What in the world is Histotechnology?

Karen Stiffler, MA, HTL

Program Director for Histotechnology

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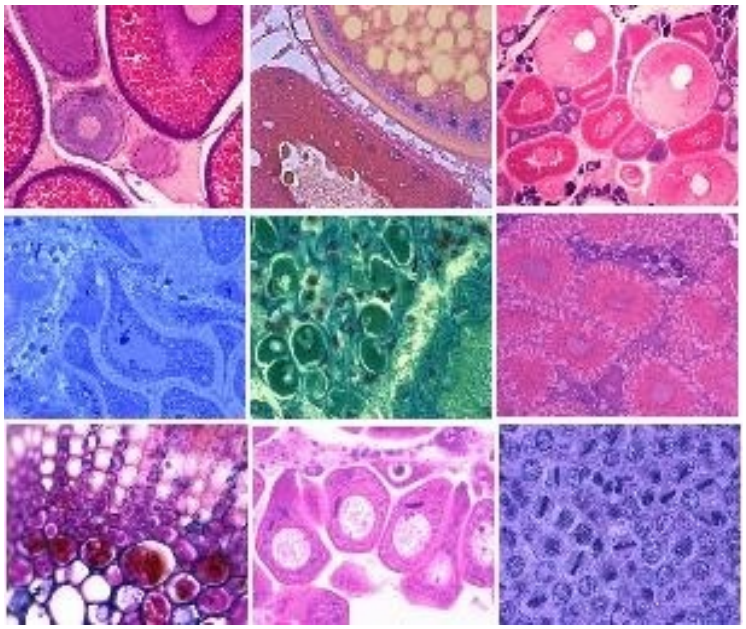
The Basics of Histology



Histology: the study of body tissues

"histo" is from the Greek "histos" meaning tissue

Histotechnology: technical histology concerned especially with preparing and processing histological specimens

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What are some uses of Histology?

1. Diagnosis for treatment

   Histopathology: study of **diseased** tissue in microscopic detail.

2. Education
3. Forensic examination
4. Autopsy

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What is the purpose of Histology?

To investigate the difference between normal (healthy) and abnormal (diseased) tissue.

It is often used to detect cancer but it can also be used to test for diseases such as those caused by bacteria, parasites or fungi.

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Where does the tissue go?

1. The surgeon or other physician removes a piece of tissue (biopsy).
2. The tissue is taken to the grossing room.
3. Pathology Assistant or Resident writes a description and cuts it appropriately.
4. Then comes the role of the **HISTOTECHNICIAN! (to be continued…)**
5. Once histotechnican performs their job, the slide is ready to go to the Pathologist for diagnosis.
6. Through the work of this team, the patient can receive the appropriate treatment as needed.

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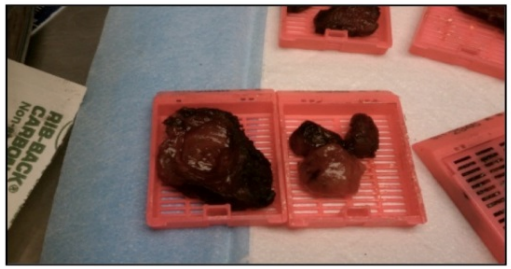
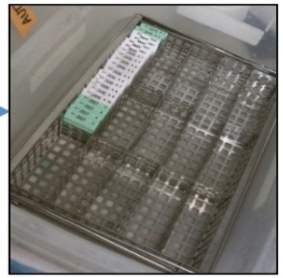
What does a histotechnician do?

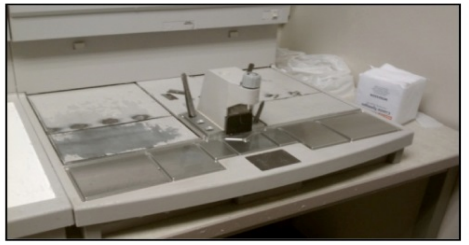
Pathology Processing: Tissue



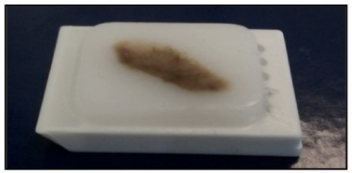
Cutting the tissue

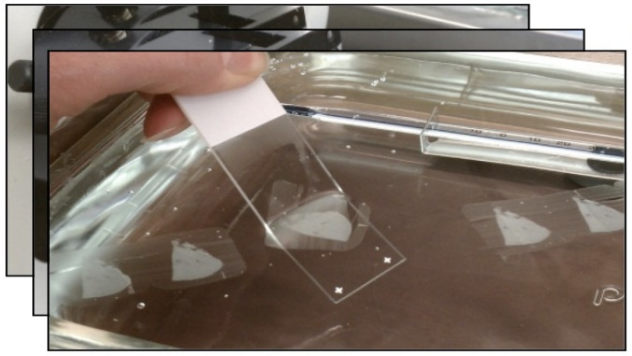


Fixation & Processing

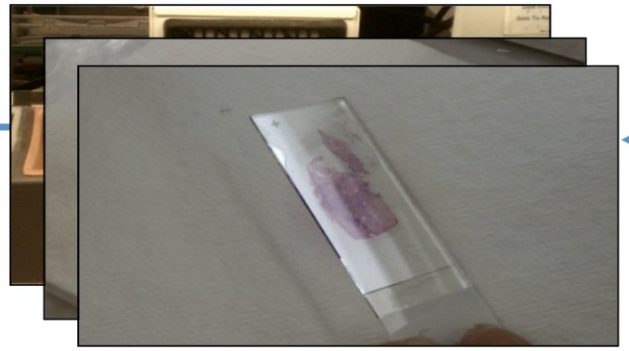


Tissue embedding in paraffin

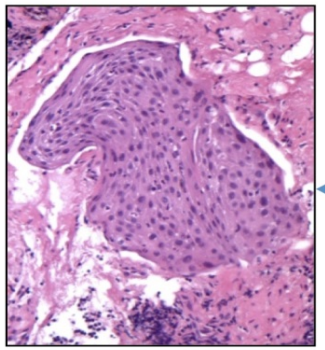




Block cut to make slides



Slide staining



Microscopic evaluation

General Steps

To give an overview of the histological process from accessioning of the tissue sample to slide distribution.

Accession ➡ Gross Examination ➡ Fixation ➡

Tissue Processing ➡ Embedding ➡ Sectioning ➡

Staining ➡ Slide Distribution

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General Terms

Accessioning: to give a unique number to each patient

Gross examination: using the naked eye to obtain diagnostic information

Fixation: the technique of preserving a specimen for microscopic study

Tissue processing: preparation of tissue to a form that will be able to be embedded

Embedding: tissue sections are placed in molds and hardened; allows for correct alignment and orientation of tissues

Sectioning: using a microtome to cut thin ribbons of tissue to be placed on slides

Staining: gives contrast to the tissue and highlights particular features

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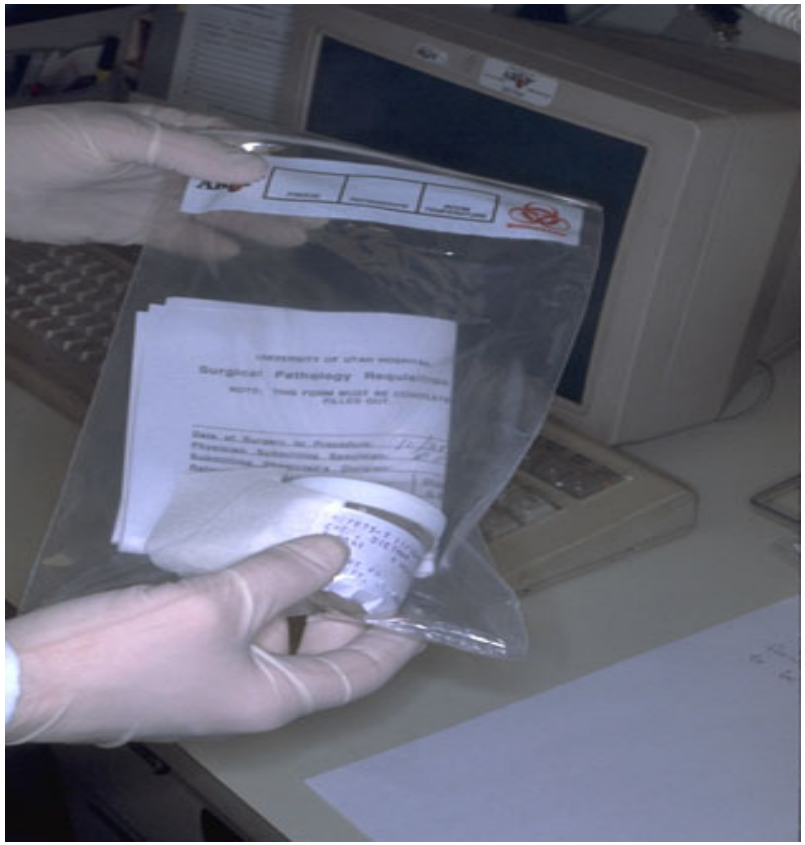
Step 1: Accessioning



1. Tissue specimens are received in the surgical pathology laboratory along with a request form.

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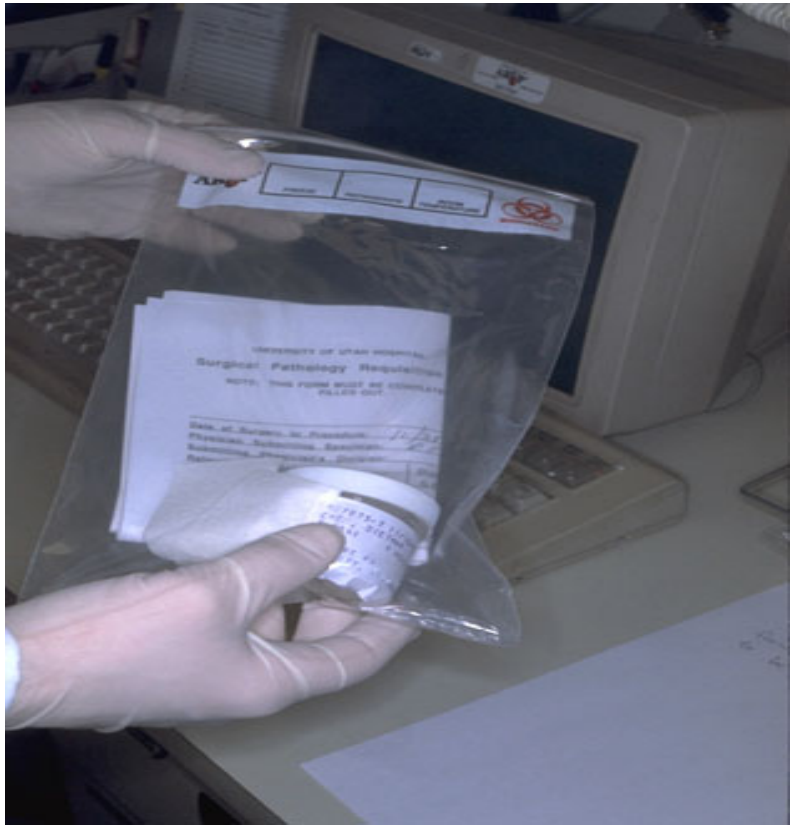
Step 1: Accessioning



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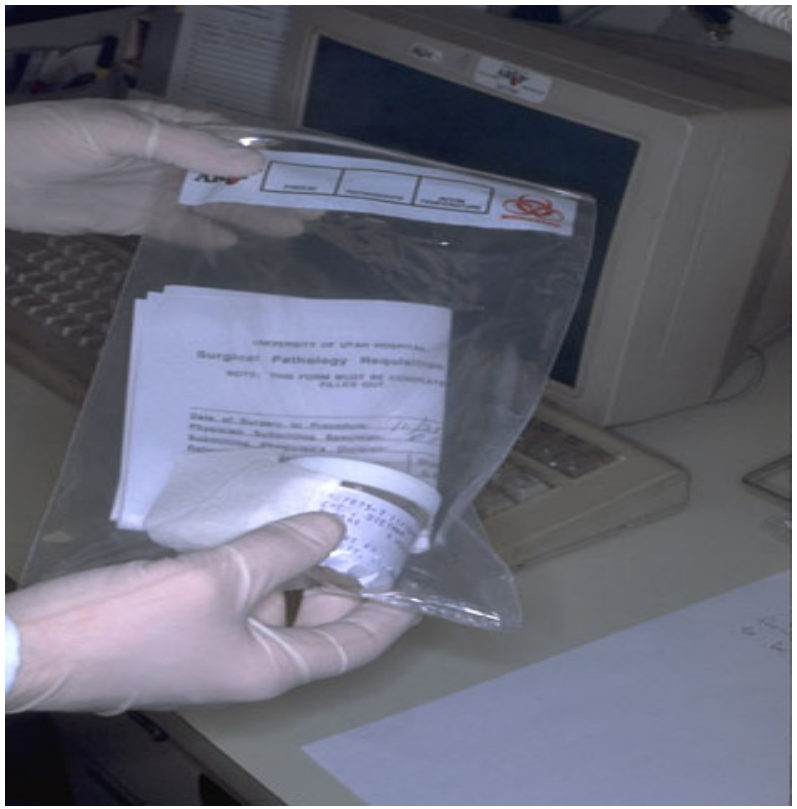

1. Tissue specimens are received in the surgical pathology laboratory along with a request form.

2. The specimen is given a number to identify the patient.

3. The information listed on the request form is entered into the computer. This includes patient history along with a description of the site of origin.

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Step 2: Gross Examination

1. Tissues are examined by a pathologist or pathologist assistant.

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Step 2: Gross Examination

1. Tissues are examined by a pathologist or pathologist assistant.

2. Size of the sample is measured; color and texture are described.

3. If any masses are found they are also measured as well as the distance from the mass to the specimen edge (where the surgeon cut it out).

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Step 2: Gross Examination

4. The pathologist cuts the tissue into small slices with a scalpel, examines it, and then places it in a cassette.

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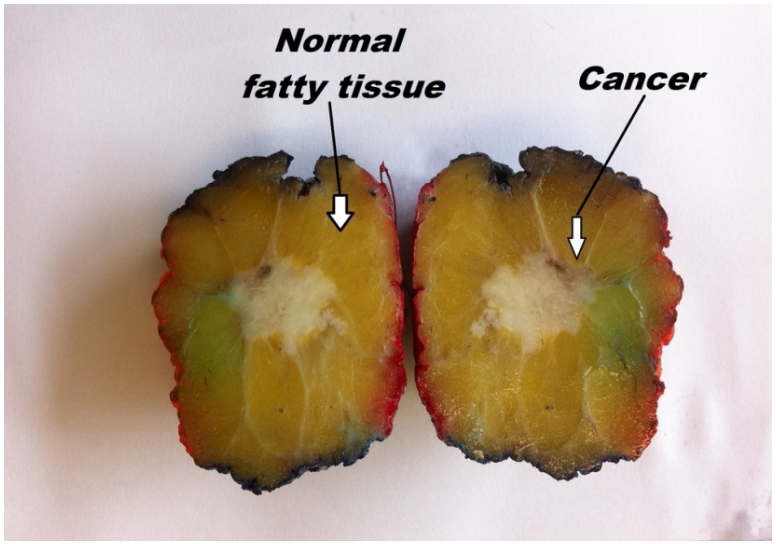

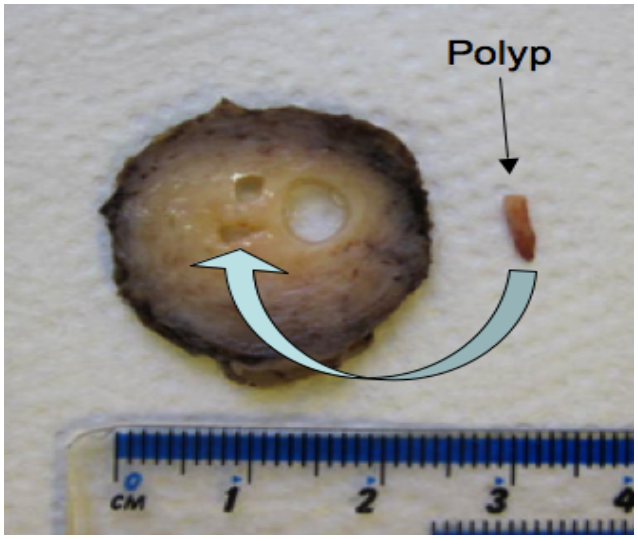

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Step 3: Fixation

1. **Fixative**: a chemical that preserves a specimen for microscopic study.

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Step 3: Fixation

1. **Fixative**: a chemical that preserves a specimen for microscopic study.
2. The cassette needs to be immediately placed in a fixative so it won't be degraded. The volume of fixative should be 15-20 times the size of the tissue.

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Step 3: Fixation

3. 10% Neutral Buffered Formalin (NBF) is most commonly used.
   - -penetrates the tissue rapidly
   - -causes less shrinking
   - -permits most special stains

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Step 3: Fixation

3. 10% Neutral Buffered Formalin (NBF) is most commonly used.
   -penetrates the tissue rapidly
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4. Fixation is generally complete in about 1 hour per mm of tissue. Small biopsies will thus take 1-2 hours to fix. Larger tissue may take 5-10 hours or more.

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Step 4: Tissue Processing

Once tissue is fixed it must be processed to a form that will be able to be embedded (usually in paraffin) and then cut into thin microscopic sections.

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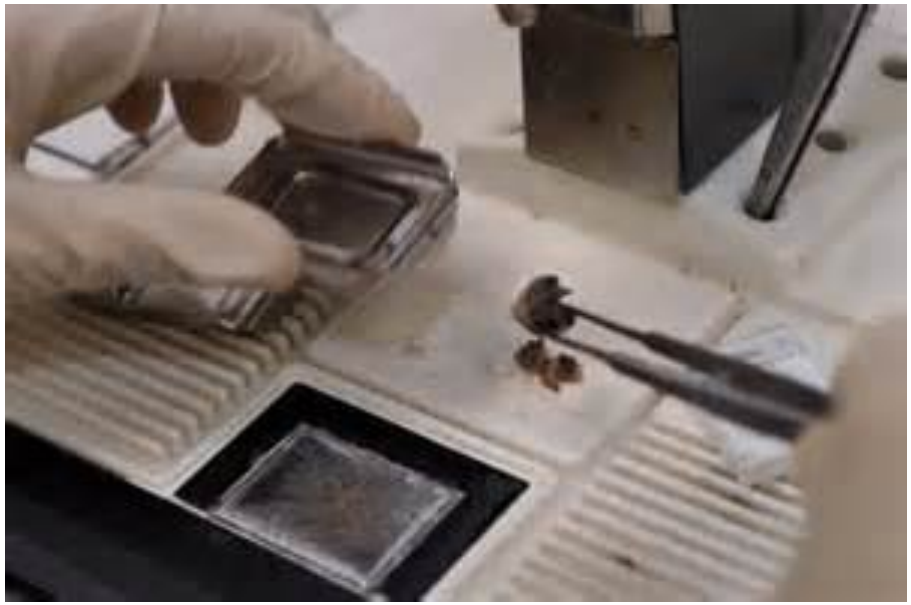
Step 5: Embedding

1. Once the tissue has completed processing, it must be embedded in paraffin.



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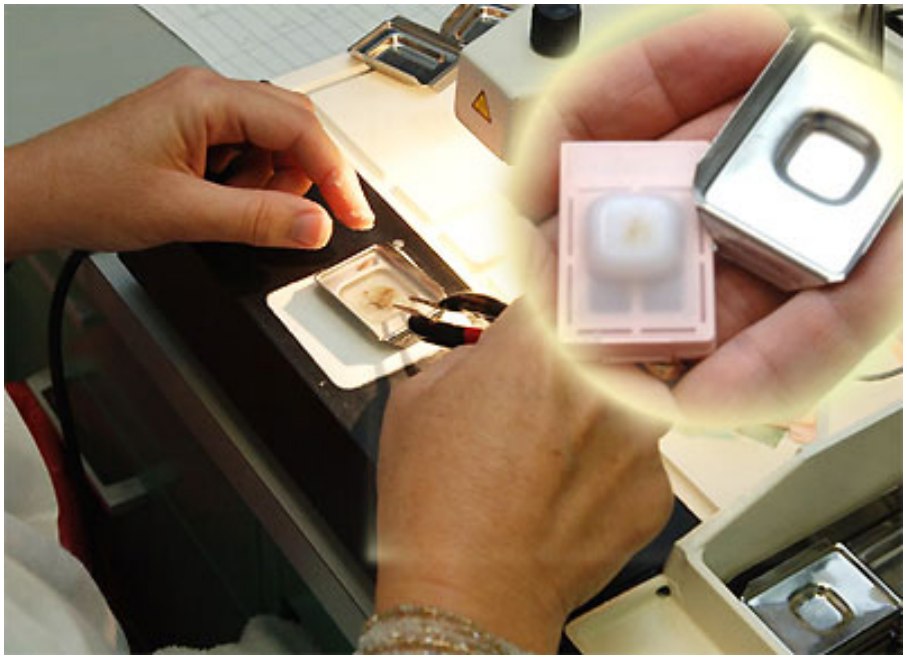
Step 5: Embedding

1. Once the tissue has completed processing it must be embedded in paraffin.

2. Tissues will be oriented differently depending on the type of tissue and the pathologist's request.



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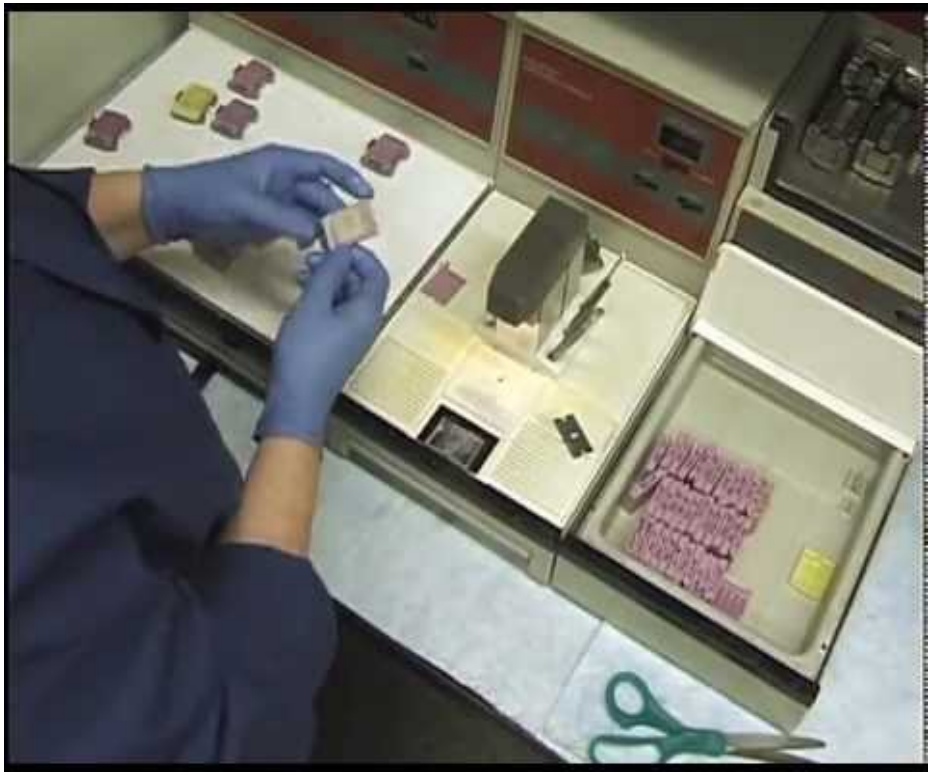
Step 5: Embedding

1. Once the tissue has completed processing it must be embedded in paraffin.

2. Tissues will be oriented differently depending on the type of tissue and the pathologist's request.

3. Tissues are placed in molds and hardened on a cold plate.



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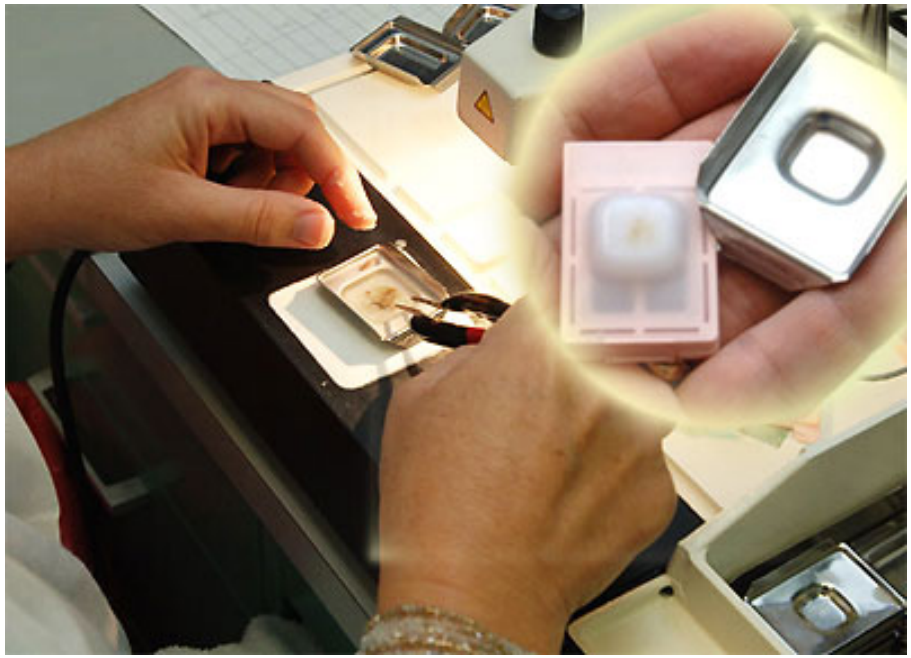
Step 5: Embedding

1. Once the tissue has completed processing it must be embedded in paraffin.
2. Tissues will be oriented differently depending on the type of tissue and the pathologist's request.
3. Tissues are placed in molds and hardened on a cold plate.
4. Cassettes with tissue are now called **blocks**.



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Step 6: Sectioning

1. **Microtome**: machine with a sharp blade that is used to cut thin (4-5µ) sections of tissue.

   Using a microtome, the block is cut into until the entire surface of the tissue can be seen.

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Step 6: Sectioning

1. **Microtome**: machine with a sharp blade that is used to cut thin (4-5µ) sections of tissue.

   Using a microtome, the block is cut into until the entire surface of the tissue can be seen.

2. Block is placed in an ice-water bath for easier sectioning.

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Step 6: Sectioning

3. The block is put back on the microtome and a ribbon is cut. A ribbon of 4-6 sections (for small biopsies) is placed on a flotation bath at about 40°C.

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Step 6: Sectioning

3. The block is put back on the microtome and a ribbon is cut. A ribbon of 4-6 sections (for small biopsies) is placed on a flotation bath at about 40°C.

4. The ribbon is placed on a slide and then put in a slide rack for subsequent staining.

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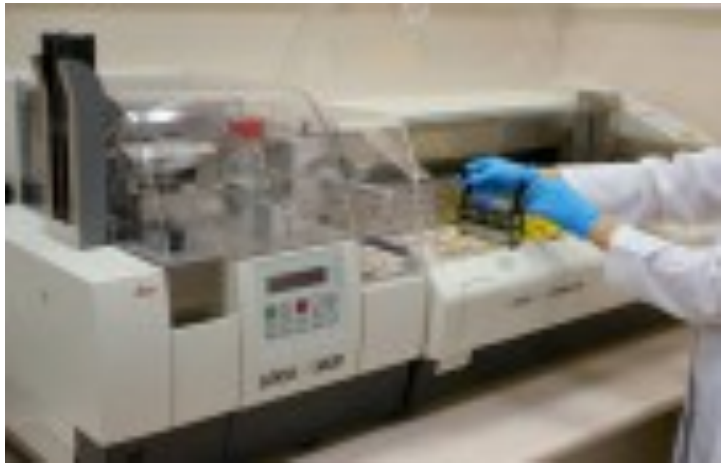
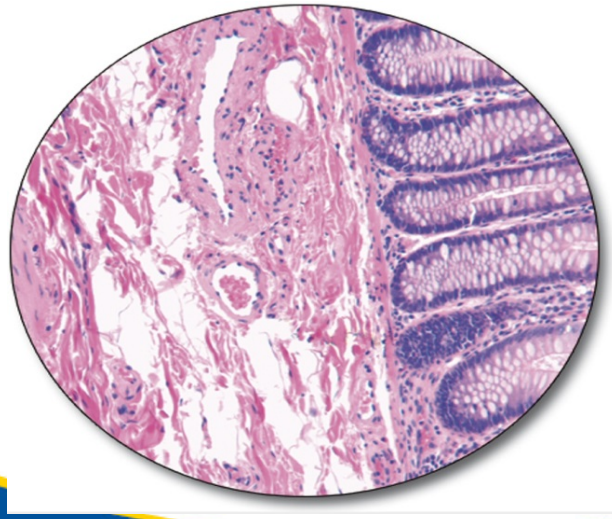
Step 7: Staining

1. **Hematoxylin and Eosin (H&E):** a stain to visualize general structures of the tissue. Often used to detect cancer.



Hematoxylin: stains nuclei

Eosin: stains cytoplasm



Step 7: Staining

1. **Hematoxylin and Eosin (H&E):** a stain to visualize general structures of the tissue. Often used to detect cancer.

   Hematoxylin: stains nuclei

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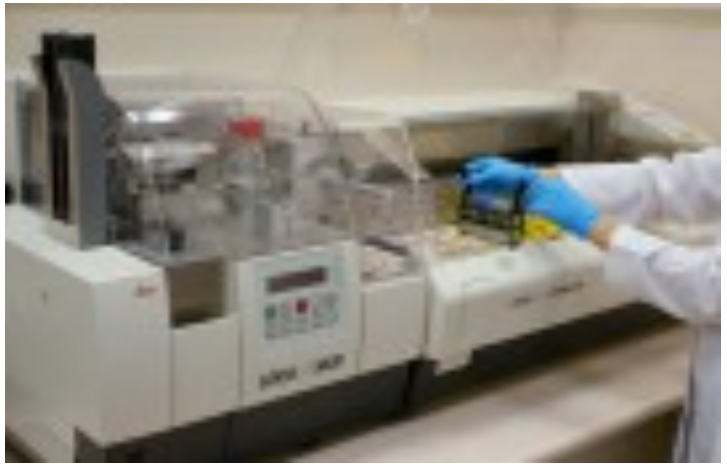
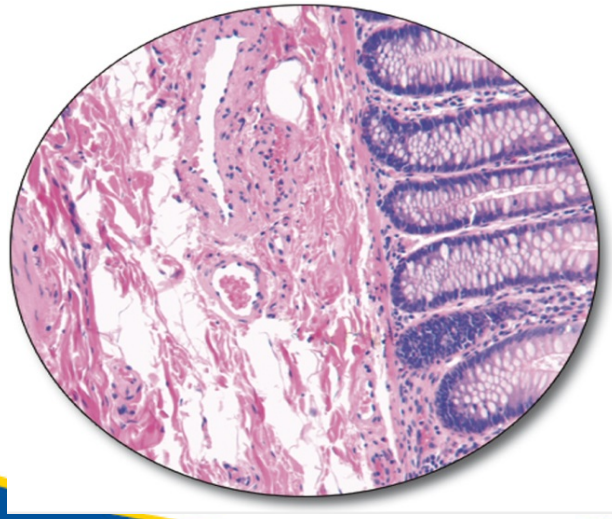
2. Slides are placed on an automated stainer set for an H&E stain.





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Step 7: Staining

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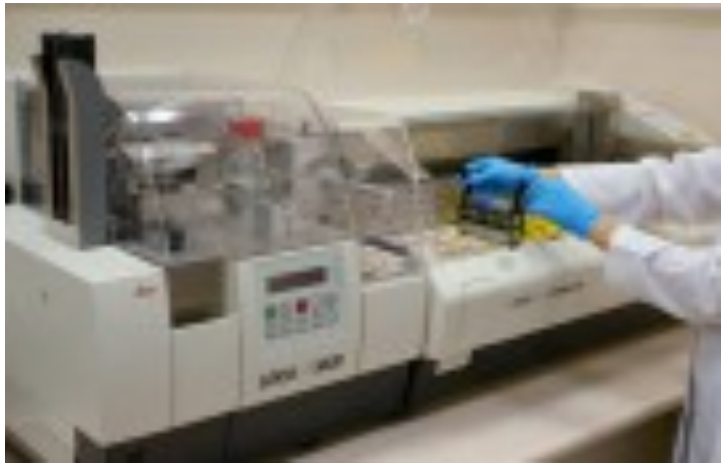
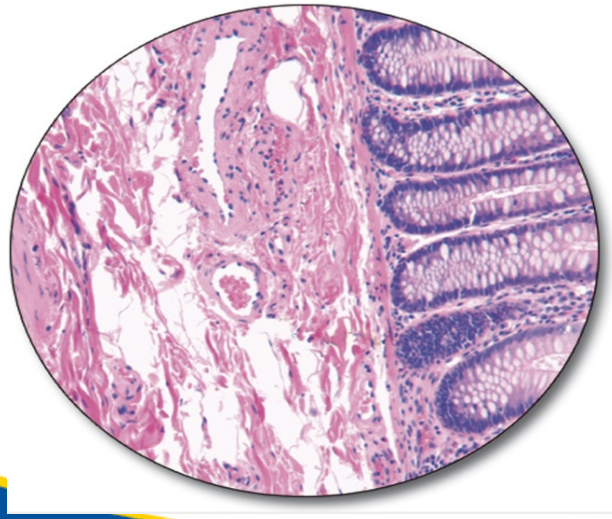
   Hematoxylin: stains nuclei

   Eosin: stains cytoplasm

2. Slides are placed on an automated stainer set for an H&E stain.
3. Slides are coverslipped to prevent damage to the tissue.





Step 7: Staining

Special stains:

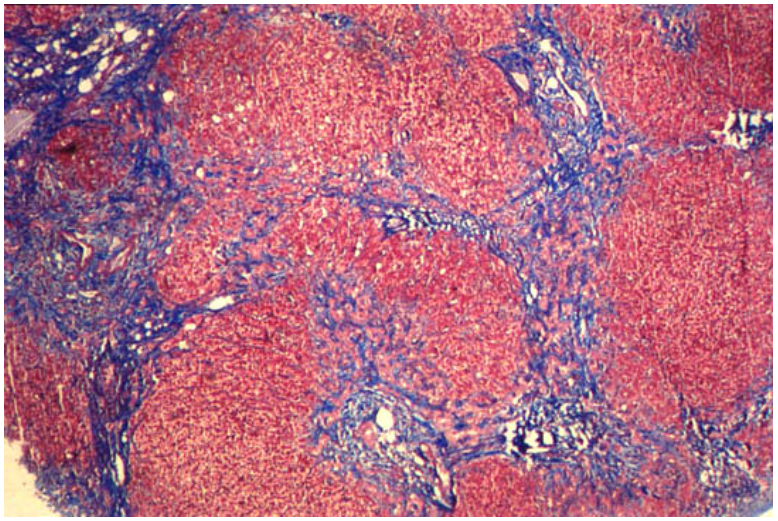
Examples:

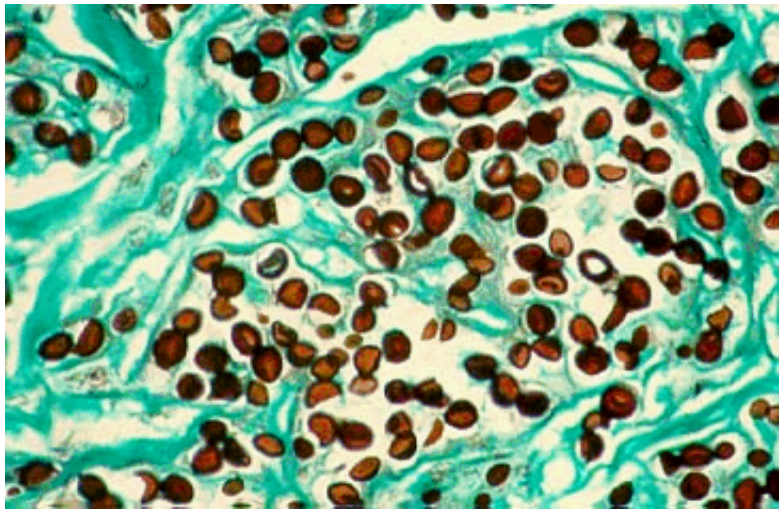
-carbohydrates

-microorganisms

-connective tissue

-nerves





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Step 8: Slide Distribution

1. Once slides have been stained they are organized into slide folders.

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2. The slides are scanned to verify order is complete.

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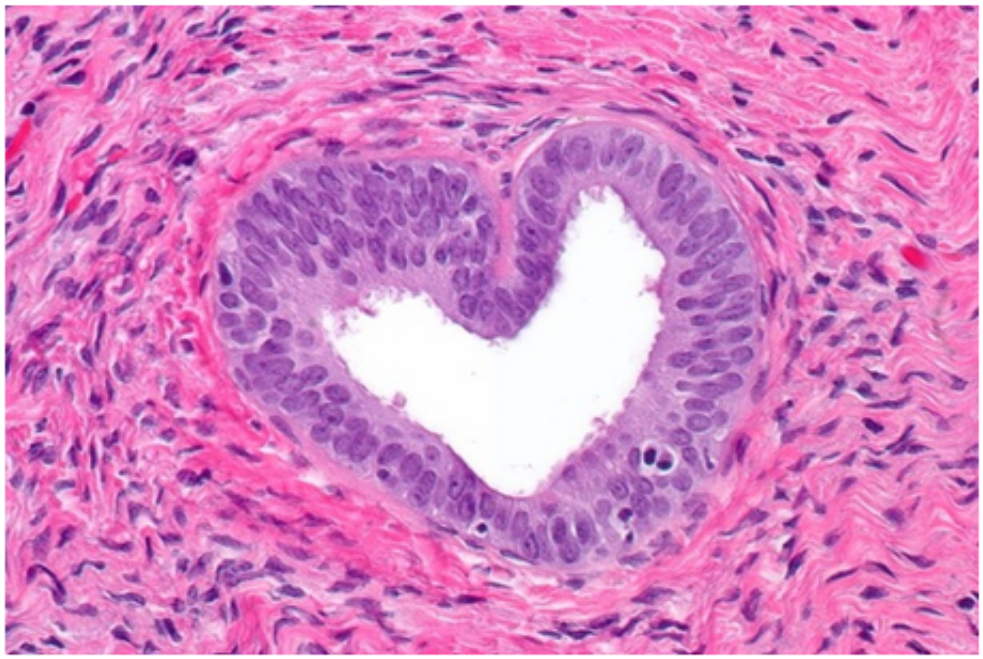
Step 8: Slide Distribution

1. Once slides have been stained they are organized into slide folders.

2. The slides are scanned to verify order is complete.

3. The slide folders are taken to the pathologist for viewing under a light microscope.



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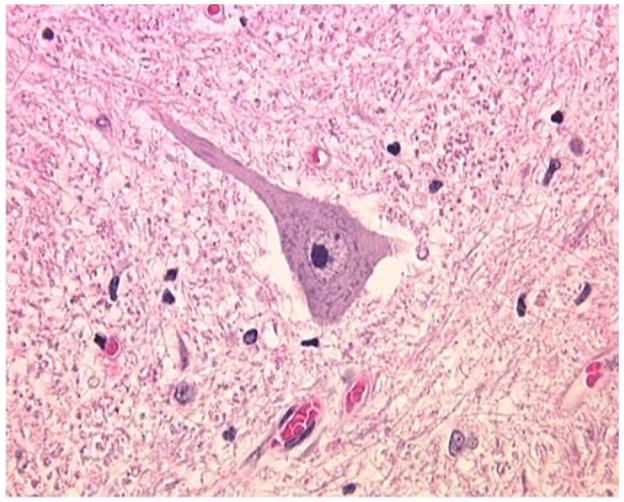

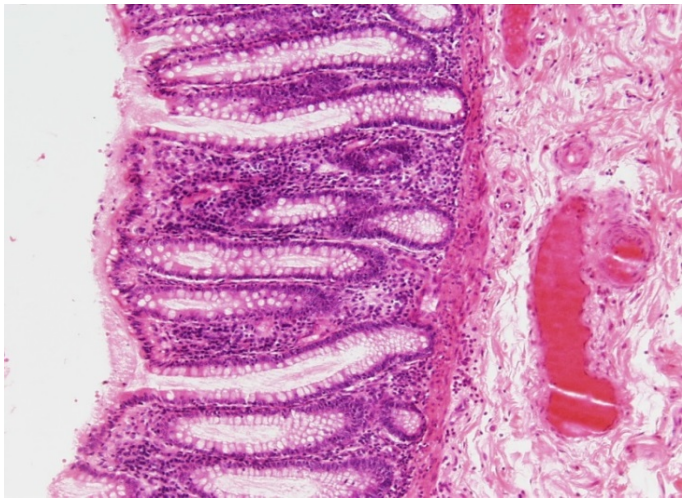

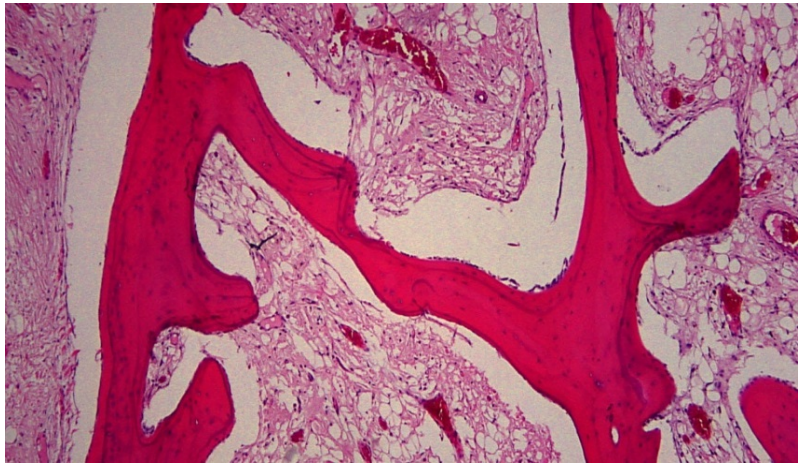

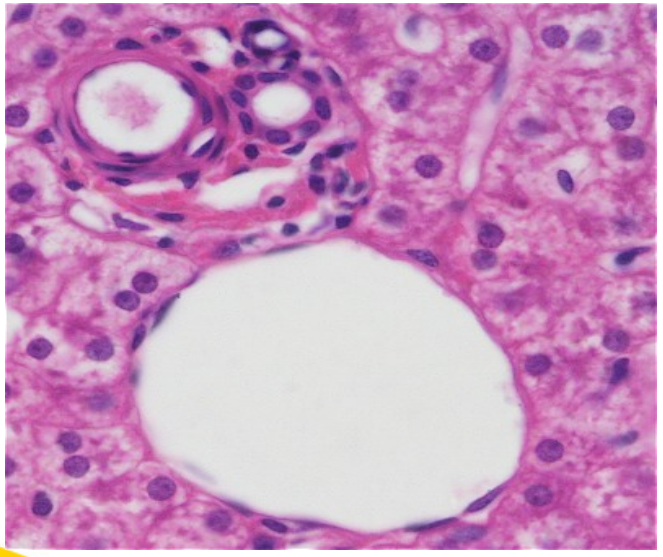

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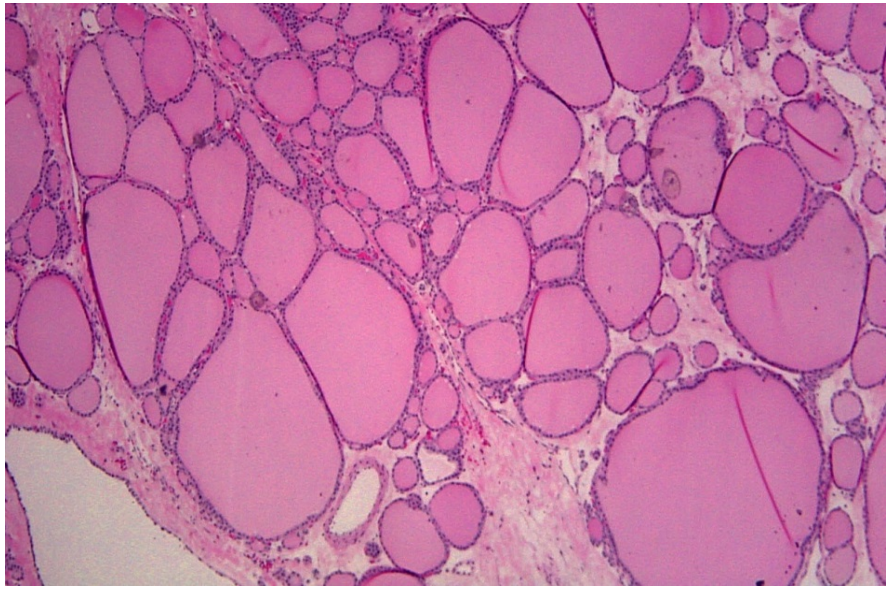

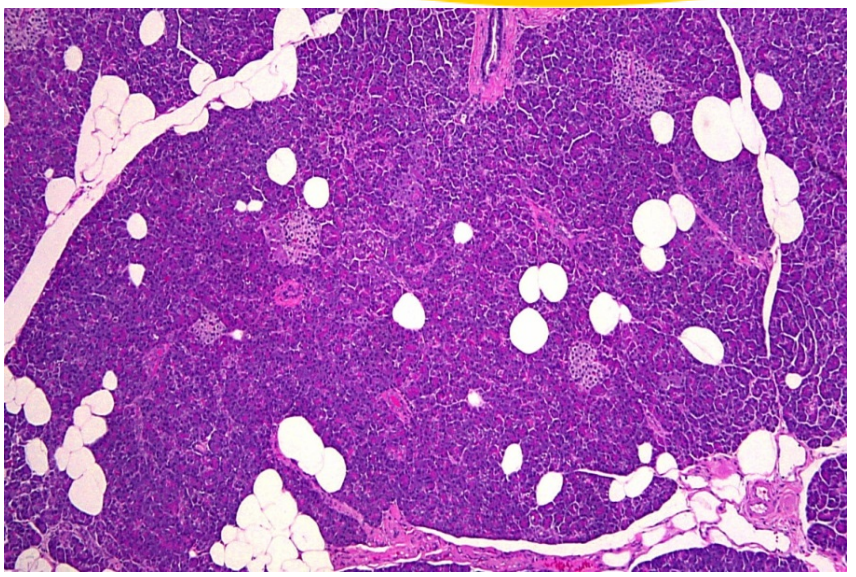

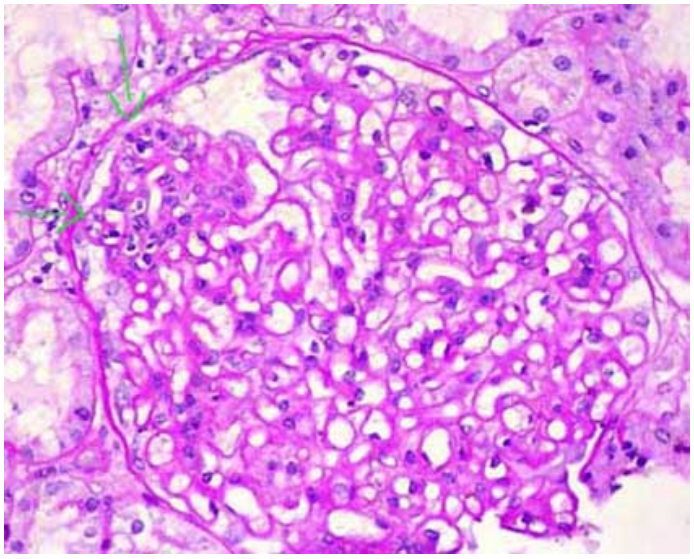

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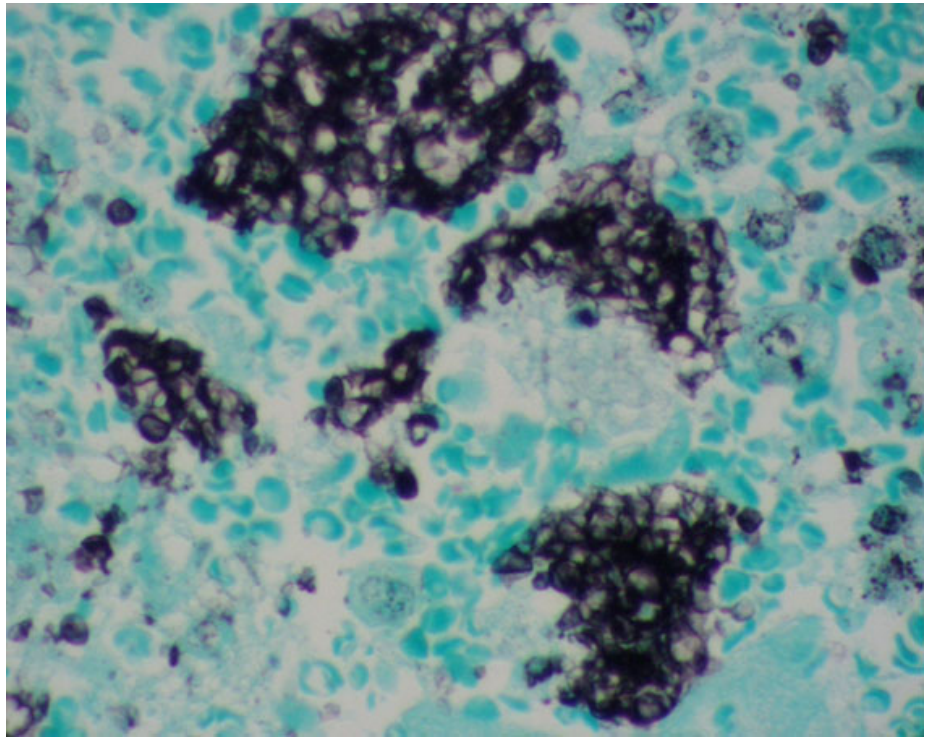
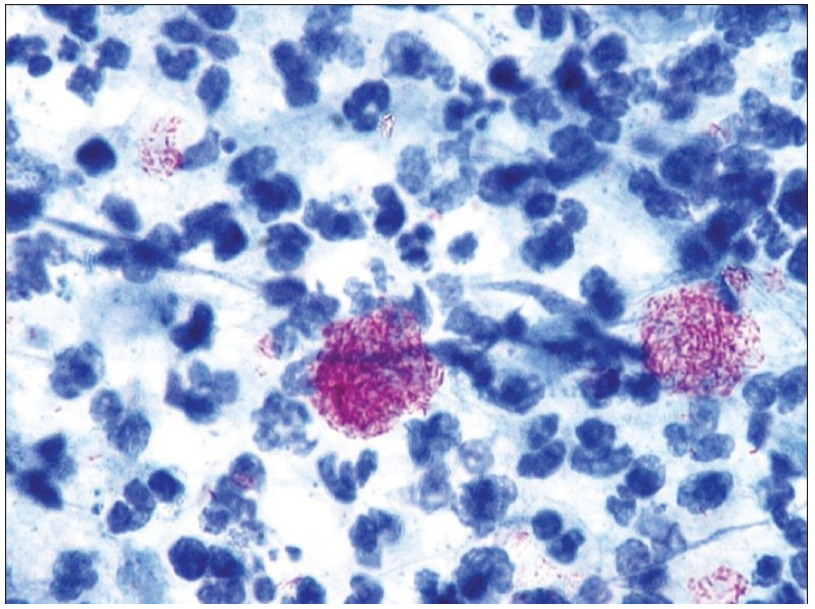
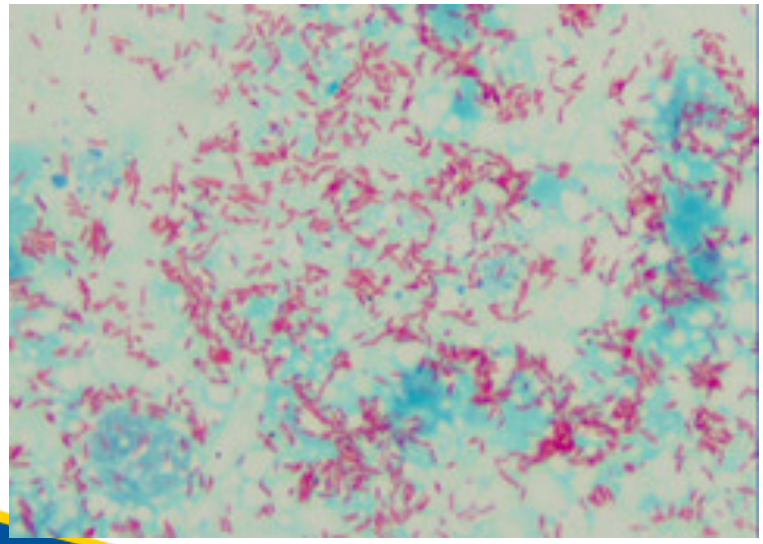
Microorganisms







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Why become a histotechnician?

- Are you interested in a career in health care but would rather work behind the scenes?
- Becoming a histotechnician may be the route for you!
- There are currently many job opportunities in hospitals, clinics, dermatology offices, independent and research laboratories.

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Lakeland's Histotechnology Program

- 2 year program leading to an Associate of Applied Science degree in Histotechnology
- Nearly 50% of required **general education** courses can be taken online. Histology courses are all on campus.
- The program combines basic science, general education, laboratory techniques and clinical laboratory experiences.
- Small class sizes allow students to receive personal attention from faculty.

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Training

- Students gain hands-on training in a simulated hospital laboratory on campus.
- We also provide you with 16 weeks (480 hours) of clinical training at area labs. Examples include:

-Cleveland Clinic Foundation

-University Hospitals

-Metrohealth

Many students get jobs at their clinical sites after graduation!

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ASCP Certification

- Students are eligible to sit for the ASCP Board of Certification HT exam upon graduation.
- Students can get a job immediately upon graduation and take the exam within a year of employment.
- Students with a bachelors degree in biology or chemistry may be eligible to take the HTL exam to provide even more career opportunities.

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Additional info

- **National Society for Histotechnology**

http://nsh.org/what-histotechnology

- **American Society for Clinical Pathology:**

https://www.ascp.org/content

http://www.lakelandcc.edu/web/about/histotechnology-departments

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