Pathology Laboratory Sessions in the Pre-Clinical Medical Curriculum:
Assessment of Construct and Effectiveness

Michael Denning, M3
Brody School of Medicine, East Carolina University
Background

- At the Brody School of Medicine, **pathology topics** are taught
  - **M1 Year**: **Basic pathology** concepts
  - **M2 Year**: **Organ-system pathology** concepts integrated with pharmacology and clinical applications concepts
Brody School of Medicine Curriculum Spiral

DIFFERENTIATION PHASE - 13 Months

- Advanced Core Clerkships:
  - Emergency Medicine - 4 weeks
  - Neurology/PMSR - 4 weeks

- Required Experiences:
  - Ambulatory Primary Care - 4 weeks
  - Acting Internship - 4 weeks
  - Intensive Care - 4 weeks
  - Electives and Field - 30 weeks

Transition to Residency

CLINICAL PHASE - 12 Months

Required Core Clerkships and Electives:

<table>
<thead>
<tr>
<th>Year</th>
<th>Family Medicine</th>
<th>Internal Medicine</th>
<th>OB/GYN</th>
<th>Pediatrics</th>
<th>Psychiatry</th>
<th>Surgery</th>
<th>Electives</th>
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<tbody>
<tr>
<td>M1</td>
<td>8 weeks</td>
<td>8 weeks</td>
<td>6 weeks</td>
<td>8 weeks</td>
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</table>

Radiology

FOUNDATIONAL PHASE - 20 Months

Block 1:
- Gross Anatomy & Embryology
- Molecular Basis of Medicine
- Histology and Cell Biology

Block 2:
- Medical Neuroscience
- Physiology

Block 3:
- Mechanisms of Disease & Therapeutics

Summer: Independent Research activities

Orientation

- Medical Microbiology & Immunology
- Foundations of Doctoring (Preceptorships and PBL)
- Ethical Issues in Medicine
- Behavioral Science
- Society, Culture, & Health Systems

USMLE Step 1
- Dedicated Study

Foundations of Medicine and Doctoring
- Society, Culture, & Health Systems and Basic Psychiatry

Organ System Capstone
- Dermatological
- Musculoskeletal
- Cardiovascular
- Gastrointestinal
- Nervous & Somatic
- Urological
- Endocrine & Reproductive

Block 4:
- Hematological
- Respiratory
- Immunological
- Renal & Electrolyte
- Endocrine & Reproductive
- Gastrointestinal
- Musculoskeletal
- Nervous & Somatic
- Cardiovascular
- Hematological
- Immunological
- Respiratory
- Renal & Electrolyte
- Endocrine & Reproductive
- Gastrointestinal
- Musculoskeletal
- Nervous & Somatic
- Cardiovascular

USMLE Step 2: Clinical Skills
Pathology instruction at Brody includes:
  - Lectures
  - Laboratories
  - Flipped Classroom Session

Laboratory sessions have traditionally been a fundamental element in pathology instruction.

However, limited literature exists regarding the specific purpose, content, and goals of pathology laboratory sessions.

In Brody general course evaluations, pathology laboratory sessions have been consistently cited as an important and interesting component of the pathology course and as a highlight of the course.

However, a systematic evaluation of the components of the Brody laboratory sessions had not been conducted to date.
Methods and Materials

- The current pathology laboratory session design and content at the Brody School of Medicine was summarized.
- Students were surveyed using a SurveyMonkey.com survey regarding their thoughts about the pathology session with a distinction between the small group and the macroscopic / gross organ components of the laboratories.
- A literature review was conducted using pubmed.gov, scholar.google.com, and google.com using key words including medical education, pathology, and laboratory.
• **Reinforce “high-yield” topics**
  – No “new” content introduced

• Provide forum for **active learning** discussion of topics

• Allow students to **see disease processes in situ**
  – Normal lung vs. emphysematous lung
  – Normal kidney vs. end-stage renal disease kidney
  – Normal aorta vs. aorta with mild/moderate/severe atherosclerosis
What Topics Should Be Covered in Laboratory Sessions?

“High-Yield”

Abnormal Processes: Health and Health Maintenance, Screening, Diagnosis, Management, Risks, Prognosis

Infectious, Immunologic, and Inflammatory Disorders

Infectious Disorders: meningitis (bacterial [Actinomyces israelii; Haemophilus influenzae; Listeria monocytogenes; Mycobacterium tuberculosis; Neisseria meningitidis; Staphylococcus aureus, epidermidis; Streptococcus agalactiae; Streptococcus pneumoniae]; viral [adenovirus, arboviruses, echovirus and coxsackie A & B viruses, polioviruses, herpes simplex virus, varicella zoster, human immunodeficiency virus, lymphocytic choriomeningitis virus, measles virus, mumps virus, St. Louis encephalitis virus, California encephalitis virus, Western equine encephalitis virus]; fungal [Blastomyces dermatitidis, Cryptococcus neoformans/gattii]; spirochetal [Borrelia burgdorferi; Leptospira; Treponema pallidum, including neurosyphilis]; protozoal/helminths [Acanthamoeba, Neogregaria fowleri, Strongyloides stercoralis, Angiostrongylus cantonensis, Baylisascaris procyonis]; encephalitis [herpesvirus [HSV-I], varicella-zoster virus, Epstein-Barr virus, cytomegalovirus, mumps virus, enterovirus, West Nile virus, St. Louis encephalitis virus, rabies virus, Eastern and Western equine encephalitis virus, poliovirus, Taenia, Toxaplasma gondii]; prion disease (e.g., Creutzfeldt-Jakob disease); botulism [Clostridium botulinum]; tetanus disease; arteriovenous malformations, ectatic cerebral vessels; transient ischemic attack; stroke, thrombotic: cerebral arterial occlusion/cerebral infarction; stroke, embolic: cerebral embolism; stroke: intracerebral hemorrhage, including subarachnoid hemorrhage, traumatic intracranial hemorrhage; cerebral arterial aneurysm; carotid artery stenosis/atherosclerosis/occlusion/dissection; vertebral artery deficiency/dissection; subclavian steal syndrome; vascular dementia; hypertensive encephalopathy; posterior reversible encephalopathy syndrome; venous sinus thrombosis

Disorders relating to the spine, spinal cord, and spinal nerve roots: cauda equina syndrome; spinal artery thrombosis/embolus/infarct; spinal cord compression; spinal cord transection, paraplegia and quadriplegia, acute and chronic effects (e.g., autonomic dysreflexia); spinal stenosis (cervical, lumbar); syringomyelia

Cranial and peripheral nerve disorders

Cranial nerve injury/disorders: cranial nerve injury; Bell palsy; anisocoria, miosis, mydriasis; internuclear ophthalmoplegia; nystagmus and other irregular eye movements; vestibular neuritis, labyrinthitis; ptosis of the eyelid; Horner syndrome

Peripheral nerve/plexus injury/disorders: peripheral nerve injury, including brachial plexus; carpal/cubital/tarsal/peroneal tunnel syndrome; mononeuritis, Guillain-Barré syndrome; Miller Fisher syndrome; neuropathy (e.g., Charcot-Marie-Tooth disease); herpes zoster
## Textbook Topics / Key Words

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<td>Subarachnoid Hemorrhage and Ruptured Saccular Aneurysm 1258</td>
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<td>Infections 1260</td>
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<td>Extracranial Abscesses 1263</td>
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<td>Tuberculosis 1263</td>
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<td>Neurophilis 1264</td>
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<td>Neuroborreliosis (Lyme Disease) 1264</td>
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Design

- Number: Basic Pathology = 2; Organ System Pathology = 12 → 14 Total
- Setting: Laboratory Space, 7th Floor of Brody Building
- Components:
  - **Small Group Case-Based Discussion**: Case-based PowerPoint content with questions are reviewed; group responses to questions are recorded on Immediate Feedback Assessment Technique (IFAT) scratch cards (Epstein Educational Enterprises).
  - **Macroscopic / Gross Organ Review - Normal and Abnormal**: Demonstration and discussion of key, “high-yield” pathologic entities.

- **Attendance**: Attendance = Required
A 55-year-old man presented with increasing dyspnea on exertion. Past medical history was significant for hypertension, hyperlipidemia, 3-vessel disease coronary artery disease with a chronic, total occlusion of LAD deemed not amenable to intervention.

**Physical Examination:** Lower extremity edema bilaterally to above the knees; Liver enlarged and tender to palpation; Ascites

**Chest X-Ray:** Cardiomegaly, severe; Pulmonary edema, interstitial, moderate

**Echocardiogram:** Left ventricle and atrium dilation, severe; Left ventricle thrombus; right ventricle wall thick and lumen dilated.

The patient’s findings are consistent with congestive heart failure (CHF). What serum analyte is valuable as one piece of data in (1) making the diagnosis of CHF and (2) assessing severity and response to treatment?

- A. AST and ALT
- B. Troponin I or T
- C. B-type natriuretic factor **✓**
- D. Creatinine kinase – MB isof orm

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**Heart Failure Laboratory Data**

- **B-Type Natriuretic Peptide** (BNP) produced and secreted by ventricular myocytes
  - Stimulation: volume expansion / pressure overload

- Good marker for “cardiac failure”: can follow over time
  - $<100 \text{ pg/mL}$: No heart failure
  - $100-300 \text{ pg/mL}$: Possible heart failure
  - $>300 \text{ pg/mL}$: Mild heart failure
  - $>600 \text{ pg/mL}$: Moderate heart failure
  - $>900 \text{ pg/mL}$: Severe heart failure

- Not specific for heart failure: Interpret in clinical context including echocardiogram, etc.
**Turning Point Question**

**Question 3**

Physical examination revealed of a patient identified **jugular venous distension, lower extremity edema, and ascites**. In addition, serum aspartate aminotransferase / transaminase (AST) and alanine aminotransferase / transaminase (ALT) levels were moderately elevated. **Which one of the following best explains this combination of physical examination and laboratory abnormalities?**

| A. Myocardial infarct       | **Clinical Finding** |
| B. Right and left heart failure |
| C. Left heart failure       | **Organ System Differential** |
| D. Right heart failure      | Heart |

- Right Heart Failure
  - ↑ Hydrostatic Pressure in Inferior Vena Cava

- Liver
  - Cirrhosis ➔ ↓ Protein Synthesis
  - ↓ Protein Synthesis ➔ ↑ Osmotic Pressure

- Kidney
  - Nephrotic Syndrome (or Severe Nephritic Syndrome)
  - ↑ Protein Loss ➔ ↓ Osmotic Pressure
**Answer 8**

Which heart valve is **MOST COMMONLY involved in rheumatic heart disease?**

- **A. Mitral valve**
- **B. Tricuspid valve**
- **C. Pulmonary valve**
- **D. Aortic valve**
- **E. All valves equally involved**

The mitral valve is by far the most commonly involved valve for reasons that are unknown. Per Robbins:

- **Mitraal Valve (alone):** 65-75%
- **Aortic Valve**
  - (usually with Mitral Valve involvement too) 25%
- **Tricuspid**
- **Pulmonary**
  - Uncommon

Least commonly involved...

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**2018 Article: Rwanda had only five cardiologists and no heart surgeons or hospitals equipped to perform heart surgery — for a population of 12 million.**

**Once a year, 40 to 60 volunteers fly to Kigali, Rwanda:** heart surgeons, cardiologists, nurses, anesthesiologists, experts in cardiac ultrasound, biomedical technicians, pharmacists, support staff and perfusionists who run the heart-lung machine that keeps patients alive during surgery.

They come from the University of Vermont, Harvard-affiliated hospitals and other medical centers. They pay their own airfare, and Rwanda’s Ministry of Health covers some hotel rooms and meals. Most use their vacation time, and this year Team Heart asked each volunteer also to raise $500 in donations to help cover costs.
Hypertensive Heart Disease: Cardiomegaly

Risk of Arrythmia and Sudden Death

Some Failure: Left Ventricle Dilation
M1 & M2 Pathology Laboratory

Macroscopic Specimens

Gentle, Non-Scar-Forming Pimping of Students

Hypertension
Complications by Organ System

<table>
<thead>
<tr>
<th>Brain</th>
<th>Eyes</th>
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<tbody>
<tr>
<td>- Arteriosclerosis:</td>
<td>- Arteriosclerosis:</td>
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<tr>
<td>- Ischemic injury</td>
<td>- Copper or Silver Arteries (light reflex)</td>
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<tr>
<td>- Infarct</td>
<td>- Ischemia</td>
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<td>- Aneurysm:</td>
<td>- Vessel Narrowing and Kinking</td>
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<td>Charcot-Bouchard in basal ganglia</td>
<td>- Hemorrhages</td>
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<td>- Hemorrhage risk</td>
<td>- Leakage: Plasma</td>
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<td>- Embolic stroke</td>
<td>- Cotton wool Spots &amp; Exudates</td>
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<table>
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<tr>
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<tr>
<td>- Glomerulosclerosis</td>
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<td>- Glomerular loss</td>
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<td>- Tubule loss</td>
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<td>- Fibrosis</td>
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<td>- Chronic inflammation</td>
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<th>Blood Vessels: Aorta &amp; Major Branches</th>
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<td>- Limb claudication</td>
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<td>- Atherosclerosis</td>
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<td>- Ischemic injury</td>
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<tr>
<td>- Thrombosis on surface</td>
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<td>- Embolization</td>
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<td>- Aneurysm formation:</td>
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<td>- Hypertension contributes</td>
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</table>

(Modified from Lillie LS, Pathophysiology of Heart Disease, 5th Edition, 2011)
Macroscopic Specimens

Lab Reinforces Concepts Discussed in Lecture
Nothing New!

Aortic Dissection

Definition
- Blood enters arterial wall; dissects along media
- Two types:
  - PROXIMAL / Ascending (TYPE A) (~90-95%)
    - More common, most serious
    - Ascending aorta alone
  - DISTAL / Branch (TYPE B) (~5-10%)
    - Origin distal to origin of subclavian artery

Aortic Dissection: Classification
- Aortic Dissection
  - Ascending
  - Descending
  - Rupture

Aortic Dissection: Types
- Type A Dissection: Ascending Aorta
  - False Lumen
  - True Lumen

Cause of Death: Tamponade vs. Exsanguination
- Usual cause of death is due to:
  - Rupture of the dissection outward through the outer 1/3 of the media-adventitia leading to:
    - Hemopericardium (Tamponade)
    - Hemothorax
    - Hemoperitoneum
Acquisition of Macroscopic / Gross Organs

Legacy Specimens
- Many Unobtainable Today:
  - e.g. Intact Mastectomy Specimen;
  - Some Obtained in 1970s and 1980s ... Still in Use

Organ Inventory

Surgical Pathology Specimens

Autopsy Pathology Specimens
Living Patient Consent:
General Photo / Video / Drawing

PHOTOGRAPHS/VIDEO: I give permission to ECU Health and Medical Staff Members (including agents and contractors) to take photographs or make videos or drawing of me for permissible treatment, payment, or health care operations purposes (may include quality assessment, patient identity, education, and training) as long as consistent with policies and laws that protect my rights. If you do not want to participate in photographs/videos/drawings, please initial:

Photograph ___________  Video ___________  Drawings ___________

Authorization/Consent is effective one year from date signed; however, will not expire for service or claims processing for admissions or visits occurring while it was in effect.

Note: If the services provided are recurrent therapeutic series (rehab/chemo), you will only need to sign one consent form to cover all the recurrent services provided within 90 days from the date of your signature.

Patient:  
Signature of Patient  
Date  Time
Print Name of Patient

Representative:  
Signature of person signing on behalf of Patient  Date  Time
Print Name of person signing on behalf of Patient
State why patient cannot sign for him/herself

Guarantor: (person or entity that agrees to be responsible for payment) By signing below as guarantor [does not apply to the patient, spouse (when medical care is necessary), or parents of a minor child], I hereby agree to pay all charges of Facility that are not covered or paid within a reasonable time by any medical insurance/coverage, whether or not I otherwise legally obligated to pay.

Signature of Guarantor  
Print name of Guarantor

Witness:  
Signature of Witness  Date  Time
- I understand that the risks, benefits, and alternatives of the anesthetic (including conscious sedation when appropriate) will be explained to me prior to the anesthetic being administered.

- I consent to the examination and retention for scientific purposes and study by a pathologist, of all tissues and organs removed during the course of the above treatment with privilege of ultimate disposal resting with said Pathologists.

- I consent to the photographing or televising of the operations or procedures to be performed, including appropriate portions of my body for medical scientific or education purposes, provided my identity is not revealed by the pictures or by descriptive texts accompanying them.

- I understand that the expected results of said treatment cannot be guaranteed. The healthcare provider listed above has discussed to my satisfaction the following:

  A. The nature and character of the proposed treatment/procedure.
  B. The anticipated benefits and results of the proposed treatment/procedure.
  C. The recognized alternative forms of proposed treatment/procedure.
  D. The recognized serious possible risks, complications, side effects of the proposed treatment/procedure, including any that might occur during recuperation, and of the recognized alternative forms of proposed treatment/procedure, including non-treatment.
  E. The anticipated date and time of the proposed treatment/procedure.

- I understand that Vidant Health, together with its affiliated hospitals, clinics, and other services, is associated with East Carolina University and other educational institutions, and I agree that students training to be physicians, nurses, and Allied Health personnel may assist in providing my care. I understand that I have the right to decline to participate in teaching activities. I further understand that observers and/or agents of contract vendors may be admitted to the procedure area and may assist in my care.

- The healthcare provider listed above has offered to answer all inquiries concerning the proposed treatment/procedure. I understand that I am free to withhold or withdraw consent to the proposed/treatment at any time.

I, ____________________________ ____________________________ ____________________________, bearing the relationship ____________________________ ____________________________ to ____________________________ ____________________________, as closest next-of-kin of ____________________________ ____________________________, hereby authorize staff physicians and employees of Vidant Medical Center, to conduct a diagnostic postmortem examination of the deceased, to include removal, examination, and disposal of organs in a manner consistent with and within the scope of applicable state law, regulations, procedures, and standards of care [NCGS 130A-398(5A)].

I further authorize the removal and retention of organs for purposes of education, research, or the advancement of medical science in a manner consistent with and within the scope of applicable state law, regulations, procedures and standards of care as long as the donor’s identity remains anonymous [NCGS 130A-402 et seq. (N.C. uniform anatomical gift act)].

List restrictions, if any: (required)

________________________________________

(Write “NONE” if there are no restrictions)

Signed ____________________________ ____________________________________________

(relative)
# Specimen Needed

## Chondrosarcoma

<table>
<thead>
<tr>
<th>Case and Specimen Now Available for Teaching in 2023 Block 4 Course</th>
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<td>Left Rib / Chest Wall Mass</td>
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Felicia Davis, M.D.
Supplementation

Photographs of Specimens For Which Sectioning Makes Specimen Itself Not Usable

Germ Cell Neoplasm: Choriocarcinoma

18-Year-Old Presenting with Headaches / Hemorrhagic Right Frontal Mass

CT Scan: Axial
Right Frontal Hemorrhage

MRI Scan: Axial – T2
Right Frontal Hemorrhagic Mass

CT Scan: Coronal
Right Testis

Right Radical Orchiectomy
Neoplasm

Normal Testis
Left Testis
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<td>- <strong>M4 Students</strong></td>
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<tr>
<td>- Neurology / PM&amp;R Clerkship</td>
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<tr>
<td>- <strong>Special Sessions</strong></td>
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<td>- Second Look</td>
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<tr>
<td>- Brody Ambassadors Health Sciences Academy</td>
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<tr>
<td>- SNMA Pre-Medical Conference</td>
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<tr>
<td>- Brody Rise</td>
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**Multipurpose Teaching Materials:** Positioned for Various Settings
Use of Macroscopic / “Gross” Specimens

M4 Neurology / Physical Medicine & Rehabilitation Clerkship:
Neuropathology PM Sessions X2
### Vascular Disease

**Infarct: Focal / Embolic**

<table>
<thead>
<tr>
<th>MCA Distribution:</th>
<th>PCA Distribution:</th>
<th>MCA:</th>
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<tbody>
<tr>
<td><strong>Acute:</strong> Pale</td>
<td><strong>Acute vs. Chronic / Hemorrhagic</strong></td>
<td><strong>Chronic</strong></td>
</tr>
</tbody>
</table>

[Images of brain slices showing different types of infarcts and distributions.]
# Degenerative Disease

<table>
<thead>
<tr>
<th>Dementia:</th>
<th>Alzheimer Disease</th>
<th>Dementia:</th>
<th>Lewy Body Dementia</th>
<th>Movement Disorder:</th>
<th>Parkinson Disease</th>
</tr>
</thead>
</table>

![Alzheimer Disease Image]

![Lewy Body Dementia Image]

![Parkinson Disease Image]
Survey

• Survey responses from **72 of 78 students** (92.3%) were obtained.
• Likert scale (1-5): Scores of 4 (agree) and 5 (strongly agree) were combined:

  • **Laboratory Sessions in General**
    • Useful way to reinforce pathology concepts **83%**
  
  • **Components of Laboratory Session** considered Useful in Reinforcing Pathology Concepts and Enhancing Education
    • Small Group Case-Based Component **68%**
    • Macroscopic / Gross Organ Component **89%**
  
  • **Session Construct for Laboratory Sessions**
    • Gross Organ Review Only Laboratory Sessions **82%**
      (No Small Group) Useful When Number of Organs Justifies It (e.g. Single Laboratory for Female & Male Reproductive systems and Pregnancy)
Survey

Positives

General:
- The laboratory sessions are a great way to review high-yield material covered in lecture.
- I think it has been a great tool to reinforce what we are learning and to repeatedly hit on high yield concepts in preparation for quizzes and examinations.
- I think the laboratory sessions are very useful and allow students to have an in-person experience of seeing real organs and how certain pathologies manifest.
- It was great to be able to see in person what we were learning about.
- I think we need to see these organs at some point to make us well-rounded physicians, so we need to do it.
- Hearing Dr. Boyer talk things out, and pimping us on useful information has been incredibly helpful and I appreciate all of the time and effort that you put into each session.
- Love seeing the macroscopic effects of microscopic processes, really helps solidify the pathology for me.

Small Group vs. Gross Organs Only:
- I like the powerpoint portion of the group sessions to talk over answers with colleagues.
- I enjoy the large group sessions because it gives Dr. Boyer more time to review more organs.
Survey

Areas for Improvement

• The two smaller lab groups sometimes feel rushed, either going over the time allotted or having to skip the organs. I felt like I could see the organs just as well during the large group and we had more time to talk about disease processes/organ examples.
• These sessions can run long, and cover too many topics, decreasing the usefulness. Potentially making more sessions with fewer topics to cover in each would be helpful.
• It is oftentimes difficult to see exactly what we are looking at when it comes to looking at the gross organ specimens. I think it would be more beneficial to have the gross organ specimen laboratory session structured the same way as they are when we have Psychiatry Standardized Patient sessions: have one group for 50 minutes at 10:00 A.M. and another group for 50 minutes at 11:00 A.M. to have a smaller concentrated group for more useful and thorough time to be spent reviewing concepts and really paying attention to what we are looking at.
• I think the two small sessions are nice but the time allotted doesn't seem to be quite enough to get through everything. so maybe a little more time allotted so we know ahead of time how long to expect to be there while you the professor are also not feeling too rushed.
• The sessions should not be mandatory for those who do not learn well with this method.
Survey

Specific Disease Processes by Organ System: **Cardiovascular**

Other Organ Systems Similar

- Atherosclerosis of Aorta
- Aortic Aneurysm
- Aortic Dissection - Hypertension
- Aortic Dissection - Marfan
- Hypertensive Cardiomyopathy
- Dilated Cardiomyopathy - ETOH
- Calcific Aortic Stenosis
- Myocardial Infarct
- Congenital Heart: AVSD
- Congenital Heart: Bicuspid AV
- Bicuspid AV: Calcific A. Sten.
- Rheumatic Heart Disease
- Infective Endocarditis
Literature Review

• There is very limited peer-reviewed literature regarding medical student pathology laboratory.
• Case-based presentations are well-received by students.
• Clinical laboratory data (hematocrit, blood urea nitrogen and creatinine concentration, calcium concentration, etc.) can and should be incorporated into pathology laboratory sessions.
• There is no description in the literature of:
  • Gross specimen acquisition opportunities
  • Specific specimens and disease processes that should be incorporated into and illustrated in pathology laboratory sessions
Conclusions

• Students consider pathology laboratory sessions to be a **valuable component** of the pathology course and the M1-M2 curriculum:
  • **Reinforcing concepts** discussed in lecture.
  • **Allowing examination of disease processes in human specimens.**
• Both **small group** and **macroscopic review of organs** are considered to enhance student understanding of pathology content.
• **Macroscopic review and discussion of organs** demonstrating pathology is considered the **most valuable** element of the sessions.
• **Small group case-based discussions** are also considered to be **excellent learning opportunities** by most students.
  • They provide the **opportunity to evaluate cases** and **discuss pathologic processes with peers.**
• **Time limitations** and **group size impose limitations** on macroscopic review of organs.
  • Sessions when **class is split between pathology and psychiatry sessions** **overcome limitations**.
• This study will be a **valuable contribution to the literature** by describing:
  • Acquisition, storage, and display of gross specimens
  • Specific disease processes that can be illustrated by gross specimens


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• Other Pathology Specimen Horders
Questions?