to properly complete a pathology requisition must be made available to all health care workers involved in the collection, labelling, submission, and transport of specimens to the pathology laboratory. • Written or electronic request for patient testing from authorized person.	Laboratory General Checklist, GEN.40750 (Requisition Elements)	

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
	• Required patient identifiers to be included on the requisition / test order: ○ Patient's name ○ Unique identifier i.e. health record or master index number ○ Date of Birth ○ Sex	Laboratory General Checklist, GEN.40930 (Authorized Requestor)	Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019. International Standard ISO 15189:2022 - Medical Laboratories – Requirements for Quality and Competence; section 7.2- Pre-examination Processes.
Collection and Handling D. Completion of Requisition ii. Specimen name/type/site	• Written or electronic request for patient testing to include: ○ Patient identifiers as listed above ○ Name and address or other suitable identifiers of the authorized person requesting the test ○ Name and address or other suitable identifier for the individual responsible for receiving the test results ○ Name and address of the laboratory submitting the specimen ○ Test and or tests to be performed ○ Procedure performed ○ Specimen site – if more than one specimen is collected during a single procedure; each specimen should be individually identified by anatomic site and or specimen type ○ Date and time of procedure or specimen collection ○ Date specimen received	Laboratory General Checklist, GEN.40930 (Authorized Requestor) Laboratory General Checklist, GEN.40750 (Requisition Elements) Laboratory General Checklist, GEN.40900 (Specimen Date Received)	Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019. International Standard ISO 15189:2022 - Medical Laboratories – Requirements for Quality and Competence; section 7.2 - Pre-examination Processes
Collection and Handling D. Completion of Requisition iii. Pertinent clinical history	• Written or electronic request for patient testing to include: ○ Clinical history – any additional information relevant or necessary for a specific test to ensure accurate and timely testing and reporting of results, including interpretation if required.	Laboratory General Checklist, GEN.40750 (Requisition Elements)	Health Insurance and Portability and Accountability Act (HIPAA). Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019. International Standard ISO 15189:2022 - Medical Laboratories – Requirements for Quality and Competence; section 7.2- Pre-examination Processes
Collection and Handling D. Completion of	• The procedure date should be indicated on the requisition following standardized format DD–MM–YYYY (i.e. 04 JAN 2012).	Laboratory General Checklist, GEN.40750 (Requisition Elements)	Allison KH, Hammond EH, Dowsett M, , et al. Estrogen and Progesterone

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Requisition iv. Procedure time/date a. Time removed from patient (Warm ischemic time)	• The requisition must have a space for the documentation of the warm ischemic time by the physician obtaining the specimen or designate. • Warm ischemic time: The time measured from the interruption of the blood supply to the tissue/tumor by the surgeon to the excision time of the tissue specimen. • Information should be available in the laboratory for review and/or appear on the patient accession.		Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. *Arch Path Lab Med*. 2020;144(5):545-563. International Standard ISO 20166-4:2020 - Molecular in vitro diagnostic examinations – Specifications for pre-examination processes for formalin-fixed and paraffin-embedded (FFPE) tissue for – Part 4: In situ detection techniques: section 6 – Inside the laboratory.
Collection and Handling D. Completion of Requisition iv. Procedure time/date b. Time fixative added (if required) (cold ischemic time)	• The requisition should have a space for the documentation of the cold ischemic time by the physician obtaining the specimen or designate. • Cold ischemic time: The time from excision of the specimen from the surgical field to the time the tissue is placed in fixative. • Information should be available in the laboratory for review and/or appear on the patient accession. • The requisition should have a space for the documentation of the date and time the specimen is placed in fixative by the physician obtaining the specimen or designate.	Anatomic Pathology Checklist, ANP.22983 (Fixation – HER2 and ER Breast Cancer Predictive Marker Testing) Laboratory General Checklist, GEN.40125 (Handling of Referred Specimens)	Allison KH, Hammond EH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. *Arch Path Lab Med*. 2020;144(5):545-563. Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020. Compton CC, Robb JA, Anderson MW, Berry AB, et.al. Preanalytics and Precision Pathology: Pathology Practices to Ensure Molecular Integrity of Cancer Patient Biospecimens for Precision Medicine. *Arch Path Lab Med*.Nov 2019, Vol. 143, No. 11 (November 2019) pp. 1346-1363.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
			International Standard ISO 20166-4:2020 - Molecular in vitro diagnostic examinations – Specifications for pre-examination processes for formalin-fixed and paraffin-embedded (FFPE) tissue for – Part 4: In situ detection techniques: section 6 – Inside the laboratory.
Collection and Handling D. Completion of Requisition iv. Procedure time/date c. Time received in lab (Transport time)	• The requisition must have a space for documentation of the date and time of arrival of the specimen in the AP laboratory to allow for calculation of the transport time. • Transport time: The time tissue specimen was collected in the operating room/doctor's office/clinic until it is received in the pathology laboratory for processing (this is the time point when the specimen is going to be grossly assessed). • Information must be available in the laboratory for review and/or appear on the patient accession.	Laboratory General Checklist, GEN.40535 (Specimen Transport QM) Laboratory General Checklist, GEN.40530 (Specimen Tracking)	Allison KH, Hammond EH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. *Arch Path Lab Med*. 2020;144(5):545-563. Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020.
Collection and Handling D. Completion of Requisition iv. Procedure time/date d. Calculation of total fixation time	• The laboratory has the responsibility to calculate and document total time the specimen was kept in fixative for required specimens (i.e. breast). To include: ○ Time specimen held in the operating room ○ Transport time from remote site to AP lab ○ Time the specimen was kept in fixative while in the lab (i.e. large specimens like colon, breast mastectomy were opened/cut to allow for penetration of fixative) ○ Time the specimen(s) are kept in cassettes after grossing ○ Time in fixative onboard the tissue processor	Anatomic Pathology Checklist, ANP.22983 (Fixation – HER2 and ER Breast Cancer Predictive Marker Testing)	Allison KH, Hammond EH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. *Arch Path Lab Med*. 2020;144(5):545-563. Wolff AC, Summerfield MR Dowsett M, et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology – College of American Pathologists Guideline Update. *Arch Pathol Lab Med*. 2023;147(9): 993-1000.

<table>
<tr><th>Guideline Section</th><th>Statement</th><th>Related CAP Checklist Requirements
❖ 2024 Edition</th><th>Additional References</th></tr>
<tr>
<td>Collection and Handling
D. Completion of Requisition
iv. Procedure time/date
e. Fixation time for breast tissue specimens</td>
<td>
• Tissue handling requirements should be standardized and reported on every specimen.
• 10% neutral buffered formalin is the recommended fixative.

• All samples must receive a minimum of six (6) hours of 10% neutral buffered formalin fixation.
• Recommended fixation time is 6 to 72 hours for estrogen and progesterone receptors.
• Recommended fixation time is 6 to 72 hours for Her2neu receptors.

• Fixation time must be documented, and the following is an example of how the data could be recorded on the requisition:
<table>
<tr><th>Time frame</th><th>Minutes</th><th>Hours</th></tr>
<tr><td>Warm ischemic time</td><td></td><td></td></tr>
<tr><td>Cold ischemic time</td><td></td><td></td></tr>
<tr><td>Transport time from OR /physician office /clinic to laboratory to time of primary examination</td><td></td><td></td></tr>
<tr><td>Time whole specimen held for additional fixation prior to placing in cassettes</td><td></td><td></td></tr>
<tr><td>Time cassettes are held prior to loading onto tissue processor</td><td></td><td></td></tr>
<tr><td>Fixation time on tissue processor (delay time plus processing time)</td><td></td><td></td></tr>
<tr><td>Total Fixation time</td><td></td><td></td></tr>
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</td>
<td>Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens)

Laboratory General Checklist, GEN.40125 (Handling of Referred Specimens)

Anatomic Pathology Checklist, ANP.22983 (Fixation - HER2 and ER Breast Cancer Predictive Marker Testing)

Anatomic Pathology Checklist, ANP.23004 (Digital Imaging – Preanalytic Testing Phase Validation)</td>
<td>Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. Arch Path Lab Med. 2023;147(9): 993-1000.

Allison KH, Hammond EH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. Arch Path Lab Med. 2020;144(5):545-563.

Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020.

Werner M, Chott A, Fabiano A, Battifora H. Effect of Formalin Tissue Fixation and Processing on Immunohistochemistry. American Journal of Surgical Pathology. 24. July 2000:1016-1019.

Spruessel A, Steimann G, Jung M, et al. Tissue ischemia time affects gene and protein expression patterns within minutes following surgical tumor excision BioTechniques. Vol. 36, No. 6, June 2004:1030–1037.</td>
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</table>

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
			Petersen BL, Sorensen MC, Pedersen S, Rasmussen M. Fluorescence In-situ Hybridization on Formalin-fixed and Paraffin-Embedded Tissue: Optimizing the Method. *Appl Immunohistochem Mol Morphol.* 12(3) September 2004:259-265. Tanney A, Kennedy RD. Developing mRNA-based biomarkers from formalin-fixed paraffin-embedded tissue. *Per Med* (2010) **7**(2), 205–211. Compton CC, Robb JA, Anderson MW, et.al. Preanalytics and Precision Pathology: Pathology Practices to Ensure Molecular Integrity of Cancer Patient Biospecimens for Precision Medicine. *Arch Path Lab Med.* Nov 2019, Vol. 143, No. 11 pp. 1346-1363.
Collection and Handling D. Completion of Requisition iv. Procedure time/date f. Fixation time for NON-breast specimens	• Establish standardized fixation times for all routine and specialized biopsies. • Document the recommended fixative for routine and specialized biopsies. • Establish specimen acceptance and rejection policies related to specimen fixation.	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements - Surgical Pathology and Cytopathology Specimens) All Common Checklist, COM.06300 (Specimen Rejection Criteria)	Department of Health and Human Services, Centers for Medicare and Medicaid Services. Clinical laboratory improvement amendments of 1988; final rule. Fed Register. 2003(Jan 24): [42CFR493.1283(a)(3)] Compton CC, Robb JA, Anderson MW, et.al. Preanalytics and Precision Pathology: Pathology Practices to Ensure Molecular Integrity of Cancer Patient Biospecimens for Precision Medicine. *Arch Path Lab Med.* Nov 2019, Vol. 143, No. 11 (November 2019) pp. 1346-1363.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Collection and Handling D. Completion of Requisition v. Requesting physician a. contact information available in LIS	• When alternate identifier is used for authorized person requesting test or receiving test results (medical billing number, hospital ID number), the number must be unique and traceable in the LIS.	Laboratory General Checklist, GEN.40750 (Requisition Elements)	Health Insurance and Portability and Accountability Act (HIPAA). Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019: Vol 30 No7. International Standard ISO 15189:2022 - Medical Laboratories – Requirements for Quality and Competence; section 7.2 - Pre-examination Processes.
Collection and Handling E. Recommendations for Tissue Collection and Handling i. Limiting Artifacts a. Thermal injury	• The use of surgical instruments driven by heat should be avoided or limited when possible. • Thermal injury has been known to interfere with diagnosis.		Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. www.ast.org
Collection and Handling E. Recommendations for Tissue Collection and Handling i. Limiting Artifacts b. Crush injury	• The use of surgical instruments should be avoided or limited as much as possible when handing the specimen to prevent crushing or damaging the tissue.		Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. http://www.ast.org
Collection and Handling E. Recommendations for Tissue Collection and Handling i. Limiting Artifacts c. Drying artifact	• All tissue should be placed in fixative as soon as possible after removal from the body, unless special studies are ordered that might be affected by the available fixative. • If fixative cannot be added in a timely manner, the specimen should be placed in a sterile basin and kept moist with sterile saline or wrapped in saline-dampened sponges until the specimen can be properly placed in fixative. • All unfixed specimens should be transported to the pathology laboratory as soon as possible and refrigerated until placed into appropriate fixative.	Anatomic Pathology Checklist, ANP.11250 (Adequate Storage) Laboratory General Checklist, GEN.40535 (Specimen Transport QM)	Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. www.ast.org Makary MA, Epstein J, Pronovost PJ, Millman EA, Hartmann EC, Freischlag JA. Surgical specimen identification errors: A new measure of quality in surgical care. *Surgery*. 2007.141:450-455.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Collection and Handling E. Recommendations for Tissue Collection and Handling ii. Tissue Transport a. All fresh specimens	• Health care facility policy and procedure should be followed for the proper collection, labeling, and transportation of the specimen to the pathology department. • All fresh specimens are to be submitted to the pathology department as soon as possible with instructions for special testing or processes. • All unfixed specimens should be transported to the pathology laboratory as soon as possible and refrigerated until placed into appropriate fixative. • Specimens not in fixative should be placed in a sterile basin and kept moist with sterile saline or wrapped in saline-soaked sponges until the specimen can be properly placed in fixative. • Confirmation with surgeon on other types of diagnostic studies to be performed, including Gram stain, acid fast and mycological studies. • Exceptions to immediate delivery of tissue specimen must be clearly described in the policies and procedures. (Example: Placentas must be refrigerated until delivery).	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements - Surgical Pathology and Cytopathology Specimens)	Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020. Makary MA, Epstein J, Pronovost PJ, Millman EA, Hartmann EC, Freischlag JA. Surgical specimen identification errors: A new measure of quality in surgical care. Surgery. 2007.141:450-455. Slavin L, Best MA, Aron DC. Gone but not forgotten: The search for the lost surgical specimens: Application of quality improvement techniques for reducing medical error. Quality Management in Health Care. 2001. 10(1): 45-53. The Joint Commission. National Patient Safety Goals Hospital Program, current edition. US Dept of Health and Human Services. Summary of the HIPAA privacy rule. 2003. World Health Organization. Guidelines for the safe transport of infectious substances and diagnostic specimens. 1997. Carson F, Hladik C. Histotechnology A Self-Instructional Text, 5th ed. Chicago, IL: ASCP Press 2020.

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			Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
Collection and Handling E. Recommendations for Tissue Collection and Handling ii. Tissue Transport b. Specimens in fixative	• Specimen in fixative must be delivered to the pathology laboratory according to the Health care facility policies and procedures. • Special guidelines are required for the handling of breast tissues to ensure fixation guidelines are met (please see section D, iv, e for specific fixation times). • Containers should be rigid, impermeable, unbreakable, and non-reactive to fixative solutions.	Laboratory General Checklist, GEN.40535 (Specimen Transport QM) Anatomic Pathology Checklist, ANP.22983 (Fixation - HER2 and ER Breast Cancer Predictive Marker Testing) Laboratory General Checklist, GEN.40942 (Specimen Container Analytic Interference)	Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. www.ast.org World Health Organization. Guidelines for the safe transport of infectious substances and diagnostic specimens. 1997.
Collection and Handling E. Recommendations for Tissue Collection and Handling ii. Tissue Transport c. Monitoring of time and environmental parameters during transport	• Documentation of fixation time for Breast specimens is required as outlined in section C. • All specimens are received in the pathology laboratory according to the policies and procedures approved, to include the acceptance of specimen protocol as time received, accessioned, and grossed. • Specimen placed in different environment (i.e. dry ice) must be recorded and delivered with specimen.	Anatomic Pathology Checklist, ANP.22983 (Fixation – HER2 and ER Breast Cancer Predictive Marker Testing) Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens) Laboratory General Checklist, GEN.40125 (Handling of Referred Specimens) Laboratory General Checklist, GEN.40535 (Specimen Transport QM)	Compton CC, Robb JA, Anderson MW, et.al. Preanalytics and Precision Pathology: Pathology Practices to Ensure Molecular Integrity of Cancer Patient Biospecimens for Precision Medicine. *Arch Path Lab Med.* Nov 2019, Vol. 143, No. 11 pp. 1346-1363. Allison KH, Hammond EH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. *Arch Path Lab Med*. 2020;144(5):545-563. Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
			Practice Guideline Update. 2023;147(9): 993-1000. AST Recommended Standards of Practice for Handling and Care of Surgical Specimens. The Joint Commission. National Patient Safety Goals Hospital Program, current edition.
Collection and Handling E. Recommendation for Tissue Collection and Handling ii. Tissue Transport d. Chain of custody 1. Specimen removal from origin of Collection (time/date)	• Chain of custody ensures continuity of quality care for the patient and provides a method to retrieve needed information. • All specimens must be recorded on a chain of custody form or log that includes dates and times, patient identification, specimen number, specimen description, and purpose for specimen delivery to the pathology department.		The Joint Commission. National Patient Safety Goals Hospital Program, current edition. US Dept of Health and Human Services. Summary of the HIPAA privacy rule. 2003. World Health Organization. Guidelines for the safe transport of infectious substances and diagnostic specimens. 1997.
Collection and Handling E. Recommendation for Tissue Collection and Handling ii. Tissue Transport d. Chain of custody 2. Personnel transporting specimen (name/title/date)	• It is advisable that chain of custody include the personnel involved in the handling and transportation of the specimen to the pathology lab and within the pathology lab during testing procedures. ○ Name of transporter ○ Title (i.e. RN, Surgical Tech, MD) ○ Dates: Collection, transported and received		The Joint Commission. National Patient Safety Goals Hospital Program, current edition. US Dept of Health and Human Services. Summary of the HIPAA privacy rule. 2003. World Health Organization. Guidelines for the safe transport of infectious substances and diagnostic specimens. 1997.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Collection and Handling E. Recommendation for Tissue Collection and Handling ii. Tissue Transport d. Chain of custody 3. Specimen receipt by laboratory (date/time/name)	• Specimen receipt procedure must be available to all personnel in the pathology department. • All specimens must be signed off on the chain of custody form carried by the transporter and logged into the LIS system of the pathology department for accessioning. • The pathology lab must have a logging system that identifies the person receiving the specimen, the date and time received. • The pathology lab must have a process for documenting who handles the original specimen and all sub-specimens throughout the entire examination, testing and reporting process.	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens) Laboratory General Checklist, GEN.40900 (Specimen Date Received) Laboratory General Checklist, GEN.41306 (Analyst Tracking ID)	The Joint Commission. National Patient Safety Goals Hospital Program, current edition. US Dept of Health and Human Services. Summary of the HIPAA privacy rule. 2003. World Health Organization. Guidelines for the safe transport of infectious substances and diagnostic specimens. 1997. Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. www.ast.org
Collection and Handling E. Recommendation for Tissue Collection and Handling ii. Tissue Transport e. Quality Assurance Monitors 1. Labeling discrepancies	• A policy and procedure must be made available that identify the process to follow for labeling discrepancies. • In some instances, the specimen can be considered to be a rejection specimen and only the originator should be making the appropriate labeling changes. • Label and requisition must be a match. Common mistakes are gender or site. • Records of all errors should be maintained.	All Common Checklist, COM.06100 (Primary Specimen Container Labeling) All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Laboratory General Checklist, GEN.40492 (Specimen Labeling Correction) All Common Checklist, COM.06300 (Specimen Rejection Criteria)	Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. www.ast.org
Collection and Handling E. Recommendation for Tissue Collection and Handling ii. Tissue Transport e. Quality Assurance Monitors 2. Specimen	• The pathology department must have a policy and procedure that handles specimen acceptance and rejection. • The information on the specimen container must match the information submitted on the requisition form. • Grounds for rejection may include: ○ Wrong name	All Common Checklist, COM.06300 (Specimen Rejection Criteria)	The Joint Commission. National Patient Safety Goals Hospital Program, current edition. US Dept of Health and Human Services. Summary of the HIPAA privacy rule. 2003.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
rejection criteria	○ Wrong site ○ Wrong identifiers ○ State of specimen		Department of Health and Human Services, Centers for Medicare and Medicaid Services. Clinical laboratory improvement amendments of 1988; final rule. Fed Register. 2003(Jan 24): [42CFR493.1283(a)(3)] World Health Organization. Guidelines for the safe transport of infectious substances and diagnostic specimens. 1997. Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. www.ast.org
Collection and Handling E. Recommendation for Tissue Collection and Handling ii. Tissue Transport e. Quality Assurance Monitors 3. Tissue Acceptance	• The specimen collection and handling procedures should include the parameters for specimens deemed acceptable. ○ Identification of the patient sample (labeling) ○ Completion of the requisition to include all required demographic and clinical data ○ Specimen container to be used ○ Type and volume of fixation ○ Transport packing, temperature, and method ○ Additional specialized instructions	All Common Checklist, COM.06300 (Specimen Rejection Criteria)	International Standard ISO 20166-4:2020 - Molecular in vitro diagnostic examinations – Specifications for pre-examination processes for formalin-fixed and paraffin-embedded (FFPE) tissue for – Part 4: In situ detection techniques: section 6 – Inside the laboratory. The Joint Commission. National Patient Safety Goals Hospital Program, current edition. Department of Health and Human Services, Centers for Medicare and Medicaid Services. Clinical laboratory improvement amendments of 1988; final rule. Fed Register. 2003(Jan 24): [42CFR493.1283(a)(3)]

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
			Association of Surgical Technologists (AST) Recommended Standards of Practice for Handling and Care of Surgical Specimens. www.ast.org Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.
Collection and Handling E. Recommendation for Tissue Collection and Handling iii. Specimen specific recommendations 1. Specialized biopsies	• A policy and procedure should be made available that identify the process to follow for different types of specimens/biopsies: ○ Muscle - enzyme studies ○ Renal/Skin - Immunofluorescence ○ Nerve/CNS ○ Cardiac ○ Lymphatic tissue - mercuric fixative; thinner sections, etc. ○ Specimens that contain radioactive implants	Anatomic Pathology Checklist, ANP.11670 (Specimen- Gross Examination) Anatomic Pathology Checklist, ANP.11275 (Radioactive Material Handling)	Clinical Laboratory Standards Institute CLSI MM13-A: Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods; Approved Guideline; 2020. Carson F, Hladik C. Histotechnology A Self-Instructional Text, 5th ed. Chicago, IL: ASCP Press 2020 AFIP, Laboratory Methods in Histotechnology.
Collection and Handling E. Recommendation for Tissue Collection and Handling iii. Specimen specific recommendations 2. General biopsies	• Health care facility policy and procedure should be followed for the proper collection and handling of general biopsies. Procedures to include: ○ Type of collection container ○ Type and volume of fixative ○ Transport and holding instructions • All fresh biopsies not needing special handling are to be submitted to the pathology department immediately for processing. • If this cannot be completed in a timely manner, the biopsy should be placed in a sterile container and kept moist with sterile saline or wrapped in saline-dampened sponges until the biopsy can be properly placed in fixative. • Specimens must be placed in appropriate fixative as specified in collection/handling and submission procedure.	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. The Joint Commission. National Patient Safety Goals Hospital Program, current edition. Makary MA, Epstein J, Pronovost PJ, Millman EA, Hartmann EC, Freischlag JA. Surgical specimen identification

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
			errors: A new measure of quality in surgical care. Surgery. 2007.141:450-455.
Collection and Handling E. Recommendation for Tissue Collection and Handling iii. Specimen specific recommendations 3. Bone marrows	• Health care facility policy and procedure should be followed for the proper collection and handling of bone marrow cores and aspirates. • Bone marrow cores/aspirates should be placed in fixative immediately after the procedure. • Bone marrow cores/aspirates should be stored at room temperature. • Cores/aspirates must be received in the laboratory, as soon as possible, for immediate handling according to written protocols.	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens)	Carson F, Hladik C. Histotechnology A Self-Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Foucar, KM, Bone Marrow Pathology. 2nd ed. Chicago, IL, ASCP Press: 2001.
Collection and Handling E. Recommendation for Tissue Collection and Handling iii. Specimen specific recommendations 4. Large specimen(s)	• Health care facility policy and procedure should be followed for the proper collection and handling of specimens. Procedures to include: ○ Type of collection container ○ Type and volume of fixative or no fixative ○ Transport and holding instructions • All fresh specimens are to be submitted to the pathology department immediately with instructions for special testing or processes. • Large specimens require a longer amount of time for tissue to be properly fixed (e.g. uterus, spleen, lung, liver, etc.). • Breast tissue must follow the ASCO guidelines for strict fixation timing and processing. (please see section D, iv, e for specific fixation times). • Placentas should be refrigerated until delivery to the pathology department.	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens) Anatomic Pathology Checklist, ANP.22983 (Fixation – HER2 and ER Breast Cancer Predictive Marker Testing) Anatomic Pathology Checklist, ANP.11250 (Adequate Storage)	American Society of Clinical Oncology. (2013). ASCO Guidelines. Retrieved December 18, 2013, from American Society of Clinical Oncology (ASCO): http://www.asco.org/Guidelines/ Lester, SC. Manual of Surgical Pathology. 3rd ed. Saunders: 2010. Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. *Arch Path Lab Med*. 2023;147(9): 993-1000.
HANDLING PRIOR TO GROSS			
Collection and Handling F. Accessioning i. Specimen Identifiers and	• Specimen must be identified/labeled following parameters identified in section B. • Each specimen container received must be compared to the requisition to ensure correct match of at least 2 patient-specific identifiers: ○ Full patient name	All Common Checklist, COM.06100 (Primary Specimen Container Labeling)	Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019:Vol 30 No7.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Labelling	○ Assigned identification number (e.g. health record / master index number) ○ Date of Birth • Additional requisition information to be checked: ○ Number of specimen containers ○ Type of specimens submitted ○ Complete clinical history ○ Name of requesting physician to return report to ○ Collection data related to fixation (section D)	All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Laboratory General Checklist, GEN.40490 (Patient Identification)	International Standard ISO 15189:2022 Medical Laboratories – Requirements for Quality and Competence; section 7.2 - Pre-examination Processes Zarbo RJ, Tuthill JM, D'Angelo R, et al. The Henry Ford Production System: reduction of surgical pathology in-process misidentification defects by bar code-specified work process standardization. *Am J Clin Pathol*. 2009; 131:469-477.
Collection and Handling F. Accessioning ii. Accessioning order a. Avoiding Error	• It is good laboratory practice to avoid accessioning like-specimens back-to-back. • If like specimens must be accessioned in sequence it is suggested to separate by size (e.g. skin punch biopsy followed by skin excision followed by skin punch biopsy) or to be identified by use of multi colored inks (punch one black ink, punch two is green ink, punch three blue ink etc.). Each specimen should be uniquely identified.	All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens) All Common Checklist, COM.06100 (Primary Specimen Container Labeling)	
Collection and Handling G. Handling Prior to Gross Examination	• There should be sufficient space available in the surgical pathology suite to store surgical specimens in an orderly fashion after accessioning, and prior to gross examination: ○ Space for the containers and accompanying paperwork/request slips. ○ Storage area should be clean, free of clutter, and well ventilated.	Laboratory General Checklist, GEN.60000 (Adequate Space) Laboratory General Checklist, GEN.60100 (Adequate Space) Anatomic Pathology Checklist, ANP.11250 (Adequate Storage)	
Collection and Handling G. Handling Prior to Gross Examination i. Immediate Gross Examination and Handling	• Site specific documentation on how to handle specimens requiring immediate gross examination (i.e. microbiological cultures, electron microscopy, cytogenetics, flow cytometry, or other special studies) must be available to all staff handling the specimens and should include: ○ Specialized grossing techniques (i.e. sterile procedures)	Anatomic Pathology Checklist, ANP.11670 (Specimen Gross Examination) Anatomic Pathology Checklist, ANP.11600 (Gross Examination – Qualifications)	Department of Health and Human Services, Centers for Medicare and Medicaid Services. Clinical Laboratory Improvement Amendments of 1988; final rule. Fed Register. 2024(Dec 28): [42CFR493.1489].

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
	○ Sample collection for submission into specialized media (i.e. cytogenetic or EM) ○ Requisition completion for further testing (i.e. microbiology or pathology referral lab) ○ Labeling procedure for sub-specimens ○ Holding and transport instructions for specialized testing (i.e. refrigerate) ○ Specimen cross contamination • Specimens submitted fresh for immediate gross examination (i.e., frozen sections, margin determination, etc.) should be kept in their labeled containers at room temperature. • If there is a delay, the fresh specimen should be kept in its labeled container and refrigerated until it can be examined. • Written procedure to prevent cross contamination.	Anatomic Pathology Checklist, ANP.11605 (Gross Examination – Supervision) Anatomic Pathology Checklist, ANP.11680 (Cross Contamination – Grossing) Anatomic Pathology Checklist, ANP.11810 (Intra-operative Preparation Quality) Anatomic Pathology Checklist, ANP.11670 (Specimen - Gross Examination) All Common Checklist, COM.06100 (Primary Specimen Container Labeling) All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Anatomic Pathology Checklist, ANP.11250 (Adequate Storage) Anatomic Pathology Checklist, ANP.21397 (Cross Contamination – Histology)	
Collection and Handling G. Handling Prior to Gross Examination ii. Delayed time to Gross Examination	• Specimens in fixative requiring gross examination should be assembled/stored in an orderly fashion after accessioning, with appropriate paperwork/request slips and labeled cassettes available. • The containers should be sealed to avoid spillage, loss of fixative, loss of specimen, and to prevent drying of the specimen prior to gross examination.	Anatomic Pathology Checklist, ANP.11600 (Gross Examination – Qualifications) Anatomic Pathology Checklist, ANP.11605 (Gross Examination – Supervision) Laboratory General Checklist, GEN.40125 (Handling of Referred Specimens)	
Collection and Handling G. Handling Prior to Gross Examination ii. Delayed time to Gross Examination	• An appropriate room temperature should be maintained, so that specimens are neither frozen nor damaged by excessive heat. • Appropriate ventilation should be maintained so that there is adequate air movement around the specimen containers, without buildup of fixative or other noxious vapors.	Laboratory General Checklist, GEN.61300 (Climate Control) Laboratory General Checklist, GEN.76720 (Formaldehyde and Xylene Safety)	

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
a. Monitoring of Environmental Parameters			
Collection and Handling G. Handling Prior to Gross Examination ii. Delayed time to Gross Examination b. Addition of fixative to specimen(s)	• Adequate fixative should be added to the specimen container as soon as possible. If insufficient fixative is present when the specimen is received in the laboratory additional fixative should be added. • Generally, this should be a volume such that there is a 15-20:1 ratio of fixative to tissue specimen. If a large specimen (i.e. uterus, colon, breast, etc.) is submitted, the specimen should be opened or regularly sliced and covered or wrapped in an absorptive material (i.e. paper towels, etc.) to maximize surface exposure to fixative reagents. • The specimen container should remain sealed so that drying or other specimen damage cannot occur.	Laboratory General Checklist, GEN.40125 (Handling of Referred Specimens)	Carson F, Hladik-Cappellano C. Histotechnology A Self-Instructional Text, 5th ed. Chicago, IL: ASCP Press 2020. Brown RW. et. al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009 Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
Collection and Handling H. Intra-Operative Consultation (i.e., Frozen Sections)	• Health care facility policy and procedure should be followed for the proper collection and handling of specimens for intra-operative consultation. Procedures to include: ○ Gross examination only. ○ Frozen sections ○ Touch preps, scrap preps • All intra-operative consultation results and tissue diagnoses are made and signed by a pathologist. • Reagents and slides used for intra-operative consultation are properly labeled.	Anatomic Pathology Checklist, ANP.11670 (Specimen – Gross Examination) Anatomic Pathology Checklist, ANP.11850 (Intra-Operative Results) Anatomic Pathology Checklist, ANP.11660 (Surgical Tissue Diagnosis) Anatomic Pathology Checklist, ANP.11756 (Reagents) All Common Checklist, COM.06100 (Primary Specimen Container Labeling)	Cibull ML. Q&A. Northfield, IL: College of American Pathologists CAP Today. 1997;11(7):112 Zhai Q, Siegal G, eds. College of American Pathologists. Quality Management in Anatomic Pathology Pub 125. Northfield, IL: CAP, 2017.

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
	• Intra-operative consultation preparations are adequate for diagnosis. • Intra-operative slides are retained and made part of the permanent case. • Residual tissue(s) used for intra-operative examination are processed into paraffin for comparison with the frozen section interpretation.	All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Anatomic Pathology Checklist, ANP.11810 (Intra-operative Preparation Quality) Anatomic Pathology Checklist, ANP.12050 (Intra-operative Slide Handling) Anatomic Pathology Checklist, ANP.12075 (Residual Frozen Tissue After Frozen Section Examination) Anatomic Pathology Checklist, ANP.12500 (Record and Material Retention – Surgical Pathology)	Rickert RR. Quality assurance goals in surgical pathology. *Arch Pathol Lab Med*. 1990;114:1157-1162. Association of Directors of Anatomic and Surgical Pathology. Recommendations on quality control and quality assurance in anatomic pathology. *Am J Surg Pathol*. 1991;15:1007-1009. Gephardt GN, et al. Interinstitutional comparison of frozen section consultations. A College of American Pathologists Q-probes study of 90 538 cases in 461 institutions. *Arch Pathol Lab Med*. 1996;120:804-809. Novis DA, et al. Interinstitutional comparison of frozen section consultation in small hospitals. *Arch Pathol Lab Med*. 1996;120:1087-1093. Zhai, Q, Siegal, G, eds. College of American Pathologists. Quality Management in Anatomic Pathology Pub 125. Northfield, IL: CAP, 2017
Collection and Handling H. Intra-Operative Consultation i. Reporting	• When giving a verbal report, the pathologist must be able to speak directly with intra-operative medical/surgical personnel. • The patient's identification is checked and confirmed before delivery of any verbal report. • All intra-operative consultation reports are made a part of the final surgical pathology report.	Anatomic Pathology Checklist, ANP.11900 (Verbal Reports) Anatomic Pathology Checklist, ANP.11950 (Verbal Report/Patient ID) Anatomic Pathology Checklist, ANP.12000 (Final Report)	

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Collection and Handling H. Intra-Operative Consultation ii. Cryostat decontamination	• There is a documented procedure for the routine decontamination of the cryostat at defined intervals. • Decontamination of the cryostat is documented, and records are available for examination.	Anatomic Pathology Checklist, ANP.23410 (Cryostat Decontamination)	Clinical Laboratory Standards Institute CLSI. Protection of Laboratory Workers from Occupational Acquired Infections, Approved Guideline M29-A4; 2014;Vol34 No8. http://www.epa.gov/oppad001/list_b_tuberculocide.pdf
Collection and Handling H. Intra-Operative Consultation iii. Hematoxylin and Eosin stain (H&E) Stain	• Establish operation procedures for H&E staining: ○ Reagents to be used – concentration and volumes ○ Staining schedule for each staining program ○ Rotation or change schedule for the reagents ○ Disposal and or recycle process for reagents • Establish quality assurance criteria for the staining and evaluation of H&E staining.	Laboratory General Checklist, GEN.77800 (Hazardous Chemical Waste Disposal) Anatomic Pathology Checklist, Quality Control, ANP.11756 (Reagents) All Common Checklist, COM.30400 (Reagent Expiration Date - Nonwaived Tests) Anatomic Pathology Checklist, ANP.11734 (Slide Quality)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Sheehan DC, Hrapchak BB., Theory and Practice of Histotechnology, 2nd ed. Columbus, OH: Battelle Press; 1980. Horobin RW. Troubleshooting Histology Stains, 1998, Churchill Livingstone

PART II. LABORATORY PROCESSES - Guidelines

Guideline Section	Statement	Related CAP Checklist Requirements ❖ 2024 Edition	Additional References
Laboratory Processes A. Guidelines i. Facility Requirements	• The laboratory has sufficient space and utilities are adequate for gross examination and specimen storage. • Gross examination area has adequate lighting. • Gross examination area has adequate ventilation system, with policy for monitoring exposure levels to formalin. • Formalin exposure level of grossing personnel should be examined annually to assure proper ventilation. • Grossing area should have readily available: ○ Photographic equipment ○ Dictation system (unless grossing personnel enters gross dictation directly into electronic laboratory information system) ○ Access to anatomic pathology laboratory information system ○ Access to diagnostic imaging PACS system if located in a clinical hospital setting	Anatomic Pathology Checklist, ANP.11250 (Adequate Storage) Laboratory General Checklist, GEN.60150 (Adequate Space) Laboratory General Checklist, GEN.60250 (Working Environment) Laboratory General Checklist, GEN.76720 (Formaldehyde and Xylene Safety)	Clinical Laboratory Standards Institute CLSI: QMS01-A4: Quality Management System: A Model for Laboratory Services; Approved Guideline, 5th ed. 2019.
Laboratory Processes A. Guidelines ii. Personnel	All macroscopic tissue examinations are performed by a pathologist or pathology resident, or under the supervision of a qualified pathologist. Activities and the nature of supervision is defined in a written protocol. Qualification requirements for non-pathologist or pathology resident personnel who assist in gross examination of specimens: • *An earned associate degree in laboratory science or medical laboratory technology, obtained from an accredited institution, OR* • *Education/training equivalent to the above that includes at least 60 semester hours or equivalent from an accredited institution.* • *This education must include 24 semester hours of medical laboratory technology courses, OR 24 semester hours of science courses that includes 6 semester hours of chemistry, 6 semester hours of biology, and 12 semester*	Anatomic Pathology Checklist, ANP.11600 (Gross Examination – Qualifications) Anatomic Pathology Checklist, ANP.11605 (Gross Examination – Supervision) Anatomic Pathology Checklist, ANP.11610 (Gross Examination Qualifications to Assist with Grossing)	Department of Health and Human Services, Centers for Medicare and Medicaid Services. Clinical Laboratory Improvement Amendments of 1988; final rule. Fed Register. 2024(Dec 28): [42CFR493.1489]. http://www.naacls.org/news/naacls-news/archives.asp?article_id=599. Department of Health and Human Services, Centers for Medicare and Medicaid Services. Clinical Laboratory Improvement Amendments of 1988;

	hours of chemistry, biology or medical laboratory technology in any combination. • *In addition, the individual must have laboratory training including either completion of a clinical laboratory* training program *approved or accredited by the Accrediting Bureau of Health Education Schools (ABHES) or the Commission on Accreditation of Allied Health Education Programs (CAAHEP) (note that this training may be included in the 60 semester hours listed above), OR at least 3 months documented laboratory training in each specialty in which the individual performs high complexity testing.* • *Additional educational pathways for qualifying as high complexity testing personnel may be found in CLIA regulation 42CFR493.1489.* • *The laboratory director is responsible in determining whether an individual's education, training, and experience satisfy the requirements.* • Protocols should be in place to specify nature of pathologist supervision of non-pathologist for differing types of specimens. o Protocol for small simple specimens that do not require knowledge of anatomy can specify indirect supervision. o Protocol for more complex specimens can require direct or indirect supervision based on laboratory director's determination of each grossing personnel's ability to properly examine specimen. • Pathologist must define in writing the gross activities and the specimen types the individual is permitted to perform. • Performance of non-pathologist who performs gross examination should be evaluated by a pathologist on a regular basis. o Annual review with documentation of errors in grossing, to include specimen mix-ups, improperly grossed specimens, and other parameters that are felt to be important by the laboratory director.	Anatomic Pathology Checklist, ANP.11670 (Specimen– Gross Examination) Anatomic Pathology Checklist, ANP.11605 (Gross Examination – Supervision) Anatomic Pathology Checklist, ANP.11640 (Competency Assessment of Individuals Assisting with Grossing)	final rule. Fed Register. 2024(Dec 28): [42CFR493.1489] Department of Health and Human Services, Centers for Medicare and Medicaid Services. Clinical Laboratory Improvement Amendments of 1988; final rule. Fed Register. 2024(Dec 28): [42CFR493.1489(b)(3)] Cibull ML. Q&A. Northfield, IL: College of American Pathologists CAP Today. 1997;11(7):112 Grzybicki DM, et al. The usefulness of pathologists' assistants. *Am J Clin Pathol*. 1999;112:619-626. Galvis CO, et al. Pathologists' assistants practice. A measurement of performance. *Am J Clin Pathol*. 2001;116:816-822. The Joint Commission. Laboratory Services (CAMLAB), current edition. The Joint Commission. Laboratory Services (CAMLAB), current edition.
Laboratory Processes A. Guidelines iii. Specimen Gross Sectioning	• Identity of every specimen is maintained at all times during the gross examination steps.	All Common Checklist, COM.06100 (Primary Specimen Container Labeling)	

	• There are documented instructions or guidelines available for the proper dissection, description, and histologic sampling of various specimen types (e.g. gastrointestinal biopsy, mastectomy, colectomy, hysterectomy, renal biopsy, nerve biopsy, muscle biopsy, etc.).	All Common Checklist, COM.06200 (Secondary Specimen Container Labeling)	
	○ Complex specimens should be dissected, described, and histologically sampled in a way that: ▪ Ensures proper microscopic evaluation and diagnosis can be performed by the pathologist by following established guidelines for specimen dissection and histologic sectioning. ▪ All required parameters of CAP Cancer Checklists can be assessed by pathologist.	Anatomic Pathology Checklist, ANP.11670 (Specimen– Gross Examination)	CAP Cancer Protocols and Checklists. http://www.cap.org/apps/cap.portal Barnes CA. False-negative frozen section results. *Am J Clin Pathol*. 2000;113(6):900.
	• There are specific policies and procedures for the safe handling, storage, and disposal of tissues that may contain radioactive material. ▪ Procedures should be developed in conjunction with institutional radiation safety guidelines and must comply with state regulations for safe handling of radioactive materials. ▪ Procedures should distinguish policy regarding specimens with low radioactivity levels (such as sentinel lymph nodes) and high radioactivity level specimens such as implant devices. ▪ Procedure should specify specific handling details and laboratory should include specific storage area of higher radioactive material. ▪ Procedure should include institute specific directions for the disposal of potentially radioactive tissues.	Anatomic Pathology Checklist, ANP.11275 (Radioactive Material Handling)	Glass EC, et al. Editorial: radiation safety considerations for sentinel node techniques. *Ann Surg Oncol*. 1999:6:10. Miner TJ, et al. Guideline for the safe use of radioactive materials during localization and resection of sentinel lymph nodes. *Ann Surg Oncol*. 1999;6:75-82. Cibull ML. Handling sentinel lymph node biopsy specimens. A work in progress. *Arch Pathol Lab Med*. 1999;123:620-621. Pfeifer JD. Sentinel lymph node biopsy. *Am J Clin Pathol*. 1999;112:599-602.
	• There is a policy regarding what type of surgical specimens (if any) may be exempt from submission to the pathology department. ▪ Such a policy should be approved by the medical staff or appropriate health care committee. ▪ Examples of typical exempt specimens include prosthetic devices, tonsils, and adenoids in children below a certain age, foreskin in children, varicose veins, cataracts, and pannus.	Anatomic Pathology Checklist, ANP.10016 (Surgical Pathology Exclusion) Anatomic Pathology Checklist, ANP.10032 (Surgical Pathology Microscopic Exemptions)	Fitzgibbons PL, et al. Recommendations for handling radioactive specimens obtained by sentinel lymphadenectomy. *Am J Surg Pathol*. 2000;24:1549-1551. Zarbo RJ, Nakleh RE. Surgical pathology specimens for gross examination only and exempt from submission. A College of American Pathologists Q-Probes study of current
	• There is a complete list of devices required for tracking under the Safe Medical Devices Act of 1990. • There is a policy for handling sup-optimal specimens (unlabeled specimens, specimens unaccompanied by adequate requisition information, left unfixed or	Laboratory General Checklist, GEN.20351 (Adverse Patient Event Reporting)	

	unrefrigerated for extended period of time, received in a container/bag with a contaminated outside surface. • There is written procedure for the storage and disposal of all specimens submitted for examination. The guideline should include: ○ Time of retention – minimum of two weeks after report issued and results reported to the referring physician ○ Approved disposal method of fixative as per local and state guidelines ○ Approved disposal method of solid waste (tissue)	All Common Checklist, COM.06300 (Specimen Rejection Criteria) Anatomic Pathology Checklist, ANP.11550 (Specimen Retention – Grossing)	policies in 413 institutions. *Arch Pathol Lab Med.* 1999;123:133-139. Zhai Q, Siegal G, eds. College of American Pathologists. Quality Management in Anatomic Pathology Pub 125. Northfield, IL: CAP, 2017,113-114. Medical devices; device tracking. Fed Reg. May 29,119;57:22966-22981 College of American Pathologists. Policies and guidelines manual. Surgical specimens to be submitted to pathology for examination. Northfield, IL: CAP, 2022: Appendix M Zhai Q, Siegal G, eds. College of American Pathologists. Quality Management in Anatomic Pathology Pub 125. Northfield, IL: CAP, 2017,113-114.
Laboratory Processes A. Guidelines iv. Tissue Submission	Document physical parameters of sections submitted for histologic examination: • General information ○ Sample size must be thin (3-4 mm) enough to ensure adequate fixation and processing of the tissue. ○ Sample must small enough to fit in the cassette and allow space for processing fluids to enter the cassette on all sides. ○ Bloody or friable tissues should be wrapped so that the tissue sample is contained within the cassette to avoid cross contamination with other samples. ○ The number of biopsies or cores should be limited to enable proper embedding, all samples flat and within the same plane. ○ Number of cassettes per sample should be recorded. ○ Number of pieces per cassettes should be recorded. ○ Specialized embedding directions should be documented. • Small biopsies	Anatomic Pathology Checklist, ANP.11670 (Specimen – Gross Examination) Anatomic Pathology Checklist, ANP.12155 (Gross Description Report Elements)	College of American Pathologists. Policies and guidelines manual. Surgical specimens to be submitted to pathology for examination. Northfield, IL: CAP, 2022Appendix M Zhai Q, Siegal G, eds. College of American Pathologists. Quality Management in Anatomic Pathology Pub 125. Northfield, IL: CAP, 2017,113-114.

	○ Multiple small pieces for most small biopsies (e.g. stomach, colon, endometrium) can be submitted in one cassette. For needle core biopsies, one or at most a few (less than 5) pieces per cassette. • Larger tissue fragments or samples from whole organs ○ If more than one section is submitted in a block, the combined sections meet the above-mentioned parameters and that there is sufficient space between each piece to allow adequate fixation and embedding.		
Laboratory Processes B. Tissue Cassette Identification	• All tissue cassettes must be identified with a unique identifier. • The unique identifier must be indelible throughout all subsequent procedures. • The unique identifier can be applied manually or electronically through the use of automated printers. • Minimum requirements for a unique identifier include: ○ Accession case identifier – to include year, subsection type (surgical, cytology etc.) ○ Specimen identifier – alpha or numeric ○ Block identifier – alpha or numeric • Additional identifiers: to be used but not required: ○ Laboratory name or identifier ○ Color coded cassette: tissue type, fixative used, pathologist etc. • Barcodes must not be the only identifying mark; a human readable identifier is also required. • If a barcode is applied to the cassette, it should be readable by all tracking modalities used in the laboratory: LIS, Hospital Information system, associated testing equipment (slide writers), and third-party tracking software.	All Common Checklist, COM.06100 (Primary Specimen Container Labeling) All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Laboratory General Checklist, GEN.40825 (Specimen ID) All Common Checklist, COM.06200 (Secondary Specimen Container Labeling)	International Standard ISO 15189:2022 - Medical Laboratories – Requirements for Quality and Competence; section 7.2 - Pre-examination Processes Clinical Laboratory Standards Institute CLSI – LIS02A2 – Specifications for Transferring Information Between Clinical Laboratory Instruments and Information Systems; 2004. Clinical Laboratory Standards Institute CLSI – Auto07A – Laboratory Automation; Data Content for Specimen Identification; 2004.

LABORATORY PROCESSES – FIXATION			
Guideline Section	Statement	CAP Checklist	Reference
Laboratory Processes C. Fixation Parameters i. Type of fixative a. Formalin, types	Guidelines for the correct fixative to use for each specimen type should be documented and include: • Fixative to be used • Recommended duration of fixation	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens)	Compton CC, Robb JA, Anderson MW, et.al. Preanalytics and Precision Pathology: Pathology Practices to Ensure Molecular Integrity of Cancer

	• Required documentation of cold and warm ischemia times • References to mandatory fixation guidelines for breast tissues • Safety precautions and spill clean-up	Anatomic Pathology Checklist, ANP.22983 (Fixation – HER2 and ER Breast Cancer Predictive Marker Testing)	Patient Biospecimens for Precision Medicine. *Arch Path Lab Med.* Nov 2019, Vol. 143, No. 11. pp. 1346-1363. Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020. International Standard ISO 20166-4:2020 - Molecular in vitro diagnostic examinations – Specifications for pre-examination processes for formalin-fixed and paraffin-embedded (FFPE) tissue for – Part 4: In situ detection techniques: section 6 – Inside the laboratory. Allison KH, Hammond EH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. *Arch Path Lab Med*. doi: 10.5858/arpa.2019-0904-SA Wolff AC, Summerfield MR, Dowsett M, et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. *Arch Path Lab Med*;2023;147(9): 993-1000. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.

			Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
Laboratory Processes C. Fixation Parameters i. Type of fixative b. Recycling formalin fixatives	• A written policy and procedure for the use of recycled formalin should include: ○ Documentation of the initial verification of quality of recycled formalin ○ Documentation of changes and reverification of quality of recycled formalin after any procedural changes or repairs to equipment used ○ What formalin can be recycled: from tissue samples or tissue processor ○ Recycled formalin be used with new tissue samples, samples to be stored, and on tissue processors ○ Procedure for recycling formalin ○ Procedure for testing quality of recycled formalin ○ Procedure for disposal of non-reusable waste ○ Procedure for cleaning and maintenance of recycling equipment ○ Validation studies comparing the filtered/tested solution to new solution are required. ○ Documentation to show licensing agencies is required.	Laboratory General Checklist, GEN.76000 (Chemical Hygiene Plan)	Section 19 of Occupational Safety and Health Act (OSHA) 1970 - Public Law 91-596. 29 CFR 1910.1000 (OSHA) Toxic and Hazardous Substances 29 CFR 1910.1048 (OSHA) Formaldehyde 29 CFR 1910.1200 (OSHA) Hazard Communication 29 CFR 1910.1048 (OSHA) Formaldehyde, Irritant and Potential Cancer Hazard 29 CFR 1910.1450 (OSHA) Occupational Exposure to Hazardous Chemicals in Laboratories 40 CFR 262 (EPA) Standards Applicable to Generators of Hazardous Wastes 49 CFR 172.101 (DOT) Table of Hazardous Materials and Special Provisions http://www.osha.gov/dsg/hazcom/index.html
Laboratory Processes C. Fixation Parameters i. Type of fixative c. Non-Formalin,	• Guidelines for the use of specialized fixatives for each specimen type must be documented and include: ○ Fixative to be used ○ Recommended duration of fixation	Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 3rd ed. Chicago, IL: ASCP Press; 2009.

types	○ Specialized handling requirements (i.e. refrigeration or flammable storage) ○ Specialized preparation or usage (i.e. mix before use) ○ Safety precautions and spill clean-up		Dapson RW. Glyoxal fixation: How it works and why it only occasionally needs antigen retrieval. *Biotech Histochem*. 82:161; 2007. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Michel B, Milner Y, David K. Preservation of tissue fixed immunoglobulins in skin biopsies of patients with lupus erythematous and bullous diseases: preliminary report. *J Invest Dermato*. 59:449; 1972. Elias JM, Miller F, Pastore J. New method for shipment of renal biopsies. *J Histotechnol*. 1:15; 1977.
Laboratory Processes C. Fixation Parameters ii. Fixation Times/Factors a. Fixative type	• Using 10% neutral buffered formalin (10% NBF), complete fixation of a 4 mm thick section of tissue is achieved in approximately 24 hours. • As a general recommendation, when using 10% NBF, ALL clinical tissue specimens should be fixed for a minimum of 6 hours and a maximum of 72 hours. • The general recommendations above are fixative dependent and relate specifically to the use of 10% NBF. Other fixatives, such as alcoholic formalin or Bouin, may have different guidelines.	Anatomic Pathology Checklist, ANP.22300 (Specimen Modification) Anatomic Pathology Checklist, ANP.22300 (Specimen Modification)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. *Arch Path Lab Med*. 2023;147(9): 993-1000. Goldstein NS, Ferkowicz M, Odish E, Mani A, Hastah F. Minimum formalin fixation time for consistent estrogen receptor immunohistochemical staining of invasive breast carcinoma. *Am J Clin Pathol*. 120:86–92, 2003.

Laboratory Processes
C. Fixation Parameters
ii. Fixation Times/Factors
b. Tissue type
	• Guidelines for the fixation and handling of specific tissue types must be documented based on:
	  ○ Accepted standards – CAP/ASCO guidelines for breast tissues
	  ○ Tissue anatomy:
	  ▪ Brain
	  ▪ Fatty tissue – requires extended fixation
	  ▪ Dense tissue such as uterus or cervix- requires extended fixation
	  ▪ Lung – requires inflation
	  ▪ Whole organs
	
	• Dense tissues, such as uterus or cervix, and those that are especially fatty or bloody, like breast, colon, and spleen, usually require extended times in most routine fixatives.
		Laboratory General Checklist, GEN.40115 (Specimen Collection Manual Elements – Surgical Pathology and Cytopathology Specimens)
		
		Anatomic Pathology Checklist, ANP.11670 (Specimen - Gross Examination)
			Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. *Arch Path Lab Med*. 2023;147(9): 993-1000.
			
			Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.
			
			Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.

Laboratory Processes
C. Fixation Parameters
ii. Fixation Times/Factors
c. Tissue Size
	• Gross dissection manual should include information about the size and thickness of the tissue sample – *see section A iv.*
	
	• A gross dissection manual should include specific instructions related to the fixation of the specimen to include:
	  ○ Total fixation time required prior to processing
	  ○ Preparation of large specimen to improve fixation:
	  ▪ Opening / slicing of whole organs
	  ▪ Exchange fixative
	
	• Thickness of tissue specimens is especially important because of its effect on reagent penetration. Large specimens should be opened or regularly sliced to maximize surface exposure to fixative reagents. Gross tissue sections should be no thicker than 3-4 mm and easily fit between the top and bottom of the processing cassette.
		Anatomic Pathology Checklist, ANP.11670 (Specimen - Gross Examination)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.
			
			Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
			
			Compton CC, Robb JA, Anderson MW, et.al. Preanalytics and Precision Pathology: Pathology Practices to Ensure Molecular Integrity of Cancer Patient Biospecimens for Precision Medicine. *Arch Path Lab Med.* Nov 2019, Vol. 143, No. 11. pp. 1346-1363.
			
			Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020.

			International Standard ISO 20166-4:2020 - Molecular in vitro diagnostic examinations – Specifications for pre-examination processes for formalin-fixed and paraffin-embedded (FFPE) tissue for – Part 4: In situ detection techniques: section 6 – Inside the laboratory.
Laboratory Processes C. Fixation Parameters ii. Fixation Times/Factors d. Total Fixation time	• Guidelines for the total fixation of the specimens should be documented. • Total fixation time required prior to processing to include: ○ Time from placement in fixative to lab ○ Time large specimen is held prior to final dissection ○ Time in cassettes prior to processing – hold time and time on processor • Tissues for clinical assessment should be placed into an appropriate fixative immediately after surgical removal. Duration of fixation is an important variable in achieving excellent processing, microtomy, staining, and special staining. • Total fixation time should be recorded for each specimen and may be dictated into the body of the surgical report.	Anatomic Pathology Checklist, ANP.22983 (Fixation – HER2 and ER Breast Cancer Predictive Marker Testing) Anatomic Pathology Checklist, ANP.12155 (Gross Description Report Elements)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. *Arch Path Lab Med*. 2023;147(9): 993-1000. Compton CC, Robb JA, Anderson MW, et.al. Preanalytics and Precision Pathology: Pathology Practices to Ensure Molecular Integrity of Cancer Patient Biospecimens for Precision Medicine. *Arch Path Lab Med.* Nov 2019, Vol. 143, No. 11. pp. 1346-1363. Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020. International Standard ISO 20166-4:2020 - Molecular in vitro diagnostic examinations – Specifications for pre-

			examination processes for formalin-fixed and paraffin-embedded (FFPE) tissue for – Part 4: In situ detection techniques: section 6 – Inside the laboratory.
Laboratory Processes C. Fixation Parameters ii. Fixation Times/Factors e. Environmental Parameters 1. Temperature	• Guidelines for the temperature at which the fixative must be used should be documented. ○ Storage temperature of fixative prior to use ○ Temperature the specimen in fixative to be stored at after collection ○ Temperature the specimen in fixative to be stored at during transport to testing laboratory. • Almost all fixatives are effectively used at room temperature (22-25°C). • Some fixatives such as acetone are more effective when used cold (4°C).	Laboratory General Checklist, GEN.76000 (Chemical Hygiene Plan)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
Laboratory Processes C. Fixation Parameters ii. Fixation Times/Factors e. Environmental Parameters 2. Use of Microwaves	• Guidelines for use and operation of specialized microwave equipment used to assist with fixation should include: ○ Safety instructions to include radiation testing process ○ What solutions can be used in microwave ○ Type of tissues that can be microwave fixed ○ Size of tissue that can be microwave fixed ○ Protocols to be applied	Anatomic Pathology Checklist, ANP.27170 (Microwave Usage) Anatomic Pathology Checklist, ANP.28290 (Microwave Monitoring) Anatomic Pathology Checklist, ANP.28860 (Microwave Container Venting) Anatomic Pathology Checklist, ANP.29430 (Microwave Venting)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Login GR, Giammara B. Rapid microwave fixation, staining and embedding for light and electron microscopy. Microscopy Society of merica Workshop; Cincinnati, OH. 1993.
LABORATORY PROCESSES – PROCESSING			
Guideline Section	Statement	CAP Checklist	Reference
Laboratory Processes D. Processing i. Time	• Procedures must be written and validated for each processing schedule used. • Documented processing schedules must include: ○ Unique title that can be related to program on the tissue processor ○ Identify what tissue types the schedule can be used for ▪ Rush/urgent, biopsies, breast tissue ○ Indicate any pretreatment of the tissues ▪ i.e. Tissue must be fully fixed prior to processing as program starts in alcohol ○ Total processing time ○ Schedule:	Anatomic Pathology Checklist, ANP.23120 (Tissue Processing Programs – Validation) Anatomic Pathology Checklist, ANP.23130 (Tissue Processing Programs) All Common Checklist, COM.30400 (Reagent Expiration Date)	Bancroft JD, Gamble M. Theory and Practice of Histological Techniques. New York, NY: Churchill Livingstone, 6th ed. 2008: 53-92. Brown RW, et. al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009: 4-8.

	▪ Name of reagent ▪ Expiration date ▪ Concentration ▪ Location on processor ▪ Order of application of reagents ▪ Ensure reagents are compatible with each other (i.e. alcohol following neutral buffered formalin must be 70% or less to stop precipitation of phosphate salts) ▪ Duration of application ▪ Specialized functions: ▪ Heat – actual temperature ▪ Pressure /vacuum – actual levels ▪ Mixing/stirring/agitation – Yes / No • Maintenance programs for the processor must be established: ○ Preventative maintenance and service contracts ▪ Completed by lab staff ▪ Completed by vendor service ○ Operational maintenance: ▪ Reagent top up / exchange / rotation schedule based on: • Number of cassettes processed • Number of time program run • Monitored and established by processor software ▪ Establish if recycled reagents can be used on processor ▪ Cleaning of reagent reservoir containers	All Common Checklist, COM.30600 (Maintenance/Function Checks) All Common Checklist, COM.30675 (Instrument and Equipment Records) Anatomic Pathology Checklist, ANP.23100 (Tissue Processor Solutions)	Carson F. Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Sheehan D, Hrapchak B. Theory and Practice of Histotechnology. Columbus, OH: Battelle Press, 2nd ed., 1980:59-78. Llewellyn B.D. StainsFile, http://stainsfile.info/StainsFile/prepare/process/auto.htm Willis D, Minshew J. Microwave Technology in the Histology Laboratory. Histologic. 2002; 35:1-4. Login GR, Dvorak AM. The Microwave Toolbook. A Practical Guide for Microscopists. Boston, MA: Beth Israel Hospital; 1994. Kok, LP, Boon ME. Microwave Cookbook of Microscopists. 3rd ed. Coulomb Press, Leyden, 1992 . Kok LP, Boon ME. Ultrarapid vacuum-microwave histoprocessing. *Histochem J*. 1995;27(5):411-419. Clinical Laboratory Standards Institute CLSI GP31-A Laboratory Instrumentation, Implementation, Validation and Maintenance.
Laboratory Processes D. Processing ii. Tissue Processor Reagents	• Establish and document for fixative to be used on the tissue processor: ○ Type of fixative to be used ▪ 10% neural buffered formalin (NBF) ▪ Zinc formalin	Anatomic Pathology Checklist, ANP.23100 (Tissue Processor Solutions	Bancroft JD, Gamble M. Theory and Practice of Histological Techniques. New York, NY: Churchill Livingstone, 6th ed. 2008: 53-92.

i. Fixative	▪ Alcoholic formalin ▪ Formalin substitute or proprietary fixative ○ Number of reservoirs of fixative to be used ○ Duration of time in fixative ○ Temperature / vacuum/ agitation ○ Rotation or change schedule • Verify and document that the fixative used is compatible with the tissues to be processed. • Establish if recycled fixative can be used on processor. • Establish and document procedures for fixative handling that include: ○ Storage ○ Safety to include: ▪ Use of personal protective equipment ▪ Spill control and clean-up ▪ Monitoring of exposure levels ○ Disposal methods that follow regulatory guidelines	Anatomic Pathology Checklist, ANP.23120 (Tissue Processing Programs – Validation Anatomic Pathology Checklist, ANP.23130 (Tissue Processing Programs)	Brown RW, et. al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009: 4-8. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020: 31-42. Sheehan D, Hrapchak B. Theory and Practice of Histotechnology. Columbus, OH: Battelle Press, 2nd ed., 1980:59-78.
Laboratory Processes D. Processing ii. Tissue Processor i. Reagents for dehydration	• Develop documentation that establishes the parameters of the dehydrant used on the tissue processor: ○ Type – alcohol or proprietary product ○ Type of alcohol – ethanol or isopropanol ○ Concentration – grades alcohols (i.e. 70%, 80%, 95%, 100%) ○ Number of reservoirs of each alcohol concentration ○ Duration of time for each alcohol reservoir and total time ○ Temperature / vacuum/ agitation ○ Rotation or change schedule • Verify and document that the dehydrant is compatible with the tissues to be processed and changed at intervals appropriate for workload. • Ensure that dehydrant following fixative is compatible with fixative: ○ 10% NBF- the first alcohol in the dehydrating series should be 70% or less to prevent the precipitation of phosphates from the 10% NBF ○ Alcoholic formalin – the first alcohol in the dehydrating series can be 95% as the tissue has already been in 70% alcohol ○ Formalin substitute or proprietary fixatives – must follow guidelines provided by the manufacturer	Anatomic Pathology Checklist, ANP.23100 (Tissue Processor Solutions) Anatomic Pathology Checklist, ANP.23120 (Tissue Processing Programs – Validation) Anatomic Pathology Checklist, ANP.23130 (Tissue Processing Programs)	Bancroft JD, Gamble M. Theory and Practice of Histological Techniques. New York, NY: Churchill Livingstone, 6th ed. 2008:53-92. Brown RW, et. Al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009:4-8. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020:31-42. Sheehan D, Hrapchak B. Theory and Practice of Histotechnology. Columbus, OH: Battelle Press, 2nd ed., 1980: 59-78.

	• Validate that the dehydrant is compatible with the reagent that follows in the processing cycle; this could be xylene or xylene substitute or paraffin. • Develop a documentation process for recording the purchase, use, and disposal of ethanol. Ethanol is strictly controlled by the federal government. • Develop procedures for alcohol: ○ Storage ○ Safety to include: ▪ Use of personal protective equipment ▪ Spill control and clean-up ▪ Monitoring of exposure levels ○ Disposal methods that follow regulatory guidelines ○ Recycling procedures: ▪ Testing method to prove quality ▪ What alcohol can be recycled ▪ When recycled alcohol can be used	Laboratory General Checklist – GEN.76000 (Chemical Hygiene Plan) Laboratory General Checklist – GEN.76500 (Flammable Storage) Laboratory General Checklist, GEN.77800 (Hazardous Chemical Waste Disposal)	
Laboratory Processes D. Processing ii. Tissue Processor i. Reagents for clearing	• Develop documentation that establishes the parameters of the clearant used on the tissue processor: ○ Type – xylene, xylene substitute or proprietary product ▪ Verification that clearant is compatible with dehydrants and paraffin ○ Number of reservoirs of clearant ○ Duration of time for each reservoir of clearant and total time ○ Temperature / vacuum/ agitation ○ Rotation or change schedule • Verification that the clearant to be used is compatible with the tissues to be processed and changed at intervals appropriate for workload. • Develop procedures for clearant: ○ Storage ○ Safety to include: ▪ Use of personal protective equipment ▪ Spill control and clean-up ▪ Monitoring of exposure levels ○ Disposal methods that follow regulatory guidelines ○ Recycling procedures: ▪ Testing method to prove quality	Anatomic Pathology Checklist, ANP.23100 (Tissue Processor Solutions) Anatomic Pathology Checklist, ANP.23350 (Paraffin Baths, Flotation Baths, and Embedding Stations) Anatomic Pathology Checklist, ANP.24050 (Automated Tissue Processor) Laboratory General Checklist, GEN.76000 (Chemical Hygiene Plan) Laboratory General Checklist, GEN.77800 (Hazardous Chemical Waste Disposal)	Bancroft JD, Gamble M. Theory and Practice of Histological Techniques. New York, NY: Churchill Livingstone, 6th ed. 2008: 53-92. Brown RW, et. Al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009 4-8. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020:31-42. Sheehan D, Hrapchak B. Theory and Practice of Histotechnology. Columbus, OH: Battelle Press, 2nd ed., 1980: 59-78.

	▪ When recycled clearant can be used		
Laboratory Processes D. Processing ii. Tissue Processor d. Reagents for infiltration i. Paraffin(s)	• Develop documentation that establishes the parameters of the paraffin to be used on the tissue processor: ○ Type – with or without additives ▪ Verification that paraffin is compatible with the dehydrant or clearant used ○ Melting point of paraffin ○ Number of reservoirs of paraffin ○ Duration of time for each reservoir of paraffin and total time ○ Temperature / vacuum/ agitation ○ Rotation or change schedule ▪ Format of wax to be used; melted wax, pellets, solid block	Anatomic Pathology Checklist, ANP.23350 (Paraffin Baths, Flotation Baths, and Embedding Stations)	Bancroft JD, Gamble M. Theory and Practice of Histological Techniques. New York, NY: Churchill Livingstone, 6th ed. 2008: 53-92. Brown RW. Et. Al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009: 4-8. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020: 31-42. Sheehan D, Hrapchak B. Theory and Practice of Histotechnology. Columbus, OH: Battelle Press, 2nd ed. 1980:59-78.
LABORATORY PROCESSES – EMBEDDING			
Guideline Section	Statement	CAP Checklist	Reference
Laboratory Processes E. Embedding i. General Recommendations	• Develop standardized guidelines for routine embedding and handling of special biopsies: ○ Opening of cassettes – one cassette at time ○ Mold size ○ Storage and temperature of molds ○ Placement of tissue in mold ▪ Similar surfaces in same direction ▪ Direction of surface in orientation to block placement on the microtome ○ Orientation of the tissue types ○ Method for cooling embedded blocks ○ Method for release of blocks from molds and removal of excess paraffin ○ Method for cleaning and reuse of molds • Develop quality assurance procedures: ○ Manual or electronic workload log used to compare recorded number of cassettes with the actual number of cassettes.	Anatomic Pathology Checklist, ANP.23350 (Paraffin Baths, Flotation Baths, and Embedding Stations) Anatomic Pathology Checklist, ANP.21350 (Specimen Preparation Records)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Luna L. Histopathologic Methods and Color Atlas of Special Stains and tissue Artifacts; American Histolabs Inc; 1992 (embedding table)

	○ Documentation and follow up of discrepancies • Establish guidelines for the order of embedding cassettes: ○ Urgency ○ Tissue type; biopsy, routine tissues • Establish guidelines for the use and operation of the embedding center: ○ Temperature of embedding paraffin – monitored daily ○ Set temperature of other heated elements: holding paraffin, work surface, and forceps ○ Cleaning of forceps and work surfaces ○ Addition of paraffin to reservoir: liquid, pellets, solid block ○ Cleaning of the paraffin reservoir and filter	Anatomic Pathology Checklist, ANP.23130 (Tissue Processing Programs) Anatomic Pathology Checklist, ANP.21397 (Cross Contamination – Histology)	
Laboratory Processes E. Embedding ii. Paraffin Wax	• Establish type of paraffin wax to be used for embedding: ○ Specialized paraffin or the same as processing paraffin ○ Additives – beeswax, plastic polymers, diethylene glycol distearate, ceresin ○ Melting point	Anatomic Pathology Checklist, ANP.23350 (Paraffin Baths, Flotation Baths, and Embedding Stations)	Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
LABORATORY PROCESSES - MICROTOMY			
Guideline Section	Statement	CAP Checklist	Reference
Laboratory Processes F. Microtomy i. Microtome Maintenance	• Written instructions for the operation of all makes/models of microtomes: ○ Manual vs. automated ○ Cleaning and maintenance ○ Acceptable cleaning products ○ Lubrication schedule and reagent • Schedule and document annual preventative maintenance, service, or repair	Anatomic Pathology Checklist, ANP.23400 (Microtome Maintenance) All Common Checklist, COM.30600 (Maintenance/Function Checks) All Common Checklist, COM.30675 (Instrument and Equipment Records)	Clinical Laboratory Standards Institute CLSI GP31-A Laboratory Instrumentation, Implementation, Validation and Maintenance; 2009. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.

<table>
<tr>
<td>;Laboratory Processes
F. Microtomy
ii. Section preparation
a. Block trimming</td>
<td>
• Develop technique to standardized position of microtome chuck (block holder) on all microtomes to ensure blocks can be recut on any microtome.

• Establish guidelines for the orientation of block placement in microtome chuck:
○ Block identifier to face to the right, left, up, or down.

• Establish cutting guidelines:
○ Placement of the slide label
○ Limiting one patient tissue to a slide
○ Thickness of section
▪ Routine tissues
▪ Specialized tissues (i.e. brain, lymph nodes)
▪ Specialized techniques (i.e. amyloid, immunohistochemistry)

<table>
<tr><td>Tissue</td><td>Thickness</td></tr>
<tr><td>Routine Paraffin</td><td>4 to 5 microns</td></tr>
<tr><td>Renal Sections</td><td>1 to 3 microns</td></tr>
<tr><td>Bone Marrow</td><td>2 to 3 microns</td></tr>
<tr><td>Nerve histochemical staining</td><td>6 to 15 microns</td></tr>
<tr><td>Amyloid demonstration</td><td>6 to 12 microns</td></tr>
</table>
○ Number of sections / ribbons per slide
▪ Sections/ ribbons are same depth
▪ Each section / ribbon is a different depth
▪ Amount of trim between each section/ribbon
○ Placement of sections on the slide
○ Number of slides per tissue type (i.e. 2 slides for biopsy blocks)
○ Use of specialized slides:
▪ Adhesive or no adhesive
▪ Control slides – specialized markings
○ Addition of additives to water bath
▪ Adhesives (i.e. gelatin, agar, Elmer’s glue or proprietary products)
▪ Surfactants (i.e. tween)
</td>
<td>All Common Checklist, COM.06100 (Primary Specimen Container Labeling)

All Common Checklist, COM.06200 (Secondary Specimen Container Labeling)

All Common Checklist, COM.06100 (Primary Specimen Container Labeling)

Anatomic Pathology Checklist, ANP.11716 (Paraffin Microtomy)</td>
<td>Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019.

Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.

Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.</td>
</tr>
<tr>
<td>Laboratory Processes
F. Microtomy
iii. Flotation Bath</td>
<td>
• Establish guidelines for the use and maintenance of flotation/water bath:
○ Temperature of flotation/water bath – documentation of temperature
○ Type of water to be used – tap vs. distilled
</td>
<td>All Common Checklist, COM.30675 (Instrument and Equipment Records)</td>
<td>Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.</td>
</tr>
</table>

a. Temperature	○ Use of additives – gelatin, agar, Elmer's glue, proprietary product(s) ○ Cleaning method ▪ Frequency ▪ Cleaning products to be used	Anatomic Pathology Checklist, ANP.23350 (Paraffin Baths, Flotation Baths, and Embedding Stations)	Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.
Laboratory Processes F. Microtomy iv. Slides a. Labelling	• All slides must be clearly labeled to identify the following: ○ Specimen accession number ○ Block identifier ○ Slide level number ○ Patient name ○ Stain identifier • Establish a labeling procedure to be used; It is good laboratory practice to label slides only as required and to avoid the practice of pre-labeling large numbers of slides in advance. • Establish a quality assurance process of matching slides against the block before delivery out of the laboratory.	All Common Checklist, COM.06100 (Primary Specimen Container Labeling) All Common Checklist, COM.06200 (Secondary Specimen Container Labeling) Anatomic Pathology Checklist, ANP.21397 (Cross-Contamination – Histology)	Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Brown RW, Della Speranza V, Alvarez JO, et al. Uniform labeling of blocks and slides in surgical pathology: Guideline from the College of American Pathologists Pathology and Laboratory Quality Center and the National Society for Histotechnology. *Arch Pathol Lab Med*. 2015;139(12):1515-24.
Laboratory Processes F. Microtomy iv. Slides b. Slide Drying	• Drying times for slides with paraffin sections should be established and made available to all technical staff. The following recommendations should be considered: ○ Air drying of cut sections before placing into the drying oven ○ Use of a forced air dryer maintained at a temperature just above the melting point of the paraffin ○ Drying time and temperature, commonly slides are dried at 58-60°C for 15-30 minutes • Special techniques, such as immunohistochemistry or in-situ hybridization may require longer drying times. The required drying time should be included in the written procedure. • Dry slides in an oven for a minimum of 60 minutes at a temperature between 50-60°C. Optimal results are achieved at room temperature for 24 hours; however, this is impractical in a clinical laboratory setting (Note: Some molecular testing protocols require that slides not be oven dried).		Clinical Laboratory Standards Institute CLSI - GP33A, Accuracy in Patient and Sample Identification; 2019. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Clinical Laboratory Standards Institute CLSI – I/L28-A2, Quality Assurance for Design Control and Implementation of Immunohistochemistry Assays, 2011.

Laboratory Processes F. Microtomy iv. Slides c. Disposal of Blocks/Slides	• Guidelines to be established for the retention and disposal of all glass paraffin blocks and slides.	Anatomic Pathology Checklist, ANP.12500 (Record and Material Retention – Surgical Pathology) Anatomic Pathology Checklist, ANP.27150 (Glass Slide/Block Disposal)	Clinical Laboratory Standards Institute CLSI – GP05-A3 Clinical Laboratory Waste Management; 2011.
LABORATORY PROCESSES – STAINING			
Guideline Section	Statement	CAP Checklist	Reference
Laboratory Processes G. Staining i. Hematoxylin & Eosin (H&E)	• Establish operation procedure for manual or automated staining: ○ Reagents to be used – concentration and volumes ○ Staining schedule for each specific staining program ○ Rotation or change schedule for the reagents ○ Disposal and or recycle process for reagents • Establish quality assurance criteria for the staining and evaluation of hematoxylin and Eosin stain. • **HEMATOXYLIN:** When applied correctly, in well-fixed, well-processed tissues, epithelial cells will demonstrate: ○ A well-defined nuclear membrane ○ Clear, open (vesicular) karyoplasm (cytoplasm of the nucleus) ○ Crisp, fine-spiculed chromatin patterns ▪ Also, in most tissue sections, there are some dense closed (hyperchromatic) nuclear patterns present in lymphoid tissue. ○ Prominent “eosinophilic” nucleoli (if present) ○ Cartilage and calcium deposits stain dark blue ○ The hematoxylin should appear blue to blue-black • **EOSIN:** When applied correctly, in well-fixed, well processed tissue, eosin produces, at least, a “tri-tonal” (three-color) effect. ○ Muscle cells (smooth, skeletal, cardiac) and epithelial cell cytoplasm will stain deep red-pink. ○ Collagen will stain a distinct lighter pink. ○ Red blood cells (RBC) will stain a bright orange-red. ○ Nucleoli (if present) should exhibit a reddish-purple color due to their high protein and RNA content.	All Common Checklist, COM.10000 (Policy and Procedure Manual) Laboratory General Checklist, GEN.77800 (Hazardous Chemical Waste Disposal) Anatomic Pathology Checklist, ANP.21360 (Automated Stainer) Anatomic Pathology Checklist, ANP.10042 (Histologic Prep Quality) Anatomic Pathology Checklist, ANP.10038 (Tissue Sample Quality) Laboratory General Checklist, GEN.30000 (Monitoring Analytic Performance) Anatomic Pathology Checklist, ANP.21395 (Special Stains/Studies) Anatomic Pathology Checklist, ANP.11734 (Slide Quality) All Common Checklist, COM.30675 (Instrument and Equipment Records)	Clinical Laboratory Standards Institute CLSI GP31-A Laboratory Instrumentation, Implementation, Validation and Maintenance; 2009. Brown RW. et. al., Histologic Preparations Common Problems and Their Solutions. College of American Pathologists, 2009. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Prophet EB, Mills B, Arrington JB, Sobin LH. AFIP Laboratory Methods in Histotechnology, AFIP; 1992. Sheehan DC, Hrapchak BB. Theory and Practice of Histotechnology, 2nd ed. Columbus, OH: Battelle Press; 1980.

	▪ It is essential, when applying eosin, that the smooth muscle/cell cytoplasm and collagen be differentially stained (different shades of red/pink). • Complete and document results of a H&E control prior to staining routine workload. ○ Documentation to include changes or actions taken to correct substandard staining of the control. • Establish a preventative maintenance program that includes annual service and emergency service.	Anatomic Pathology Checklist, ANP.21360 (Automated Stainer) Anatomic Pathology Checklist, ANP.11734 (Slide Quality)	Horobin RW. Troubleshooting Histology Stains, Churchill Livingstone; 1998.
Laboratory Processes G. Staining ii. Histochemical and enzymatic stains (special stains)	• Establish written procedures for manual or automated staining procedures to include: ○ Special cutting or preparation of tissue section ○ Reagents used ▪ Access to material data sheets ▪ Concentration ▪ Storage ▪ Disposal ○ Specific steps of staining procedure ○ Quality assurance process ▪ Define positive control tissue ▪ Define expected stain results ▪ Records of acceptability • Establish operation procedures for automated staining equipment: ○ Validation process ○ Cleaning and maintenance procedures • Establish a preventative maintenance program that includes annual service and emergency service. • Histochemical stains, or special stains, refer to a group of secondary stains used in conjunction with H&E staining. They were developed to provide differential coloration and contrast to cell and tissue constituents with the goal of understanding cell structure and function. • Many are used to identify morphological entities such as bacteria, fungi, nerve fibers, and for connective tissues including collagen and reticular fibers.	All Common Checklist, COM.10000 (Policy and Procedure Manual) Laboratory General Checklist, GEN.76100 (Chemical Safety Document Access) Anatomic Pathology Checklist, ANP.21395 (Special Stains/Studies) Laboratory General Checklist, GEN.77800 (Hazardous Chemical Waste Disposal) Anatomic Pathology Checklist, ANP.23100 (Tissue Processor Solutions) Anatomic Pathology Checklist, ANP.23120 (Tissue Processing Programs – Validation) Anatomic Pathology Checklist, ANP.23130 (Tissue Processing Programs) All Common Checklist, COM.30550 (Instrument/Equipment Performance Verification) All Common Checklist, COM.30600 (Maintenance/Function Checks) All Common Checklist, COM.30675 (Instrument and Equipment Records)	Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020. Sheehan DC, Hrapchak BB. Theory and Practice of Histotechnology, 2nd ed. Columbus, OH: Battelle Press; 1980. Kiernan J. Histological and Histochemical Methods: Theory and Practice 4th ed. Oxfordshire, England; 2008. Pearse AGE, Stoward PJ. Histochemistry, Theoretical and Applied, 4th ed. Vol. 2. Analytical Technique. Edinburgh: Churchill-Livingstone, 1985. Lillie RD, Fullmer HM. Histopathologic Technic and Practical Histochemistry. 4th ed. New York: McGraw-Hill; 1976.

	• Other special histochemical stains are used for specific tissue components and include stains for iron, mucins, glycogen, amyloid, and nucleic acids. • Enzyme histochemical staining refers to a subclass of histochemistry that identifies enzymes by employing substrates containing one of a number of various naphthol compounds.		
Laboratory Processes G. Staining iii. Immunohistochemical stains	• Establish a procedure for selection and development of antibodies and clones to be added to menu: ○ Fixation of tissue ○ Cutting of tissue section ▪ Paraffin ▪ Frozen ○ Selection and validation of antibody and clone ○ Selection, validation, and monitoring of reagents ○ Validation of application method ▪ Pretreatment ▪ Antibody dilution ▪ Retrieval method – if required ▪ Detection method • DAB • Alkaline phosphatase • Fluorescent ○ Documentation of scoring methodology ▪ Manual or automated ○ Documentation of validation; record test tissue, expected results actual results and changes to method ○ Storage of antibody and reagents • Establish re-validation procedures after change of: ○ Methodology ○ Reagent ○ Antibody ▪ Clone ▪ Lot number ▪ Dilution ○ Equipment ▪ New model ▪ major service repair	Anatomic Pathology Checklist, ANP.22983 (Fixation - HER2 and ER Breast Cancer Predictive Marker Testing) Anatomic Pathology Checklist, ANP.22300 (Specimen Modification) Anatomic Pathology Checklist, ANP.22500 (Buffer pH) Anatomic Pathology Checklist, ANP.22750 (Antibody Validation/Verification – Non-Predictive Marker) Anatomic Pathology Checklist, ANP.22978 (Predictive Marker Testing – Validation/Verification) Anatomic Pathology Checklist, ANP.22969 (Report Elements) All Common Checklist, COM.30350 (Reagent Storage and Handling – Nonwaived Tests) Anatomic Pathology Checklist, ANP.22615 (Endogenous Biotin) Anatomic Pathology Checklist, ANP.22900 (Slide Quality)	Clinical Laboratory Standards Institute CLSI: ILA28-A2: Quality Assurance for Design Control and Implementation of Immunohistochemistry Assays; Approved Guideline: 2011. Goldsmith JD, Troxell ML, Roy-Chowdhuri S, et.al. Principles of Analytic Validation of Immunohistochemical Assays: Guideline Update. *Arch Path Lab Med.* 2024;148(6):e11-e153. Troxell ML, Fulton RS, Swanson PE, Bellizzi AM, Fitzgibbons PL, et.al. Predictive Markers Require Thorough Analytic Validation. *Arch Path Lab Med*; Aug 2019, Vol. 143, No. 8. pp. 907-909. Torlakovic EE. How Validate Predictive Immunohistochemistry Testing in Pathology? *Arch Path Lab Med*; Aug 2019, Vol. 143, No. 8. pp. 907-907. Validation doc Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008.

	▪ move or relocation • Establish procedures for cleaning and maintenance of equipment: ○ Calibration of pipettes ○ Monitoring of refrigerator and freezer temperature ▪ NIST calibration procedure ○ Ancillary equipment ▪ Microwave oven ▪ Steamer ○ Stainer • Establish a preventative maintenance program that includes annual service and emergency service. • Establish procedure for the disposal of reagents as per local, state and national requirements. • Immunohistochemistry (IHC) staining refers to the method of localizing specific antigens (e.g. proteins) in cells of a tissue by the principle of an antibody / antigen recognition. This reaction is labelled by a detection technique and visualized by a chromogen.	Anatomic Pathology Checklist, ANP.22760 (New Reagent Lot Confirmation of Acceptability) Anatomic Pathology Checklist, ANP.22780 (IHC Assay Performance) All Common Checklist, COM.30550 (Instrument/Equipment Performance Verification) All Common Checklist, COM.30820 (Quantitative Pipette Accuracy and Reproducibility) All Common Checklist, COM.30750 (Temperature Checks) All Common Checklists, COM.30600 (Maintenance/Function Checks) All Common Checklist, COM.30675 (Instrument and Equipment Records) Laboratory General Checklist, GEN.77800 (Hazardous Chemical Waste Disposal)	Dabbs D. Diagnostic Immunohistochemistry: Theranostic and Genomic Applications, Expert Consult: Online and Print , 3rd ed. Goldsmith JD, Troxell ML, Roy-Chowdhuri S et.al. Principles of Analytic Validation of Immunohistochemical Assays: Guideline Update. *Arch Path Lab Med*; 2024;148(6):e11-e153. Taylor, Cote; Immunomicroscopy Volume 19 in Major Problems in Pathology Series, 3rd ed. Hayat MA. Microscopy, Immunohistochemistry and Antigen Retrieval Methods: For Light and Electron Microscopy, Springer Press; 2002. Elias JM. Immunohistopathology: A Practical Approach to Diagnosis; 2nd ed. Chicago, IL: ASCP Press, 2003. Hayat MA. Immunogold-Silver Staining: Principles, Methods, and Applications, CRC; 1995. Javois LC. Immunocytochemical Methods and Protocols, 3rd ed. :BIOS Scientific; 2003. Polack JM. Introduction to Immunocytochemistry, 3rd ed. :BIOS Scientific; 2003.

			Hayat MA. Microscopy, Immunohistochemistry and Antigen Retrieval Methods: For Light and Electron Microscopy, Springer Press; 2002. Javois LC. Immunocytochemical Methods and Protocols, 3rd ed. :BIOS Scientific; 2003. Shi S, Taylor CR. Antigen Retrieval Techniques: Immunohistochemistry and Molecular Morphology, Eaton Publications; 2000. Immunochemical Staining Methods Handbook, 3rd ed., Dako Corp, Carpinteria, CA. Clinical Laboratory Standards Institute CLSI – I/L28-A2, Quality Assurance for Design Control and Implementation of Immunohistochemistry Assays, 2011.
Laboratory Processes G. Staining iv. Immunohistochemical Stains a. Quality Control	• Establish Quality Control and Quality Assurance procedures to include: ○ Selection of appropriate control material ○ Validation of control material ▪ Documentation of test of control at accredited lab ▪ Establish or verify control ranges for synthetic or commercial control materials ○ Use and application of controls ▪ Patient and antibody reagent control ▪ Positive and negative • Establish procedures for the review of controls and release of patient slides for interpretation. • Records of review need to be retained.	Anatomic Pathology Checklist, ANP.21395 (Special Stains/Studies) Anatomic Pathology Checklist, ANP.21850 (QC – Immunofluorescence) Anatomic Pathology Checklist, ANP.22550 (QC – Antibodies) Anatomic Pathology Checklist, ANP.22560 (Synthetic and Commercial Control Range) Anatomic Pathology Checklist, ANP.22570 (QC – Antibodies)	Goldsmith JD, Troxell ML, Roy-Chowdhuri S, et.al. Principles of Analytic Validation of Immunohistochemical Assays: Guideline Update. *Arch Path Lab Med*. 2024;148(6):e11-e153. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Dabbs D. Diagnostic Immunohistochemistry: Theranostic and

	• IHC quality control measures are essential to provide and ensure consistency of performance and reproducibility of the intended target.	Anatomic Pathology Checklist, ANP.22660 (Control Slide Review) Anatomic Pathology Checklist, ANP.22780 (IHC Assay Performance) Laboratory General Checklist, GEN.30000 (Monitoring Analytic Performance)	Genomic Applications, Expert Consult: Online and Print, 3rd ed. Taylor C, Cote RJ. Immunomicroscopy. Volume 19 in Major Problems in Pathology Series, 3rd ed. Hayat MA. Microscopy, Immunohistochemistry and Antigen Retrieval Methods: For Light and Electron Microscopy, Springer Press; 2002. Elias JM. Immunohistopathology: A Practical Approach to Diagnosis; 2nd ed. Chicago, IL: ASCP Press; 2003. Taylor C, Cote RJ. Immunomicroscopy: A Diagnostic Tool for the Surgical Pathologist, 3rd ed., WB Saunders; 2005. Immunochemical Staining Methods Handbook, 3rd ed., Dako Corp, Carpinteria, CA.
Laboratory Processes G. Staining iv. Immunohistochemical stains b. Intended Use of the Antibody	• Establish procedure for clinical validation of each antibody: ○ Number of tissue sections to be tested per antibody ○ Representative inclusion of differing fixatives, if applicable ○ Comparison of results to previous stained slides or duplicate slides stained by accredited lab ○ If performed on cytologic specimens fixed in a different manner than tissues used in original assay development, separate validation should be done for each assay and corresponding fixation method. • Each antibody MUST be clinically validated to be relevant to its intended target antigen and organ-system scoring system, if applicable. • Data for predictive marker validation must show the degree of concordance (90%) between assays or methods.	Anatomic Pathology Checklist, ANP.22750 (Antibody Validation/Verification – Non-Predictive Marker) Anatomic Pathology Checklist, ANP.22760 (New Reagent Lot Confirmation of Acceptability) Anatomic Pathology Checklist, ANP.22550 (QC – Antibodies) Anatomic Pathology Checklist, ANP.22570 (QC – Antibodies)	Clinical Laboratory Standards Institute CLSI – I/L28-A2, Quality Assurance for Design Control and Implementation of Immunohistochemistry Assays: 2011. Goldsmith JD, Troxell ML, Roy-Chowdhuri S, et.al. Principles of Analytic Validation of Immunohistochemical Assays: Guideline Update. *Arch Path Lab Med*. 2024;148(6):e11-e153. Troxell ML, Fulton RS, Swanson PE, Bellizzi AM, Fitzgibbons PL, et.al.

		Anatomic Pathology Checklist, ANP.22978 (Predictive Marker Testing – Validation/ Verification)	Predictive Markers Require Thorough Analytic Validation. *Arch Path Lab Med*. Aug 2019, Vol. 143, No. 8. pp. 907-909. Torlakovic EE. How to Validate Predictive Immunohistochemistry Testing in Pathology? *Arch Path Lab Med*. Aug 2019, Vol. 143, No. 8. pp. 907-907.
Laboratory Processes G. Staining v. In Situ Hybridization	• Establish a procedure for selection and development of probes to be added to menu: ○ Preparation and cutting of tissue section ○ Selection of probe ○ Validation of application method ▪ Pretreatment ▪ Antibody dilution ▪ Retrieval method – if required ▪ Detection method • DAB • Alkaline phosphatase • Fluorescent ○ Selection and validation of control material ○ Instructions on how to score slide and expected results ○ Documentation of validation; record test tissue, expected results, actual results, and changes to method ○ Storage of probe and reagents ○ Retention and storage of slides and or images • Establish procedures for change of: ○ Methodology ○ Reagent ○ Antibody ▪ Clone ▪ Lot number ▪ Dilution ○ Equipment ▪ New model	Anatomic Pathology Checklist, ANP.22956 (ISH Probe Validation/ Verification) Anatomic Pathology Checklist, ANP.22978 (Predictive Marker Testing – Validation/ Verification) Anatomic Pathology Checklist, ANP.22964 (ISH Controls) Anatomic Pathology Checklist, ANP.22959 (ISH Assay Performance) Anatomic Pathology Checklist, ANP.22963 (ISH scoring) Anatomic Pathology Checklist, ANP.22965 (Image and Slide Retention – ISH) Anatomic Pathology Checklist, ANP.22956 (ISH Probe Validation/ Verification) Anatomic Pathology Checklist, ANP.22963 (ISH Scoring) Anatomic Pathology Checklist, ANP.22964 (ISH Controls)	Clinical Laboratory Standards Institute CLSI – MM13, Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods: 2020. International Standard ISO 20166-4:2020 - Molecular in vitro diagnostic examinations – Specifications for pre-examination processes for formalin-fixed and paraffin-embedded (FFPE) tissue for – Part 4: In situ detection techniques: section 6 – Inside the laboratory. Clinical Laboratory Standards Institute CLSI. MM7-A2 Fluorescence In Situ Hybridization (FISH) Methods for Clinical Labs, Approved Guideline, 2nd ed. 2013. Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. David J. Dabbs. Diagnostic Immunohistochemistry: Theranostic and Genomic Applications, 3rd ed.

	▪ Major service repair ▪ Move or relocation • Establish procedure for clinical validation of each probe: ○ Number of tissue sections to be tested per probe ○ Comparison of results to previous stained slides or duplicate slides stained by accredited lab • In Situ Hybridization (ISH) staining refers to a method using probes made up of complementary strands used to target sequences of mRNA, viral DNA or chromosomal DNA located in tissue cells. • Retention of Images and permanent slides	All Common Checklist, COM.30450 (New Reagent Lot and Shipment Confirmation of Acceptability – Nonwaived Tests) Anatomic Pathology Checklist, ANP.22966 (ISH Interpretation)	Philadelphia, PA: Saunders Elsevier; 2010. Awatif I. AL-Nafussi, 2nd ed. Tumor Diagnosis, Practical Approach and Pattern Analysis. London, Hodde Arnold; 2005. American College of Medical Genetics Laboratory. Standards and guidelines for clinical genetics laboratories, Bethesda, MD: ACMG; 2021 Clinical Laboratory Standards Institute CLSI. MM7-A2 Fluorescence In Situ Hybridization (FISH) Methods for Clinical Labs, Approved Guideline, 2nd ed. 2013. Jennings L, Van Deerlin VM, Gulley ML. Recommended Principles and Practices for Validating Clinical Molecular Pathology Tests. *Arch Path Lab Med*. 2009;Vol. 133, No. 5: 743-755. Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. *Arch Path Lab Med*. 2023;147(9): 993-1000. Tanner M, Gancberg D, Di Leo A, et al. Chromogenic in situ hybridization: a practical alternative for fluorescence in situ hybridization to detect HER-2/neu

			oncogene amplification in archival breast cancer samples. *Am J Pathol*. 2000;157(5):1467-72. Di Palma S, Collins N, Faulkes C, et al. Chromogenic in situ hybridisation (CISH) should be an accepted method in the routine diagnostic evaluation of HER2 status in breast cancer. *J Clin Pathol*. 2007;60(9):1067-8. Gong Y, Gilcrease M, Sneige N. Reliability of chromogenic in situ hybridization for detecting HER-2 gene status in breast cancer: comparison with fluorescence in situ hybridization and assessment of interobserver reproducibility. *Mod Pathol*. 2005;18(8):1015-21. Hauser-Kronberger C, Dandachi N. Comparison of chromogenic in situ hybridization with other methodologies for HER2 status assessment in breast cancer. *J Mol Histol*. 2004;35(6):647-53. Saez A, Andreu FJ, Segui MA, et al. HER-2 gene amplification by chromogenic in situ hybridisation (CISH) compared with fluorescence in situ hybridisation (FISH) in breast cancer-A study of two hundred cases. *Breast*. 2006;15(4):519-27. Bhargava R, Lal P, Chen B. Chromogenic in situ hybridization for the detection of HER-2/neu gene amplification in breast cancer with an

			emphasis on tumors with borderline and low-level amplification: does it measure up to fluorescence in situ hybridization? *Am J Clin Pathol*. 2005;123(2):237-43. Dietel M, Ellis IO, Höfler H, et al. Comparison of automated silver enhanced in situ hybridisation (SISH) and fluorescence ISH (FISH) for the validation of HER2 gene status in breast carcinoma according to the guidelines of the American Society of Clinical Oncology and the College of American Pathologists. *Virchows Arch*. 2007;451(1):19-25. van de Vijver M, Bilous M, Hanna W, Hofmann M, Kristel P, Penault- Llorca F, et al. Chromogenic in situ hybridisation for the assessment of HER2 status in breast cancer: an international validation ring study. *Breast Cancer Res*. 2007;9(5):R68. Bilous M, Morey A, Armes J, Cummings M, Francis G. Chromogenic in situ hybridisation testing for HER2 gene amplification in breast cancer produces highly reproducible results concordant with fluorescence in situ hybridisation and immunohistochemistry. *Pathology*. 2006;38(2):120-4. Di Palma S, Collins N, Bilous M, Sapino A, Mottolese M, Kapranos N, et al. A quality assurance exercise to evaluate the accuracy and reproducibility of chromogenic in situ hybridisation for

			HER2 analysis in breast cancer. *J Clin Pathol*. 2008;61(6):757-60.
Laboratory Processes G. Staining v.Immunohistochemistry and In Situ Hybridization a. Quality assurance	• Establish Quality Assurance procedures for IHC and ISH procedures to include: ○ Compilation of predictive marker results ▪ Total cases ▪ % positive, % negative ▪ Comparison to benchmarks ▪ Corrective action taken • Documented participation in external proficiency testing for HER2 and ER	Anatomic Pathology Checklist, ANP.22970 (Annual Result Comparison – Breast Carcinoma) All Common Checklist, COM.01520 (PT and Alternative Performance Assessment for IHC, ICC, and ISH Predictive Markers)	Allison KH, Hammond EH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer American Society of Clinical Oncology/College of American Pathologists Guideline Update. *Arch Path Lab Med*. 2020 May;144(5):545-563. Wolff AC, Summerfield MR, Dowsett M et al. Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline Update. *Arch Path Lab Med*; 2023;147(9): 993-1000. Goldsmith JD, Troxell ML, Roy-Chowdhuri S, et.al. Principles of Analytic Validation of Immunohistochemical Assays: Guideline Update. *Arch Path Lab Med*; 2024;148(6):e11-e153.
LABORATORY PROCESSES - COVERSLIPPING			
Guideline Section	Statement	CAP Checklist	Reference
Laboratory Processes H. Coverslipping i. Manual/Automated	• Establish manual coverslipping procedures that: ○ Include ergonomic techniques ○ Reduce chemical exposure • Use mounting media with an appropriate refractive index for proper resolution: ○ Aqueous vs. non aqueous • Non fluorescent Identify size and weight of coverslip to be used Identify drying method of coverslip and slide Establish validation and operation procedures for an automated coverslipper:	Laboratory General Checklist, GEN.77200 (Ergonomics)	Bancroft J, Gamble M. Theory and Practice of Histological Techniques, 6th ed. New York, NY: Churchill Livingston; 2008. Carson F, Hladik C. Histotechnology A Self- Instructional Text, 5th ed. Chicago, IL: ASCP Press; 2020.

	○ Speed of operation ○ Type of mounting media ○ Size and type of coverslip ○ Type and volume of transfer fluid (xylene or xylene substitute) ○ Cleaning and maintenance ○ Reagent filling or change ○ Filter change ○ Drying time • Establish a preventative maintenance program that includes annual service and emergency service.	All Common Checklist, COM.30575 (Instrument/Equipment Operation) All Common Checklists, COM.30600 (Maintenance/Function Checks) All Common Checklist, COM.30675 (Instrument and Equipment Records)	
END			