## SEMINAR IN INFECTIOUS DISEASES - 2018

**Course Schedule**  
**UTHealth GSBS Course No. GS07 1731**  
*Wednesdays from 12-1 in MSB 1.180 (MMG Library) unless otherwise indicated*

**Co-Course Directors:**  
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*C = case; A = article*

<table>
<thead>
<tr>
<th>Date</th>
<th>Room</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Sept. 5</td>
<td>MSB 1.180</td>
<td>Introduction</td>
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<tr>
<td>Sept. 12</td>
<td>BCM</td>
<td>City-Wide Infectious Disease Grand Rounds 1 (meet at MSB 1.180) <em>Be sure to bring your UTHealth ID</em></td>
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<td>Sept. 19</td>
<td>MSB 1.180</td>
<td>Discussion of Cases/Articles 1</td>
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<td>Sept. 26</td>
<td>BCM</td>
<td>City-Wide Infectious Disease Grand Rounds 2 (BCM M112)</td>
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<td>Oct. 3</td>
<td>MSB 1.180</td>
<td>Tour of Memorial-Hermann Clinical Microbiology Lab (meet at MSB 1.180)</td>
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<td>Oct. 10</td>
<td>MSB 1.180</td>
<td>Discussion of Cases/Articles 2</td>
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<td>Oct. 17</td>
<td>BCM</td>
<td>City-Wide Infectious Disease Grand Rounds 3</td>
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<td>MSB 1.180</td>
<td><strong>12-1 1-1:45</strong> Discussion with Anthony Flores, M.D. (Pediatric Infectious Diseases, Group A streptococcus virulence/host-pathogen interaction)</td>
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<td></td>
<td>(Lunch provided)</td>
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<td>Oct. 24</td>
<td>MSB 1.180</td>
<td>Discussion of Cases/Articles 3</td>
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<td>Oct. 31</td>
<td>BCM</td>
<td>City-Wide Infectious Disease Grand Rounds 4 (BCM M112)</td>
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<td>Nov. 7</td>
<td>BCM</td>
<td>City-Wide Infectious Disease Grand Rounds 5 (BCM M112)</td>
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<td>MSB 1.180</td>
<td><strong>12-1 1-1:45</strong> Discussion with Luis Ostrosky-Zeichner, M.D. (Adult infectious diseases, clinical mycology, Hospital epidemiology and infection control)</td>
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<td>(Lunch provided)</td>
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<td>Nov. 14</td>
<td>BCM</td>
<td>Discussion of Cases/Articles 4</td>
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<tr>
<td>Nov. 21</td>
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<td><strong>No class (Thanksgiving)</strong></td>
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<tr>
<td>Nov. 28</td>
<td>MSB 1.180</td>
<td>Final Discussion – Bring an ID Research idea</td>
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The Seminar in Infectious Diseases is intended to be a bridging course in which students gain a perspective of the clinical side of infectious diseases and the potential application of this insight to basic research. The course includes the following:

- Attendance of the City-Wide Infectious Disease Grand Rounds and Journal Club.
- Student presentations on either an infectious disease case (with use of references) or a review of a scientific article. Each student should give a minimum of four presentations. (Preferably we will cover bacterial, viral, parasitic, and fungal infectious agents)
- Participation in discussions with ID physicians regarding important current and future topics in ID practice and research.
- Tour of the Memorial Hermann Clinical Microbiology Laboratory.
- **Tour of the Environmental Microbiology Laboratory at NASA Johnson Space Center (To be arranged)**

These formats will be interspersed throughout the semester.

The student presentations should be 20 to 30 minutes in length, and could use a Powerpoint presentation, blackboard, or handouts. Please provide a handout addressing the major points of the case or article. Students should also email a .pdf file of the article to the group in advance, if it is available.

General outlines of the two formats for student presentations are provided below. Please contact me if you have any questions, suggestions or comments.

Dr. Norris  713-500-5338  Steven.J.Norris@uth.tmc.edu
Dr. Miller  713-500-6757  Willam.R.Miller@uth.tmc.edu
FORMAT # 1: Grand Rounds Review. Attend one of the City-Wide Infectious Disease Conferences held every Wednesday at Noon in the auditorium behind the elevators on the ground floor of the DeBakey Building, Baylor College of Medicine. (This building is the white building next to the new Baylor Graduate School Building and across the street from the Jones Library). Usually three cases are presented as unknowns, a differential diagnosis is made, and the outcome and ramifications of the case are discussed. The presenters often provide handouts for the case, but you may wish to record the conference to help you glean out the information. Note that the infectious disease aspects are generally covered in detail, whereas the microbiology may be discussed briefly, if at all. Part of our job is to investigate the microbiologic aspects of the disease and incorporate them into your interpretation and description of the case.

Choose ONE of the cases presented.

a) Briefly describe the case, concentrating on the clinical manifestations (patient’s symptoms + findings from examination and tests) that are most relevant. Use medical terms where you can, but define them in a few words. Include the diagnosis, treatment, and outcome (if presented). Include a copy of the handout for the case, if one was provided.

b) Using the articles cited in the case description, microbiology texts, and other sources, describe the organism(s) that caused the infection in this case. What is the normal course of disease, and how did they differ in this case? What treatments are generally effective, and were they effective in this patient?

c) Discuss the mechanisms of pathogenesis of this organism. Is this pathogen invasive, toxigenic, or both? Where does this organism fall in the spectrum of host dependence? For example, is it a obligate pathogen of humans, an epizootic pathogen, or an opportunistic infection with a commensal organism? Describe any known virulence factors for this organism (or related organisms, if not much information is available) and how they may fit into the disease manifestations in this case.

d) On the other side of the host/pathogen interaction, what patient factor(s) contributed to the disease process? For example, did the patient have cancer, AIDS, hereditary immunodeficiency or some other condition affecting the immune system? How did the immune response (or lack thereof) affect the outcome of this case? Did the immune response actually contribute to the pathogenesis of this disease (i.e. is immunopathology involved)? Describe immunization or other immunologic procedures (such as passive transfer of antibodies) used in the prevention or treatment of this disease.

d) Cite any references you used in your analysis.
FORMAT #2: Scientific Article Review. Select a scientific paper with infectious disease implications from a medical or scientific journal. The article should be a primary research article, but can be either a medical case presentation or a basic science study. Provide a copy of the article you selected with your assignment. Answer the following questions. (Note: these instructions were devised initially for medical students, so they may be more detailed than you need.)

a) What are the central questions or hypotheses addressed by the article? What is the background information on this topic, and how did it lead the authors to investigate it? (Use the title, abstract, and introduction.)

b) What scientific or medical approaches were taken to answer the question or hypothesis? First, describe the overall rationale of the approach, and then briefly describe the scientific methods used. (introduction and materials and methods sections).

c) What results were obtained? What answers did they provide to the questions or hypotheses posed in the beginning of the article? (Results section).

d) What are the implications of their findings, particularly as they relate to our understanding of infectious disease? Be sure to include a thorough discussion of the infectious disease implications, even if the authors do not describe them in detail in the paper. (Discussion section).

e) Did you find the article convincing? Why or why not? What did you find that was particularly important, novel, interesting, or insightful about the article? In what ways do you think the scientific approach or interpretation could have been improved?

f) Cite any additional references you used in your analysis.

You may need to refer to articles in the Literature Cited section of the paper to obtain specific background information or methods.
Evolution of Pathogenesis

Prokaryotes predated eukaryotes by billions of years. Therefore, all bacteria were initially free-living. Multicellular eukaryotes provided a new ecologic niche. Development of host-associated prokaryotes represented genetic adaptation to:

- Protect themselves from other life forms.
- Parasitize other organisms (commensals, symbionts)
- Become harmful to other organisms (pathogens)

This adaptation involved modification, acquisition, and loss of a variety of genes and functions.

**Evolution of Pathogenesis**

Earth formed → Earliest prokaryotes → ‘free-living era’

5 bya → 3.5 bya → 1 bya → 0.3 – 0.1 bya

commensals ←→ symbionts

opportunistic pathogens ←→ frank pathogens

Schopf, PNAS 97:6947, 2000; Noonan et al. Science 314:1113, 2006; wikipedia
Invasiveness vs. Toxigenesis

- T. pallidum
- B. burgdorferi
- M. tuberculosis
- S. typhi
- L. interrogans
- S. aureus
- E. faecalis
- T. denticola
- ‘Symbiont’ E. coli
- S. epidermidis
- Cl. perfringens
- S. pyogenes (“flesh-eating”)
- Enteroinvasive E. coli
- C. diphtheriae
- Cl. botulinum
Invasiveness vs. Toxigenesis

Toxigenesis

Invasiveness

T. pallidum
B. burgdorferi
E. faecalis
S. aureus
S. typhi
Enteroinvasive E. coli
C. diphtheriae
S. epidermidis
S. pyogenes
("flesh-eating")
Cl. perfringens
Cl. botulinum
L. interrogans
M. tuberculosis
'Symbiont' E. coli
T. denticola

Spectrum of Dependence

Free-Living Pathogens
 Clostridium botulinum
 Vibrio fischeri

Facultative Pathogens
 Legionella pneumophila
 Escherichia coli

Opportunistic Pathogens
 Mycobacterium avium
 Candida albicans

Epizootic Pathogens
 Borrelia burgdorferi
 Listeria monocytogenes

Obligate Human Pathogens
 Mycobacterium tuberculosis
 Treponema pallidum

Obligate Intracellular Pathogens
 Chlamydia trachomatis
 Rickettsia prowazekii

Free-Living Organisms

Obligate Parasites
Science – revealing the truth about nature

Revealing the truth in research

- Identifying the problem
- Look for gaps in existing knowledge: observations, background reading, seminars, THOUGHT

- Gathering information
- Literature searches, critical analysis, correlation and integration of information

- Formulating hypotheses
- Ask important questions, develop testable hypotheses

- Collecting data
- Experimentation

- Drawing evidence-based conclusions
- Formulate, validate, and publicize conclusions

Revealing the truth in medicine

- Identifying the problem
- Chief concern; presenting symptoms

- Gathering information
- History, physical exam, review of systems

- Formulating hypotheses
- Differential diagnoses

- Collecting data
- Biopsies, clinical tests, imaging

- Drawing evidence-based conclusions
- Diagnosis of underlying problem(s), treatment