GENERAL OUTLINE

HISTOTECHNOLOGY KNOWLEDGE AREAS

Histotechnician HT (ASCP)

Histotechnologist HTL (ASCP)
CERTIFICATION OF TECHNICIAN

HT(ASCP) Histologic Technician

The HT(ASCP) application is valid for five (5) years from the date it is received. Both the practical and multiple-choice components of the examination must be successfully completed within this five year period for certification to be granted.

To be eligible for this examination category, an applicant must satisfy the requirements of at least one of the following qualification routes:

1. Successful completion of a NAACLS accredited Histologic Technician program.

2. Associate degree or at least 60 semester hours (90 quarter hours) of academic credit from a regionally accredited college/university with combination of 12 semester hours (18 quarter hours) of biology and chemistry, and one year full time acceptable experience in histopathology within the last ten years under the supervision of a pathologist (certified by the American Board of Pathology in Anatomic Pathology, or eligible), or an appropriately certified medical scientist.

CERTIFICATION OF HISTOTECHNOLOGIST

HTL(ASCP) Histotechnologist

The HTL (ASCP) application is valid for five (5) years from the date it is received. Both the practical and multiple-choice components of the examination must be successfully completed with this five year period for certification to be granted.

To be eligible for this examination category, an applicant must satisfy the requirement of at least one of the following qualification routes:

1. Baccalaureate degree from a regionally accredited college/university with a combination of 30 semester hours (45 quarter hours) of biology and chemistry, and one year full time acceptable experience in histopathology laboratory within the last ten years, under the supervision of a pathologist (certified by the American Board of Pathology in Anatomic Pathology, or eligible), or an appropriately certified medical scientist.

2. Baccalaureate degree from a regionally accredited college/university including the above course requirements, and successful completion of a NAACLS accredited Histology Technician or Histotechnologist program.

Acceptable Experience:
Full-time experience is defined as a minimum of thirty-five (35) hours per week. Individuals who have part-time experience may be permitted to utilize prorated part-time experience to meet the work experience requirements. For example, if you are employed 20 hours per week for one year, experience would be computed as 20 divided by 35 multiplied by 52 weeks which is the equivalent of 29.7 weeks of full-time employment. Contact the Board of Registry prior to applying if you have questions concerning part-time experience.

The Board of Registry does not accept clinical laboratory experience obtained in a foreign country outside the United States or Canada.

To fulfill the experience requirements for the examinations, you must have experience in the following areas within the last ten years.

- fixation
- specimen processing, including embedding
- microtomy
- staining, including reagent preparation

Applications can be obtained from: ASCP, Board of Registry
P.O. Box 12277
Chicago, IL 60612
1-800-621-4142
SUGGESTED READING IN PREPARATION FOR TAKING THE HT/HTL EXAMS

Material will provide a broad spectrum of knowledge in histotechnology.
(*These references are more appropriate for HTL level.)


ADDITIONAL STUDY AIDS


JOURNAL OF HISTOTECHNOLOGY, by membership or subscription, National Society for Histotechnology, 4201 Northview Drive, Suite 502, Bowie, MD 20716-2604; Phone: 310-262-6221; Fax: 301-262-9188

SELF-ASSESSMENT EXAMINATION BOOKLETS, NSH (See last page for order form)

HT/HTL STUDY GUIDE, 2nd ed., Michigan Society for Histotechnologists, c/o Dick Dapson, 1020 Harts Lake Road, Battle Creek, MI 49015 or contact: Micki Conrad, W: 269-668-3336 x353; H: 269-668-2726; email: mickiconrad@mickiconrad.com.


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The General Outline was developed by the National Society for Histotechnology (NSH) Education Committee using the American Society of Clinical Pathologists (ASCP) Board of Registry Examination Content Guidelines with their permission. The General Outline has not been approved by the ASCP Board of Registry.

The General Outline is intended for use as a guide by NSH members when studying for the ASCP Board of Registry Histologic Technician (HT) and Histotechnologist (HTL) exams. These exams are periodically changed to reflect new procedures, techniques, and concerns in the field. While every effort has been made to be current, the following outline may not contain all areas to be tested.

Please refer to the “Histologic Technician HT (ASCP) and Histotechnologist HTL (ASCP) Examination Content Guideline”, published by the American Society of Clinical Pathologists (ASCP) Board of Registry for more complete information, descriptions and explanations of:

- Career Entry competency statements for both HT and HTL
- Taxonomy levels for exam questions

Prepared by:
Peggy A. Wenk, BS, HTL (ASCP)
I. FIXATION (10-25%)
   A. Tissues
      1. Morphology/Anatomy (see STAINING)
   2. Cell/Component preservation
      a. Indications for use
         (1) Required by what stain
         (2) Required for preservation of what cell/component
      b. Contra-indications for use
         (1) Should not be used, as destroys/injures what component/cell
   3. Pathology**
      a. Required for which diseases
   4. Biochemistry principles/theories**
      a. Binds with what amino acid/nucleic acid, etc.
   B. Procedures
      1. Light microscopy
         a. Which fixative
         b. Primary and Secondary
      2. Electron microscopy
         a. Which fixative required (see STAINING)
   3. Special stains
   4. Frozen sections/tissues
      a. Fixed or unfixed
      b. Which fixatives
   5. Enzyme histochemistry
      a. Fixed or unfixed
      b. Which fixative
      c. Best temperature
   6. Immunohistochemistry
      a. Fixed or unfixed
      b. Advantages/Disadvantages of various fixatives
   7. Artifacts/Precipitates/Pigments
      a. Endogenous/Exogenous
      b. Cause of formation
      c. Methods to prevent
      d. Identification of pigments through microscope
         (1) Size/shape
         (2) Location
         (3) Polarization
      3. Methods of removal
   8. Quality Control
      a. Shelf-life
   C. Parameters (To be applied to all fixatives listed below)
      1. Size of specimen
         a. Maximum section thickness
         b. Effects of too thick specimen
      2. Volume of specimen/fixative
         a. Minimum ratio required
         b. Effects of inadequate volume
      3. Time in fixation
         a. Minimum time
         b. Maximum time
         c. Effects of underfixation
         d. Effects of overfixation
      4. Temperature
         a. Effects of adding heat
         b. Effects of too high temperature
         c. Effect of too long time in heat
         d. Effects of freezing
      5. Other
         a. Autolysis vs. Putrefaction
         b. Chemical vs. Physical effects
         c. Effects of pH
         d. Primary vs. Secondary vs. Post-fixation
         e. Coagulative vs. non-coagulative
         f. Additive vs. non-additive
         g. Effects of delay in fixation
   D. Reagents
      1. Types/Components
         a. The following information is needed on the fixatives listed below:
            (1) Reagents used
            (2) Alternate reagents that could be used
            (3) Direction for preparation
            (4) Direction for storage
            (5) Hazards and handling precautions
            (6) Disposal
         b. Aldehydes
            (1) 10% unbuffered formalin
            (2) higher % formalin
            (3) 10% neutral buffered formalin
            (4) alcoholic formalin
            (5) formalin ammonium bromide (FAB)
            (6) glutaraldehyde
            (7) paraformaldehyde
         c. Picric acid
            (1) Bouin
            (2) Dubosq Brasil (DB)
            (3) Zamboni
d. Mercuric/Chromate/Zinc/Copper  
   (1) Zenker  
   (2) Helly  
   (3) B-5  
   (4) Heidenhain (Susa)  
   (5) Muller  
   (6) Orth  
   (7) Zinc-formalin  
   (8) Hoallinde  
e. Osmium  
   (1) 1% osmium tetroxide  
   (2) Marchi  
f. Nonaqueous  
   (1) Carnoy  
   (2) Clark  
   (3) Acetone  
   (4) Menthanol  
   (5) Ethanol  
   (6) Acetic acid  
g. Other  
   (1) Proprietary  
   (2) Formalin substitutes  
      (a) Glyoxal  
      (3) Dual purpose (light and EM)  

2. Properties/Function/Actions  
   a. Covering the fixatives listed in above list:  
   b. Purpose of each reagent/effect on tissue  
      (1) nucleic acid  
      (2) cytoplasm  
      (3) lipids  
      (4) all other components (connective tissue, muscle, etc.)  
   c. Directions for use  
   d. Coagulative or non-coagulative  
   e. Additive or non-additive  

3. Frozen sections/tissues  
   a. Methods of freezing  
      (1) freezing bar  
      (2) isopentane  
      (3) liquid nitrogen  
      (4) liquid nitrogen/isopentane  
      (5) carbon dioxide  
      (6) cryogenic spray  
   b. Advantages/Disadvantages/each method  
   c. Hazards/each method  
   d. When to use frozen section/each method  

4. Enzyme histochemistry  
   a. Frozen section of fixation/processing  
   b. When to use each method  
   c. Effects of each method on enzymes  

5. Decalcification  
   a. The following may be asked for each procedure:  
      (1) Purpose of reagent(s)  
      (2) Directions of use  
      (3) Effects of:  
         (a) Temperature  
         (b) Section thickness  
         (c) Volume tissue/decalcification solution  
         (d) Time  
            i) Maximum/minimum  
            ii) Effects of over decalcification  
               a) Cell/Component  
               b) Staining  
         (e) pH/Buffers  
         (f) Concentration  
         (g) Agitation  
   b. Method  
      (1) Strong acid  
         (a) hydrochloric acid  
         (b) nitric acid  
         (c) sulfuric acid  
      (2) Formic acid  
         (a) Formic acid (%)  
         (b) Formic acid-sodium citrate (FASC)  
         i) Effects of buffering  
      (3) Weak acids  
         (a) Picric acid in fixatives  
         (b) Acetic acid in fixatives  
      (4) Chelating agents (e.g. EDTA)  
      (5) Ion Exchange Resin  
      (6) Miscellaneous
(a) Electrolytic
(b) Ultrasonics
c. End-point determination
   (1) For each of the following, may be asked:
      (a) How to perform method
      (b) Advantages/disadvantages
   (2) Method
      (a) Physical
         i) Bending, probing, etc.
      (b) X-ray
      (c) Weighing
      (d) Chemical
         i) Calcium oxalate

6. Immunohistochemistry
   a. Frozen section or fixation/processing

7. Quality Control

C. Instrumentation
   1. See LABORATORY OPERATIONS

D. Reagents/Media
   1. Types/Components
      a. The following information is needed on each reagent:
         (1) Reagent(s) used
         (2) Alternate name(s)
         (3) Purpose of reagent
         (4) Hazards and handling precautions/disposal
      b. Reagents
         (1) Dehydrants
            (a) Ethanol
               i) pure
               ii) denatured (reagent)
            (b) Mehtanol
            (c) Isopropanol
            (d) Butanol
            (e) Acetone
            (f) Cellosolve (ethylene glycol monoethyl ether)
            (g) propylene oxide
            (h) proprietary
               i) solid
                  i) anhydrous copper sulfate
                  ii) anhydrous calcium sulfate
            (2) Universal solvents
               (a) Tetrahydrofuran (THF)
               (b) Tertiary butyl alcohol
               (c) Diozone
            (3) Clearants
               (a) Xylene
               (b) Toluene
               (c) Benzene
               (d) Chloroform
               (e) Carbon tetrachloride
               (f) Methyl salicylate
               (g) Xylene substitutes
                  i) Limonene derivatives
                  ii) Aliphatic hydrocarbons
               (h) Essential oils
            (4) Infiltrating/Embedding media
               (a) Aliphatic
                  i) Paraffin
               (b) Water soluble waxes
                  i) Carbowax
               (c) Double embedding
                  i) Agar
                  ii) Gelatin
               (d) Celloidin
               (e) Resins
                  i) Electron microscopy
                     a) Hardeners
                     b) Accelerators
                     c) Plasticisors
                     d) Resins (Epon, Spurr, etc.)
                  ii) Glycolmethacrylate

Properties/Function/Action – The following is needed for above reagents:
   a. Directions for use
   b. Definition of dehydrating, clearing, infiltrating
   c. Temperature
      (1) Maximum/minimum
      (2) Effects of too high/too long
   d. Maximum section thickness
   e. Volume tissue: reagent
   f. Time
      (1) Minimum/Maximum
      (2) Causes and effects of over and/or under dehydration/clearing/infiltrating
   g. Vacuum
   h. Advantages/Disadvantages
   i. Refractive index (clearing)
   j. How to solidify (infiltration)
      (1) crystallization
      (2) evaporation
      (3) polymerization
   k. How to store
      (1) reagents
      (2) blocks

3. Quality Control
   a. Cause and effect of
      (1) using wrong reagent
      (2) following directions wrong
      (3) contamination
   b. Methods to correct errors

4. Chemistry principles/theories**

III. MICROTMOMY (10-14%)
   A. Tissues (see STAINING)
      1. Morphology

   2. Cell/Component Demonstration
      a. What thickness
      b. Frozen vs. processed/embedded

   B. Procedures
      1. Paraffin
a. Knife
   (1) Profile types
   (2) Angles
      (a) bevel
      (b) wedge
      (c) clearance
   (3) Material
   (4) Sharpening
      (a) Hone
      (b) Strop
      (c) Abrasive material
b. Microtome
   (1) Type
      (a) Rotary
      (b) Sliding
      (c) Base sledge
      (d) Rocking
   (2) Sections
      (a) thickness
      (b) temperature
   (3) Troubleshoot
      (a) thick/thin
      (b) Venetian blind/microchatter
      (c) holes/tears/knife lines
      (d) folds/wavy sections
      (e) etc.
c. Floatation bath
   (1) Solutions/Adhesives
   (2) Cleaning
   (3) Contamination
d. Drying oven
   (1) temperature

2. Frozen Section
a. Type of microtome
   (1) Cryostat
   (2) Clinical freezing
b. Temperature
   (1) majority tissue
   (2) fatty tissue
   (3) tissue with high water content
   (4) fixed tissue
c. Frozen sections
   (1) Cutting techniques
   (2) Troubleshooting
      (a) Ice crystal artifact
      (b) Poor freezing
      (c) Sectioning artifacts
      (d) Anti-roll plate

3. Agar/gelatin
a. Double embedding
   (1) paraffin
   (2) frozen sectioning
b. Orientation of specimen
   (1) during grossing
   (2) on edge/friable

4. Quality Control

5. Epoxy resin**
a. Type of knives
   (1) Glass
   (2) Diamond
   (3) How to make
   (4) How to determine good knife edge
b. Thickness
   (1) Colors seen during sectioning
   (2) Cause of colors
   (3) Need for thickness
      (a) 0.5-1.0 \( \mu \)m
      (b) 600-800 Å (60-80 nm)
c. Troubleshooting

6. Glycol methacrylate**
a. Type of knife
b. Thickness
c. Troubleshooting

C. Instrumentation – See above (IIIB)
   1. See LABORATORY OPERATIONS

IV. STAINING (40-50%)
A. Tissues
   1. Morphology/Anatomy
      a. Be able to identify tissues/organs
   2. Cell/Component demonstration
      a. Be able to identify cell/component
      b. Select appropriate stain
   3. Function
      a. Identify function of the tissue/cell/component
   4. Pathology**
      a. Identify diseases as to the stain required
   5. Biochemistry principles/theories**

B. Procedures
   1. Nucleus/Cytoplasmic
      a. Nuclear stains
         (1) Hematoxylins
            (a) Alum
            (b) Iron
            (c) Tungsten
            (d) Other
         (2) Methylene blue
         (3) Celestine blue
         (4) Carmine
      b. Cytoplasm stains
         (1) Eosin(s)
         (2) Phloxine
   2. Blood/Bone Marrow
      a. Giemsa and all formulations
   3. Carbohydrates
      a. periodic acid-Schiff (PAS) with and without digestion
      b. Mucicarmine
      c. Alcian blue with and without digestion
(1) pH 2.5 and/or pH 1.0

d. Colloidal iron with/without digestion
   (Mowry)
e. Amyloid
   (1) Congo red
   (2) Sirius red
   (3) Thioflavin T/Thioflavin S
   (4) Crystal violet/Methyl violet

4. Connective/Supporting Tissue
   a. Collagen
      (1) Masson trichrome
      (2) Gomori trichrome
      (3) Other trichromes (Goldner, Mallory, etc.)
      (4) Movat pentachrome
   b. Elastin
      (1) Verhoeff-van Gieson
      (2) Aldehyde fuchsin
      (3) Orcein (Pinkus)
      (4) Resorcin-Fuchsin
   c. Muscle/Fibrin
      (1) PTAH
      (2) Masson or Gomori trichrome
      (3) Lendrum (MSB)
   d. Reticulin
      (1) all silver procedures
   e. Basement membrane
      (1) PAS
      (2) Periodic acid-Methenamine silver (PASM, PAMS, Jones)

5. Lipids
   a. Oil red O
   b. Sudan black B
   c. Osmium tetroxide

6. Microorganism
   a. bacteria
      (1) Gram
      (2) Brown & Hopps
      (3) Brown & Brenn
      (4) Giemsa
      (5) Spirochete stains
   b. Mycobacteria
      (1) Kinyoun
      (2) Ziehl-Neelsen
      (3) Fites
      (4) Auramine-Rhodamine
   c. Spirochetes
      (1) Dieterle
      (2) Warthin-Starry
      (3) Steiner & Steiner
   d. Helicobacter
      (1) Bacteria stains
      (2) Spirochete stains
      (3) Toluidine blue
      (4) Diff-Quik
      (5) with mucin counterstains
   e. Fungus/Yeast/Cryptococcus
      (1) PASH
      (2) Gridley
      (3) Grocott Methenamine Silver (GMS)

7. Nerve
   a. Fibers
      (1) Bodian
      (2) Bielchowsky
      (3) Sevier-Munger
      (4) Holmes
   b. Myelin
      (1) Luxol fast blue (LFB) (Kluver)
      (2) Weil
      (3) Trichrome stains
      (4) Marchi
   c. Nissl
      (1) Cresyl echt-violet (cresyl violet acetate)
      (2) Thionin
   d. Glial cells
      (1) Holzer
      (2) Cajal
      (3) PTAH

8. Pigments/mineral Granules
   a. Bile
      (1) Fouchet (Hall)
      (2) Stein
   b. Calcium
      (1) von Kossa
      (2) Alizarin red S (Dahl)
   c. Iron
      (1) Prussian blue
   d. Copper
      (1) Rhodanine (Lindquist)
      (2) Rubeanic acid
   e. Melanin/Argentaffin
      (1) Fontana-Masson
      (2) Schmorl
   f. Argyrophil
      (1) Grimelius
      (2) Churukian-Schenk
      (3) Sevier-Munger
      (4) Pascual
   g. Urates
      (1) Methenamine silver stains

9. Quality Control
   a. See QC Reagents/Dyes
C. Miscellaneous procedures

1. Nucleic acids
   a. Feulgen
   b. Methyl green-pyronin (MGP)
   c. Acridine orange
   d. Extraction of nucleic acids

2. Tissues/Cells/Components
   a. Fibrin
      (1) See above (Connective Tissue)
   b. Mast cells
      (1) Giemsa
      (2) Toluidine blue
      (3) Alcian blue pH 1.0
   c. Beta cells pancreas
      (1) Aldehyde fuchsin
   d. Lipofuchsin
      (1) PAS
      (2) Lipid stains
      (3) Carbol-fuchsin stains

3. Quality Control
   a. see QC Reagents/Dyes

4. Electron Microscopy**
   a. Thick sections
      (1) Polychromatic dyes
   b. Thin sections
      (1) Uranyl acetate
      (2) Lead citrate
      (3) Negative staining

5. Enzymes**
   a. Chloroacetate esterase (Leder)
   b. Muscle
      (1) ATPase
      (2) NADH
      (3) SDH
      (4) alpha-naphthyl acetate esterase
      (5) Alkaline phosphatase
      (6) Acid phosphatase
      (7) Cytochrome oxidase
      (8) Phosphorylase
   c. Techniques
      (1) Metal salt
      (2) Azo dye
      (3) Indoxyl
      (4) Oxidation-Reduction

6. Immunohistochemistry**
   a. Immunofluorescence
      (1) Fluorochromes (eg. FITC)
      (2) When used
      (3) Methods
         (a) Direct
         (b) Indirect
         (c) Sandwich
   b. Immunoenzymek
      (1) Types
         (a) Immunoperoxidase
         (b) Avidin-biotin complex (ABC)
         (c) Labeled avidin biotin (LAB)
         (d) Alkaline phosphatase
         (e) Immunogold
         (f) Other enzymes
   c. Staining components
      (1) Unmasking
         (a) digestion (trypsin, pronase, etc.)
         (b) retrieval methods
            i) Citrate, EDTA, etc.
            ii) steamer, microwave, etc.
      (2) Buffer washes
      (3) Removal of endogenous peroxidases
      (4) Protein blocking
      (5) Antibodies (primary, secondary, etc.)
         (a) dilution
         (b) animal antibody raised in
         (c) monoclonal vs. polyclonal
      (6) Conjugated enzyme
      (7) Dye/development of color
      (8) Counterstains
      (9) Mounting media

D. Instrumentation
   1. See LABORATORY OPERATIONS

E. Reagents/Dyes – Apply to all stains listed above
   1. Types/Components
      a. What dyes/reagents are sued?
      b. Alternate for the dye/reagent (if possible)

   2. Properties/Functions/Actions
      a. Chemistry
         (1) atom/molecule/element
         (2) compound/mixture
         (3) salts/buffer
         (4) acid/base/pH
         (5) isoelectric point/zwitterion
         (6) protein
         (7) carbohydrate
         (8) enzyme
         (9) lipid
         (10) etc.
      b. Used to:
         (1) Stain
         (2) Sensitize
         (3) Oxidize
         (4) Differentiate
         (5) Reduce/Develop
         (6) Mordant
         (7) Impregnate
         (8) Adjust pH
         (9) etc.
      c. Staining mechanism
         (1) Progressive/Regressive
         (2) Impregnation
         (3) Argentaffin/Argyrophil
         (4) Absorption/Adsorption
         (5) Metachromatic/Polychromatic
         (6) Physical/Chemical
3. Quality Control  
   a. Fixative to use/avoid  
   b. Processing to use/avoid  
   c. Special procedure required  
      (1) Frozen section  
      (2) Avoid water  
      (3) Decalcification  
      (4) etc.  
   d. Control  
      (1) Best tissue to use  
      (2) Alternative control tissue  
      (3) Component/Cell that stains  
   e. Recommended section thickness  
   f. Sources of error and corrective action

4. Chemistry principle/theories**

F. Mounting Procedures  
1. Media  
   a. Aqueous  
      (1) Indications for use  
      (2) Advantages/Disadvantages  
      (3) Sealers  
   b. Resinous  
      (1) natural/Synthetic  
      (2) Advantages/Disadvantages  
      (3) Solvents

2. Coverglass  
   a. Thickness

3. Refractive index **  
   a. Definition

V. LABORATORY OPERATIONS (10-15%)  
A. Safety  
1. Storage  
   a. Reagents/Solutions  
   b. Blocks/Slides  
   c. Equipment

2. Disposal  
   a. Heavy metals  
   b. Organic Solvents  
   c. Acids/Bases  
   d. Formaldehyde/other fixatives

3. Hazards  
   a. Reagents  
      (1) Health Hazard  
      (a) biohazardous  
      (b) carcinogenic  
      (c) toxic  
      (d) irritant  
      (e) corrosive  
      (f) sensitizer

(2) Physical hazard  
   (a) Flammable/Combustible  
   (b) Reactivity (explosive)  
   (c) Radioactive  
   (d) Oxidizer  
   (e) Compressed gas

(3) Route of entry  
   (4) Target organs and effects

b. Electrical

c. Ergonomics (carpal tunnel, etc.)

d. Identification – labeling  
   (1) Target organs  
   (2) NFPA diamond

4. Regulations  
   a. Federal  
      (1) OSHA  
      (2) EPA

   b. State

5. Procedures  
   a. Storage  
   b. Recycling  
   c. Disposal  
   d. Training

6. Quality Control

B. Laboratory Mathematics  
1. Metric system

2. Percent solutions/Dilutions

3. Normal/Molar solution**

C. Equipment  
1. Components (identification)

2. Use  
   a. Time schedules  
   b. Vacuum  
   c. Temperature  
   d. Reagents

3. Maintenance  
   a. Routine/Preventative  
   b. Repair

4. Troubleshooting  
   a. Equipment  
   b. Failures  
   c. Ergonomics  
      (1) Cause  
      (2) Prevention

5. Quality Control

6. The above information should be known on the following histology equipment  
   a. Tissue processors  
   b. Embedding Centers and equipment  
   c. Microtomes (See MICROTMY)
D. **Management**

1. **Theories**

2. **Procedures**

3. **Examples**
   a. statistical methods
   b. cost accounting
      1. procedures
      2. personnel/budget
   c. test/equipment selection
   d. quality control/assurance
   e. personnel practices
   f. workload recording

E. **Education**

1. **Theories**

2. **Procedures**

3. **Examples**
   a. Taxonomy levels
      1. recall
      2. analysis
      3. troubleshooting
   b. Domains
      1. cognitive
      2. psychomotor
      3. affective
   c. Competency/Proficiency

F. **Regulations**

1. **Federal Government**
   a. OSHA
   b. EPA
   c. CDC
   d. etc.

2. **Accrediting agencies**
   a. JCAHO
   b. CAP
   c. NCCLS
   d. NAACLS (training programs)
   e. etc.

3. **NOTE:** Both HT and HTL are expected to know those regulations required of all people working in a hospital
   a. Blood-borne pathogens
      1. universal precautions
   b. Right-to-know
      1. Hazard communication
      2. MSDS
   c. Laboratory Chemical Standard
      1. Chemical Hygiene Plan
   d. Formaldehyde Standard
      1. levels
      2. monitoring

**HTL EXAM ONLY**
# List of Tissues and Stains for ASCP Board of Registry HT and HTL Practical Examinations

A list of tissues and stains from which the HT practical examination will be selected:

**Histotechnician (HT)**

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Minimum Size</th>
<th>Stain</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFB</td>
<td>-ant tissue</td>
<td>Carbol fuchsin</td>
</tr>
<tr>
<td></td>
<td>-do <strong>NOT</strong> use embedded culture material</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-block is <strong>NOT</strong> submitted</td>
<td></td>
</tr>
<tr>
<td>Aorta</td>
<td>2.0 cm in length</td>
<td>H&amp;E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verhoeff-Van Gieson (VVG)</td>
</tr>
<tr>
<td>Artery</td>
<td>-complete cross-section</td>
<td>H&amp;E</td>
</tr>
<tr>
<td></td>
<td>0.5 cm (outside diameter)</td>
<td>Trichrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verhoeff-Van Gieson (VVG)</td>
</tr>
<tr>
<td>Bladder</td>
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<td>H&amp;E</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>-to include all layers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-epithelium to cover one entire surface</td>
<td></td>
</tr>
<tr>
<td>Bone</td>
<td>1.0 cm in length</td>
<td>H&amp;E</td>
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<tr>
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<td>-to include cortex and hematopoietic marrow</td>
<td></td>
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<tr>
<td>Breast</td>
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<td>-to include ductal epithelium</td>
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<tr>
<td>Cervix</td>
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<td>H&amp;E</td>
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<tr>
<td></td>
<td>-to include ectocervix</td>
<td>Periodic acid Schiff/hematoxylin (PASH)</td>
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<tr>
<td>Colon</td>
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<tr>
<td></td>
<td>-not autolyzed</td>
<td>Alcian blue (pH 2.5)</td>
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<tr>
<td></td>
<td>-to include all layers</td>
<td>Fontana-Masson</td>
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<tr>
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<td>-epithelium to cover one entire surface</td>
<td>Trichrome</td>
</tr>
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<td>-to include all layers</td>
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</tr>
<tr>
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<td>-epithelium to cover one entire surface</td>
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<td>Fallopian Tube</td>
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<td>-complete cross-section</td>
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<td></td>
<td>Trichrome</td>
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<tr>
<td>Fungi</td>
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<td>Periodic acid-Schiff/light green (PAS/LG)</td>
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<td>-block is <strong>NOT</strong> submitted</td>
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<tr>
<td>Kidney</td>
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<td>H&amp;E</td>
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<tr>
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<td>Periodic acid-Schiff/hematoxylin (PASH)</td>
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<td>TISSUE</td>
<td>MINIMUM SIZE *</td>
<td>STAIN</td>
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<tr>
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</tr>
<tr>
<td>LIVER</td>
<td>1.0 x 1.0 cm (square)</td>
<td>H&amp;E</td>
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<tr>
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<td></td>
<td>Reticulin (silver impregnation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trichrome</td>
</tr>
<tr>
<td>LUNG</td>
<td>1.0 x 1.0 cm (square)</td>
<td>H&amp;E</td>
</tr>
<tr>
<td>OVARY</td>
<td>1.0 cm in one dimension</td>
<td>H&amp;E</td>
</tr>
<tr>
<td></td>
<td>-to include cortical surface</td>
<td>Trichrome</td>
</tr>
<tr>
<td></td>
<td>along one entire side</td>
<td></td>
</tr>
<tr>
<td>PANCREAS</td>
<td>1.0 x 1.0 cm (square)</td>
<td>H&amp;E</td>
</tr>
<tr>
<td></td>
<td>-not autolyzed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-to include islets</td>
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</tr>
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<td>H&amp;E</td>
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<tr>
<td></td>
<td>-epithelium to cover one entire surface</td>
<td>Fontana-Masson</td>
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<tr>
<td></td>
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<td>Trichrome</td>
</tr>
<tr>
<td>SMALL INTESTINE</td>
<td>2.0 cm in length</td>
<td>H&amp;E</td>
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<tr>
<td></td>
<td>-not autolyzed</td>
<td>Alcian blue (pH 2.5)</td>
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<tr>
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<td>-to include all layers</td>
<td>Fontana-Masson</td>
</tr>
<tr>
<td></td>
<td>-epithelium to cover one entire surface</td>
<td>Mucicarmione</td>
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<td>Trichrome</td>
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<tr>
<td>SPINAL CORD</td>
<td>-complete cross-section</td>
<td>H&amp;E</td>
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<tr>
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<td>-cut sections at 8-10 micrometers</td>
<td>Myelin</td>
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<td>1.0 x 1.0 cm (square)</td>
<td>H&amp;E</td>
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<tr>
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<td>Reticulin (silver impregnation)</td>
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<td>STOMACH</td>
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</tr>
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<td>H&amp;E</td>
</tr>
<tr>
<td>UTERUS</td>
<td>1.5 x 1.5 cm (square)</td>
<td>H&amp;E</td>
</tr>
</tbody>
</table>

*Please note that the minimum measurements indicated for the blocks are after processing and the stained sections are after coverslipping. When square measurements are indicated, the section must cover a square of the size indicated. All tissues must exhibit positive results with the technique utilized.

Revised 4/01
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<th>STAIN</th>
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<td></td>
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<tr>
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<td>Congo Red</td>
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<td>-cut sections at 8-10 micrometers</td>
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<td>Fontana -Masson</td>
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<td>H&amp;E</td>
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<tr>
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<td>Verhoeff-Van Gieson (VVG)</td>
</tr>
<tr>
<td>BONE</td>
<td>1.5 x 1.5 cm (square)</td>
<td>H&amp;E</td>
</tr>
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<td></td>
<td>Giemsa</td>
</tr>
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<td>Iron (Prussian blue)</td>
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<td>H&amp;E</td>
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<td>Bielschowsky</td>
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<td>Luxol fast blue-Cresyl echt violet (LFB-CEV)</td>
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<td>H&amp;E</td>
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<td>Alcian blue-Periodic acid Schiff (AB-PAS)</td>
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<td>Immunoenzyme Pan-Keratin</td>
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<td>H&amp;E</td>
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<tr>
<td>-to include all layers</td>
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<td>-epithelium to cover one entire surface</td>
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</tr>
<tr>
<td>-to include all layers</td>
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<tr>
<td>-epithelium to cover one entire surface</td>
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<tr>
<td>TISSUE</td>
<td>MINIMUM SIZE*</td>
<td>STAIN</td>
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<td>---------------------------------</td>
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<td>Silver Technique</td>
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<td>- do <strong>NOT</strong> use embedded culture material</td>
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<td>Periodic acid-methenamine silver (PAM)</td>
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<tr>
<td>LIVER</td>
<td>1.0 x 1.0 cm (square)</td>
<td>H&amp;E</td>
</tr>
<tr>
<td></td>
<td>Reticulin (silver impregnation)</td>
<td></td>
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<td>LUNG</td>
<td>1.5 x 1.5 cm (square)</td>
<td>H&amp;E</td>
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<tr>
<td></td>
<td>Colloidal iron without digestion Trichrome</td>
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<tr>
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<td>H&amp;E</td>
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<td>- to include inferior olivary nucleus</td>
<td>Bielchowsky</td>
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<tr>
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<td>- cut sections at 8-10 micrometers</td>
<td>Luxol fast blue-Cresyl echt violet (LFB-CEV)</td>
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<tr>
<td>OVARY</td>
<td>1.0 x 1.0 cm (square)</td>
<td>H&amp;E</td>
</tr>
<tr>
<td></td>
<td>- to include cortical surface along one entire side</td>
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</tr>
<tr>
<td>PANCREAS</td>
<td>1.0 x 1.0 cm (square)</td>
<td>H&amp;E</td>
</tr>
<tr>
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<td>- not autolyzed</td>
<td>Immunoenzyme Chromogranin</td>
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<tr>
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<td>- to include islets</td>
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<td>H&amp;E</td>
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<td>Immunoenzyme</td>
</tr>
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<td>Prostate specific antigen (PSA OR Prostate acid phosphatase (PAP)</td>
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<td>H&amp;E</td>
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<td>Verhoeff-Van Gieson (VVG)</td>
</tr>
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<td>TISSUE</td>
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<td>STAIN</td>
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<td>H&amp;E</td>
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<tr>
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<td>Colloidal iron</td>
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<td>-to include all layers</td>
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<td>Methyl green-pyronin</td>
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<td>Mucicarmine</td>
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<td>Periodic acid-Schiff/hematoxylin (PASH)</td>
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<td>H&amp;E</td>
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<tr>
<td>TONSIL</td>
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<td>Trichrome</td>
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<td>-endometrium to cover one entire surface</td>
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*Please note that the minimum measurements for the blocks are after processing and the stained sections are after coverslipping. When square measurements are indicated, the section must cover a square of the size indicated. All tissues submitted must exhibit positive results with the technique utilized.

Revised 4/01