

Pathophysiology In Pre-Clerkship Curriculum



QUILLEN
COLLEGE *of* MEDICINE

EAST TENNESSEE STATE UNIVERSITY

Pathophysiology

- The study of the biologic and physical manifestations of disease as they correlate with the underlying abnormalities and physiologic disturbances. Pathophysiology does not deal directly with the treatment of disease. Rather, it explains the processes within the body that result in the signs and symptoms of a disease.



USMLE Steps 1 & 2

- Do not report separate pathophysiology score













2018 NBME Pathology Subject Exam

	Lower Performance	Average Performance	Higher Performance
Organ Systems			
Cardiopulmonary Systems			
Endocrine System			
Gastrointestinal and Nutrition Systems			
Hematopoietic and Neoplasia Systems			
Immunology			
Reproductive and Renal/Urinary Systems			
Skin, Musculoskeletal, and Nervous Systems			
Disciplines			
General Principles of Pathology			
Processes of Infectious Disease			
Systemic Pathology and Pathophysiology			



2017 NBME Pathology Subject Exam

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Pathophysiology in Pre-Clerkship Curriculum

- Minor
 - Doctoring I – case-based learning
 - Anatomy
 - Cellular & Molecular Medicine
 - Genetics
 - Cell & Tissue Biology
 - Physiology
 - Introduction to Clinical Psychiatry
 - Microbiology
 - Neuroscience



Pathophysiology in Pre-Clerkship Curriculum

- Major
 - Doctoring II – Practice of Medicine
 - Pathology
 - Pharmacology



Practice of Medicine

- First course objective
 - Integrate, review, and apply basic science pathophysiology to clinical cases



Practice of Med/Doctoring II

- Pathophysiology of pelvic inflammatory disease/tubo-ovarian abscess
- Pathophysiology of Diabetic peripheral neuropathy
- Pathophysiology of pancreatitis
- Pathophysiology of diarrhea
- Pathophysiology of pneumonia
- Pathophysiology of chest pain/acute coronary syndrome



Practice of Med/Doctoring II

- Pathophysiology of ecchymoses & purpura
- Pathophysiology of mysathenia gravis (dropped in 2019)
- Renal failure pathophysiology (dropped in 2019)
- DKA pathophysiology
- Anemia pathophysiology
- Discussed in sim lab cases: pathophysiology of COPD and asthma exacerbation, arrhythmias, anaphylaxis, & pneumothorax.



Medical Pathology Syllabus

- When given 1) a clinical case including signs, symptoms, or pertinent laboratory tests, or when given a specific disorder or disease process, 2) a written description of a gross or microscopic abnormality, 3) an abnormality directly identified, with or without associated clinical findings, or 4) a gross or microscopic picture of an abnormality, with or without associated clinical findings:
 - identify the underlying disease process or pathophysiology causing the abnormality



Medical Pathology D2L Site

The screenshot shows a D2L (Desire2Learn) course page for "Dr. Brown". The browser address bar shows the URL: /d2l/le/content/7442437/Home. The page title is "Dr. Brown".

Left Sidebar (Navigation):

- Search Topics
- Bookmarks
- Course Schedule
- Table of Contents **131**
- Syllabus and Schedule
- Beepy's Flashcards **24**
- Exam 1 **18**
- Exam 2 **37**
- Heart **15**
- Dr. Youngberg **9**

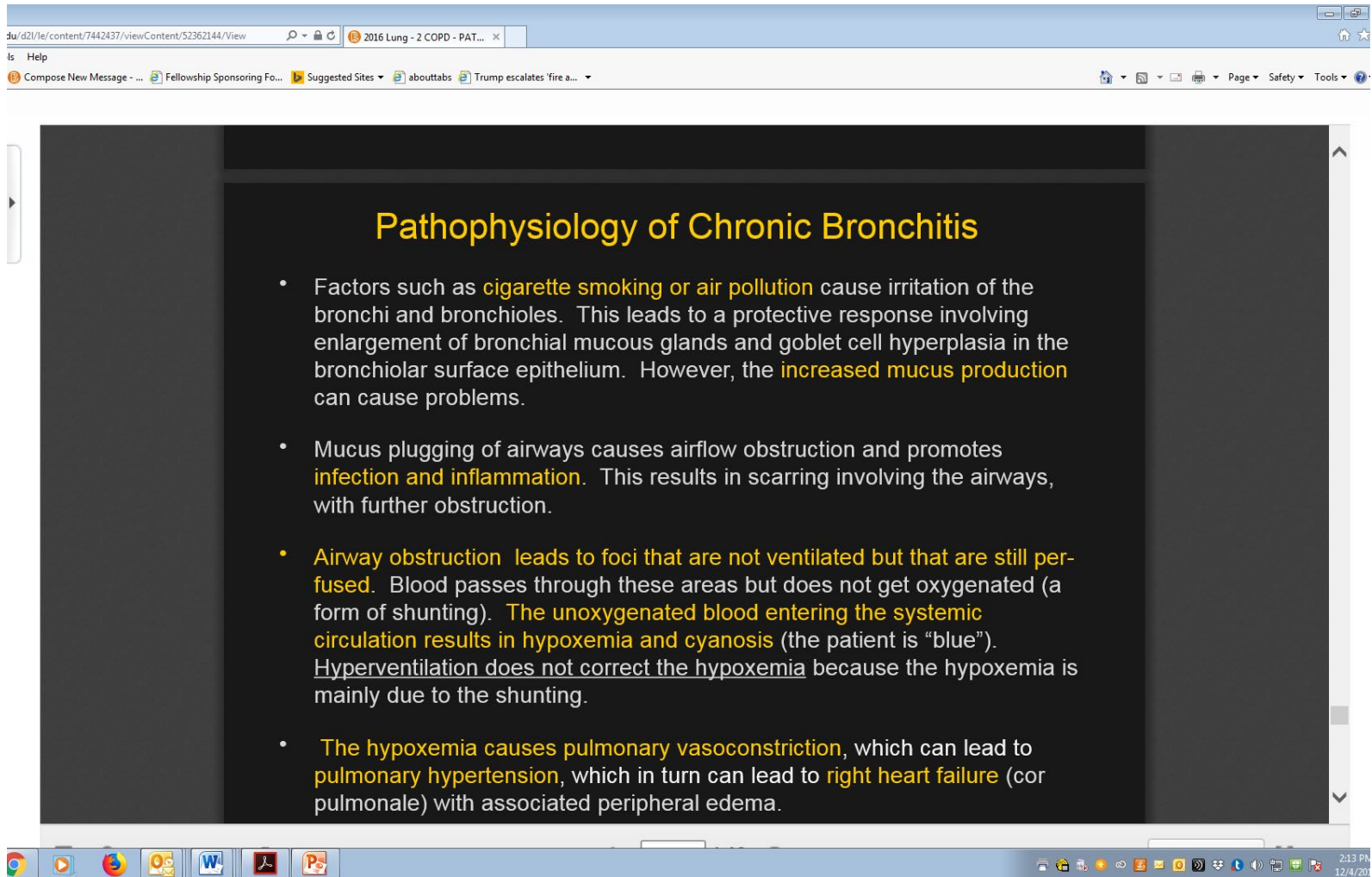
Main Content Area:

- Download button
- Progress: 0% 0 of 6 topics complete
- heart review pictures 2017 for D2L (PowerPoint Presentation)
- heart questions 2017 for D2L (PowerPoint Presentation)
- heart pathophysiology of congestive heart failure (PDF document)
- heart pathophysiology of congenital (PDF document)
- heart pathophysiology of electrical (PDF document)
- heart pathophysiology of valves (PDF document)

The Windows taskbar at the bottom shows various application icons including Chrome, Word, and PowerPoint.



Medical Pathology D2L Site



The screenshot shows a web browser window with a slide titled "Pathophysiology of Chronic Bronchitis". The slide content is as follows:

Pathophysiology of Chronic Bronchitis

- Factors such as **cigarette smoking or air pollution** cause irritation of the bronchi and bronchioles. This leads to a protective response involving enlargement of bronchial mucous glands and goblet cell hyperplasia in the bronchiolar surface epithelium. However, the **increased mucus production** can cause problems.
- Mucus plugging of airways causes airflow obstruction and promotes **infection and inflammation**. This results in scarring involving the airways, with further obstruction.
- **Airway obstruction** leads to foci that are not ventilated but that are still perfused. Blood passes through these areas but does not get oxygenated (a form of shunting). **The unoxygenated blood entering the systemic circulation results in hypoxemia and cyanosis** (the patient is "blue"). Hyperventilation does not correct the hypoxemia because the hypoxemia is mainly due to the shunting.
- **The hypoxemia causes pulmonary vasoconstriction**, which can lead to **pulmonary hypertension**, which in turn can lead to **right heart failure** (cor pulmonale) with associated peripheral edema.



Medical Pathology D2L Site

http://content/7442437/viewContent/52362149/View

2016 Lung - 7 Vascular

Pulmonary Arterial Hypertension (PAH) Etiology / Pathophysiology

- Sometimes PAH arises in the absence of any obvious causative factors. Most of these cases are sporadic, but about 6% are familial.
- Many of the familial cases have a mutation that involves the transforming growth factor-beta (TGF- β) signaling pathway. The bone morphogenetic protein receptor type 2 (BMPR-2) gene product is involved with the TGF- β / Smad signaling pathway.
- Germline mutations of have been demonstrated in 50-70% of familial cases.
- The BMPR-2 protein is inhibitory with respect to cell proliferation. Therefore, loss of function of this protein results in pulmonary smooth muscle proliferation, which promotes pulmonary hypertension.
- Some patients with sporadic "idiopathic" pulmonary arterial hypertension also will turn out to have BMPR-2 gene mutations.
- Another pathway leading to pulmonary hypertension involves mutations in the serotonin transporter gene. Some drugs that are serotonergic also can lead to serious disease from pulmonary hypertension.



Medical Pathology

- Congestive Heart Failure Pathophysiology
- Congenital Heart Disease Pathophysiology
- Heart Conduction Pathophysiology
- Valvular Heart Disease Pathophysiology
- Inflammation – mechanisms and clinical signs; clinical photos in context of mechanism, e.g. angioedema, wound healing, DePuytren's contracture
- Mechanisms of fluid dynamics, photos of lymphedema, anasarca, ascites, peripheral edema
- Hemorrhage: photos of petechiae, purpura, ecchymoses, hematoma



Medical Pathology

- Thrombosis: photos of HITT, DVT
- Ischemic heart disease- mechanisms and clinical presentation, complications
- Chronic bronchitis pathophysiology
- Asthma Pathophysiology
- Pulmonary artery hypertension pathophysiology
- V/Q mismatching and A-a gradients pathophysiology
- Renal syndromes in context of renal disease
- Membranous glomerulopathy pathophysiology



Medical Pathology

- Membranoproliferative Glomerulonephritis Pathophysiology
- Dense Deposit Disease Pathophysiology
- Poststreptococcal Glomerulonephritis Pathophysiology
- IgA Nephropathy Pathophysiology
- Alport Syndrome Pathophysiology
- Hypertensive Urgency
- Reflux esophagitis symptoms and pathogenic mechanisms
- H. pylori in ulcers and gastritis pathophysiology
- Intestinal obstruction pathophysiology



Medical Pathology

- Ischemic bowel disease pathophysiology
- Diarrhea and malabsorption syndromes as manifestations of GI disease
- Colon cancer presentations
- Carcinoid mechanisms and presentations
- Complications of liver failure
- Clinical feature of cirrhosis
- Jaundice and ascites pathophysiology
- Alcoholic liver disease pathophysiology
- Cholethiasis and cholecystitis pathophysiology



Medical Pathology

- Pancreatitis pathophysiology
- Craniopharyngioma clinical case
- CNS germinoma clinical case
- CNS lymphoma clinical case
- Central diabetes insipidus pathophysiology
- Concussion pathophysiology
- Clinical case tuberculous meningitis
- Multiple sclerosis pathophysiology



Medical Pathology

- Dementia pathophysiology
- Guillian Barre syndrome pathophysiology
- Diabetic peripheral neuropathy pathophysiology
- Neurofibromatosis pathophysiology
- BPH pathophysiology
- Anemia pathophysiology
- Diabetes pathophysiology



Medical Pharmacology

- Integrate previously acquired knowledge of anatomy, biochemistry, physiology and pathology with newly acquired information concerning the actions of drugs at the cellular, organ, system, and whole body levels.



Medical Pharmacology

- Example – discussion of how ACE inhibitor reduces afterload to benefit CHF



2018 AAMC Graduation Questionnaire

AAMC

2018 Medical School Graduation Questionnaire

9. **How well did your study of the following sciences basic to medicine prepare you for clinical clerkships and electives?**

Note: Respondents had the option to select "Not applicable"; these data are not included in the report calculations and counts. (Continued)

		Percentage of Respondents Selecting Each Rating				
		Poor	Fair	Good	Excellent	Count
Pathophysiology of disease						
All Medical Schools	2018	1.0	5.5	35.4	58.0	15,828
East Tennessee-Quillen	2018	1.7	0.0	46.7	51.7	60
East Tennessee-Quillen	2017	1.6	8.1	58.1	32.3	62
East Tennessee-Quillen	2016	0.0	3.8	47.2	49.1	53
East Tennessee-Quillen	2015	4.9	3.3	36.1	55.7	61
East Tennessee-Quillen	2014	0.0	3.4	44.1	52.5	59



Clerkship Phase

- Pathophysiology instruction continues in the clerkship phase but has not been detailed in this report.
- Examples:
 - 10 Aquifer cases in Peds & Fam Med, e.g
 - Describe the epidemiology, pathophysiology, and clinical findings of important causes of periorbital swelling.
 - Formulate the differential for fussiness in a young infant and the pathophysiology of colic in infants.



Conclusion

- There appears to be adequate coverage of pathophysiology in the pre-clerkship curriculum phase.

