MHD I
Histology Lab
(aka Histology Boot-Camp)
August 8, 2019

Objectives
• Recognize the most common stain used in pathology (H&E) and explain the characteristic staining pattern.
• Summarize the concept of "power" when visualizing histologic sections under a microscope.
• Define "special stains" and give examples of when they would be used.
• Identify basic cellular components histologically:
  — nucleus
  — nucleolus
  — cytoplasm
  — cell borders
• Identify basic tissue types histologically:
  — epithelial tissue
  — connective tissue
  — adipose tissue
  — blood vessels
  — muscle tissue
  — nervous tissue
  — inflammatory cells

Warm-up
• 2 volunteers, please
Describe what you see

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Describe what you see

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Describe what you see
What did we just do?

What knowledge/skills were needed to do what you just did?
2 new Volunteers, please  

Describe what you see  

Describe what you see
Describe what you see

Describe what you see

Describe what you see
What did we just do?

What knowledge/skills were needed to do what you just did?

HISTOLOGY

*It is not all new to you*
How do we visualize microscopic anatomy (histology) and pathology (histopathology)?

- Traditional Microscope
- Digitally scanned slides
  - SSOM "Zoomify" = Digitally scanned slides
    - Viewable via a "virtual microscope"
    - Simulates traditional microscope

Full set of Zoomify digital histology slides available on LUMEN
• During the MHD labs themselves we will be displaying histology and histopathology slides on different powers largely via static images — Zoomify Histology Slides are included in the “Histology for Pathology” modules on Sakai for your review

Objective
• Recognize the most common stain used in pathology (H&E) and explain the characteristic staining pattern.

Hematoxylin and Eosin (H&E stain)
• Hematoxylin
  – A basic dye
  – Stains structures containing acids (e.g. nuclei) blue
• Eosin
  – An acidic dye
  – Stains structures containing protein (e.g. cytoplasm) pink
Objective

- Define “special stains” and give examples of when they would be used.

“Special Stains”

- Staining techniques used to
  - demonstrate specific cellular components (structures and substances)
  - identify micro-organisms
  - aid pathologists in the evaluation of disease states
Objective

- Summarize the concept of “power” when visualizing histologic sections under a microscope.

What is “power”?  

- Many objectives from 2x – 100x  
- Low power – 2x-10x – to see overall structure of tissue  
- High Power – 20x-100x – examine smaller structures / cellular level
http://zoomify.lumc.edu/histonew/skin/skin_main.htm

Thick skin palm

Review slide from low power to high power

Objective

- Identify basic cellular components histologically:
  - nucleus
  - nucleolus
  - cytoplasm
  - cell borders

Basic Histology – Cellular level
Identify basic cellular components histologically:
Nucleus, nucleolus, cytoplasm, cell borders

Thyroid Gland
Identify cells, nuclei, cytoplasm

Organ: Appendix
Identify cells, nuclei, nucleoli, cytoplasm
Objective: Identify basic tissue types histologically

- Epithelium
- Adipose tissue
- Blood vessels
- Muscle
- Inflammatory cells
- Nervous tissue

Epithelium

- Tissue which covers nearly all body surfaces
- Functions:
  - Protects (skin, esophagus)
  - Absorbs (GI tract, kidney)
  - Transports (ciliated cells of trachea)
  - Secretes (glands)
  - Gas exchange (lung)
  - Lubricates (pleural cavity)

Peritoneum:
Simple Squamous
(scale-like)
Kidney Tubule: Simple Cuboidal

What is the PAS stain outlining on this section?

Appendix: Simple Columnar

Skin – Epidermis
Stratified Squamous

Cells originate from a layer of cells along a basal lamina and form a multilayered structure. Cells toward the surface have smaller nuclei and greater amounts of cytoplasm with keratin.
Self-Assessment: Type of Epithelium?

Respiratory Tract: Nasopharynx

Objective

- Identify basic tissue types histologically:
  - epithelial tissue
  - connective tissue
  - adipose tissue
  - blood vessels
  - muscle tissue
  - nervous tissue
  - inflammatory cells
Connective Tissue

• Provides structural support
  – Binds cells and tissues together
  – Provides metabolic support

• Types
  – Dense connective tissue, loose connective tissue
  • Fibers (mostly collagen)
  • “Fibroblast” = nuclei
  – Adipose Tissue
  • Primary site of fat storage
  – Elastic tissue, reticular tissue

Dense connective tissue? skin

Identify fibroblasts
Identify the collagen fibers
Adipose Tissue

Skin

Cells = Adipocytes

- Thin cell membrane
- Surrounds cytoplasmic lipid (cytoplasm appears clear because processing removes the actual lipids)
- Cell nucleus is pushed to the side by cytoplasmic lipid

“Special Stain” Example

- Oil Red O
  - Fat soluble dye which can stain lipids, triglycerides and some lipoproteins
    - Requires special processing of tissue sections
Objective

- Identify basic tissue types histologically:
  - epithelial tissue
  - connective tissue
  - adipose tissue
  - blood vessels
  - muscle tissue
  - nervous tissue
  - inflammatory cells

Blood Vessels

- Arterial
  - Arteries, arterioles, capillaries
- Veins
- Lymphatics

All lined by endothelium and have a smooth muscle layer of various thickness

Artery
Objective

- Identify basic tissue types histologically:
  - epithelial tissue
  - connective tissue
  - adipose tissue
  - blood vessels
  - muscle tissue
  - nervous tissue
  - inflammatory cells

Muscle

From your FHB Lecture – Muscle 1 – L3

Tongue:

a) What tissue type is covering the surface of the tongue?

b) Where is the muscle?
What kind of epithelium covers the surface of the tongue?

Muscle – point out cross sections and longitudinal sections

Skeletal muscle
Identify nuclei, fibers, cross-striations

Skin

On low power, identify Epithelium Dense connective tissue Adipose tissue

Objective

• Identify basic tissue types histologically:
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  – connective tissue
  – adipose tissue
  – blood vessels
  – muscle tissue
  – nervous tissue
  – inflammatory cells
Identify Dense connective tissue Blood vessels Nerve bundle highlighted by the arrow

What are these cells?

Nerve bundle: Cross section

Nervous Tissue

Longitudinal Section Cross Section
Ganglion Cells
- Nerve cell bodies that are part of the sympathetic and parasympathetic nervous system

Inflammatory Cells in tissue
- Neutrophils
- Eosinophils
- Lymphocytes
- Plasma cells
- Macrophages
- Sometimes lymphocytes and plasma cells can be part of “normal” histology of an organ
  - Appendix
  - Ileum
Normal Appendix – what cells are the arrows highlighting on low power and the predominant cell type on high power?

What cell types are highlighted in the image?

“Final Exam”

Ileum
Identify:
Epithelium – name the type
Smooth muscle
Connective tissue
Adipose tissue
Blood vessels
Inflammatory cells

View on your own computer.
Pair up or do so in small groups.
We will ask for 2 volunteers to review the slides with us.

http://zoomify.lumc.edu/histonew/gioverview/overview_main.htm
Ileum #131
Final Questions?