



# Infectious Diseases Fellowship Curriculum

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## Introduction:

As with other aspects of internal medicine training, the ID fellowship curriculum acknowledges that all fellows must attain the core competencies of patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. At a minimum, the curriculum is designed:

1. to meet or exceed the standards set forth by the American Council for Graduate Medical Education ([ACGME](#))
2. to ensure that fellows meet the requirements of the American Board of Internal Medicine ([ABIM](#)) subspecialty board in Infectious Diseases .

ID fellows and faculty should review the curriculum prior to the beginning of each rotation to clarify learning objectives, and revisit the objectives outlined herein at the end of the rotation to assess whether the goals were met.

The core curricula may differ in years 2 and 3 depending on the long-term career plans of the fellow. In general the curricula follow the guidelines established by the Infectious Diseases Society of America ([IDSA](#)) These tracts offer the fellow maximal flexibility in career planning while continuing to meet the above standards.

Recommended readings for each of the rotations as well as supplemental materials are indexed below. This list is not all-inclusive, and is designed to serve simply as a starting point for new fellows. The list is updated on a regular basis as new information becomes available. Adobe pdf files are available for all of the indexed articles (as well as other articles) in the literature database maintained in the ID Division offices. Fellows are encouraged to supplement the literature files as they find new articles that should be shared with the other fellows.

## Clinical Rotations

### Infectious Diseases Inpatient Consult Rotation

#### Overview

The Inpatient Infectious Diseases Service offers fellows a diverse experience that involves patients from multiple disciplines whose infections demand the expertise of the ID service. Virtually all aspects of infectious diseases are encountered on the ID consult service which serves patients at our three teaching hospitals: the VA medical center, the Regional Medical Center, and Methodist University Hospital.

## Goals

1. provide fellows with the breadth of clinical experience required to establish expertise in the management of complex, serious, and life-threatening infections, including complications of HIV infection.
2. introduce fellows to the approach to evaluating and researching data relevant to the management of infectious diseases.
3. provide clinical and/or didactic experiences that cover clinically relevant aspects of infectious diseases

## objectives

1. develop expertise in patient care and the medical knowledge base required to manage the following aspects of Infectious diseases:
  - febrile patients presenting with rash or FUO <sup>1-3</sup>
  - upper respiratory tract infections <sup>4-5</sup>
  - pleuropulmonary and bronchial infections <sup>6-10</sup> *All fellows are required to review the CDC Core Curriculum on Tuberculosis and to document completion by taking the CDC exam <http://www.cdc.gov/nchstp/tb/default.htm>.*
  - urinary tract infections <sup>11</sup>
  - peritonitis and other intra-abdominal infections
  - cardiovascular infections <sup>12-14</sup>
  - central nervous system infections <sup>15-20</sup>
  - skin and soft tissue infections
  - infections related to trauma, burns, and human and animal bites
  - gastrointestinal infections and food poisoning syndromes <sup>21</sup>
  - bone and joint infections <sup>22</sup>
  - infections of reproductive organs
  - sexually transmitted diseases
  - infections of the eye <sup>23, 24</sup>
  - viral hepatitis <sup>25-29</sup>
  - sepsis syndromes <sup>30-33</sup>
  - nosocomial infections
  - Infectious and non-infectious complications of HIV infection and acquired immunodeficiency syndrome <sup>16, 34-36</sup>
  - Infections in the immunocompromised or neutropenic hosts <sup>37</sup>
  - Infections in acute leukemia and lymphoma
  - Transplant-related infections, including bone marrow <sup>38, 39</sup> and solid organ <sup>40-46</sup>
  - Infections in geriatric patients <sup>47, 48</sup>
  - Infections in travelers <sup>49-54</sup>
  - Infections related to intravenous drug abuse <sup>55-58</sup>
2. provide instruction in the following:
  - mechanism of action and adverse reactions to antimicrobial agents <sup>59</sup>
  - clinical pharmacology of antimicrobial agents <sup>60, 61</sup>
  - assessing antimicrobial activity of drugs in appropriate clinical setting.
  - recognition of emerging infections/epidemics; principles and practice of hospital infection control.
  - principles of chemoprophylaxis and immunoprophylaxis
  - principles and practice of hospital control
  - mechanisms of action of monoclonal antibodies, cytokines, interferons, interleukins, and colony-stimulating factors/applications; side effects
  - introduce basic concepts of immunology, host defense mechanisms, <sup>62</sup>
  - utility of procedures for specimen collection relevant to ID.

### Teaching rounds

It is expected that the fellow will round on service patients in conjunction with the residents on a daily basis. The attending will round with the entire consult team daily and conduct teaching rounds that consist of both didactic and bedside interaction.

### Evaluations

Feedback is essential for the maturation of the fellow into an independent ID clinician. Attendings are expected to complete the evaluation form for the fellows and to discuss their evaluations at the end of each rotation. Each fellow will be evaluated on the core competencies of patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

Likewise, fellows are expected to evaluate attendings using the forms provided to them. Fellow evaluations of attendings should be submitted anonymously through [New Innovations](#). This allows fellows to submit evaluations anonymously without fear of retribution. Data will be abstracted and forwarded to the program director for Infectious Diseases, who will then forward it to the individual attending physicians.

#### **Semiannual evaluations**

Each fellow is required to meet with the program director every 6 months during their fellowship to review evaluations to date, discuss potential problems, and to ensure adequate feedback regarding both the fellow and the program. This also provides the fellow to discuss potential research plans, identify mentors, and affirm career plans.

## Adult Special Care HIV Continuity Clinic

### Overview

The Adult Special Care Clinic (ASCC) is a multidisciplinary subspecialty clinic directed solely toward the care of HIV-infected patients. This clinic, which relies on the expertise of physicians, PhD clinical pharmacologists, nurses, social workers and nutritionists provides an ideal environment for both patient care and the education and training of fellows in the long-term management of patients with HIV infections. The HIV clinical also provides an avenue to learn about the management of STDs (Sexually Transmitted Diseases) in addition to HIV.

### Goals

1. Provide an outpatient HIV care continuity clinic experience for infectious disease trainees
2. serve as a vehicle for learning all aspects of longitudinal management of HIV-infected patients.
3. To develop proficiency in the recognition and management of STDs.

### Objectives

1. recognize conditions for initiation and alteration in Highly active antiretroviral therapy (HAART)
2. learn the pharmacology and pharmacokinetics of antiretroviral therapeutic agents.
3. develop expertise in long-term management of HIV infection
4. optimization of drug therapy to minimize side effects, drug interactions, and to maximize therapeutic benefits based on interpretation of laboratory parameters and viral genotyping data.
5. initiate chemo and immunoprophylaxis to prevent emergence of infectious complications in advanced HIV infections <sup>35</sup>, and recognize when prophylaxis can safely be discontinued <sup>63</sup>.

### Clinic Supervision

The ASCC is directed by Dr. Melissa Appleton, who specializes in the care and management of HIV patients. She directs multiple clinical investigation efforts in the clinic, and oversees its operations. Fellows are routinely supervised by either Dr. Appleton, or Dr. John Norwood, who also focuses on the management of patients with HIV infection. The fellow to faculty ratio in the clinic is 1:1.

### ASCC evaluations

Fellows are evaluated on a semi-annual basis by their clinic preceptor(s), using the Adult Special Care Clinic Fellow Evaluation Forms which are available via [New innovations](#)

"360°" Fellow evaluations are also conducted on annual basis. These will be solicited by the ASCC Clinic Director, Dr. Melissa Appleton. Forms for 360° evaluations are also programmed into New Innovations.

## STD clinic rotation

### Overview

This required 2 week rotation, is supervised by [Dr. Helen Morrow](#). Fellows evaluate patients in the [Packer STD/HIV Clinic](#) at the Memphis Shelby County Health Department under the supervision and guidance of highly-experienced nurse case managers. The rotation is designed to provide practical experience in the identification and management of sexually transmitted diseases. Fellows are trained to perform techniques commonly employed in STD evaluation including wet preps, darkfield microscopy, gram staining, etc.

This clinic routinely offers confidential testing, treatment and counseling of STD cases and contacts, follow-up of PID cases. They also perform confidential testing, counseling, referral for treatment of HIV/AIDS cases, as well as partner notification.

### Goals and objectives

gain expertise in the diagnosis and management of sexually-transmitted diseases.  
review and implement latest treatment guidelines  
(<http://www.cdc.gov/std/treatment/>)

### Evaluation

Fellows are expected to complete the [intensive online course in STD training](#) based on the most recent guidelines by the CDC. Fellows should document their completion of training by completing the on-line examination and printing the CME completion form.

### STD clinic contact:

Cynthia Lawrence, RN  
[Shelby County Health Department](#)  
814 Jefferson Avenue  
Room 221  
Memphis, TN 38105  
901-544-7782  
[clawrence@co.shelby.tn.us](mailto:clawrence@co.shelby.tn.us)

## Clinical Microbiology Rotation

### Overview

The clinical microbiology rotation is a 4 week rotation conducted by Dr. Vickie Baselski. This rotation serves as an introduction to routine as well as advanced molecular methods and immunologic methods currently employed in the diagnosis of bacterial, fungal, mycobacterial, viral, and parasitic infections. This rotation is conducted at the [Memphis Pathology Laboratories](#).

### Goals and objectives:

1. become familiar with basic operation of the clinical microbiology laboratory
2. develop a working understanding of culture methods, organism identification, antibiotic sensitivity testing, and molecular methods for diagnosis.

3. fellows should become proficient at Gram staining and its interpretation, and be able to recognize acid fast organisms, fungal elements and parasites (ova) on the appropriate stains and smears.

**evaluations:** The proficiency of each fellow rotating through the clinical microbiology laboratory will be assessed by Dr. Baselski at the end of the rotation.

### **Infection Control and Hospital Epidemiology:**

#### **SHEA/CDC Course in Hospital Epidemiology**

All fellows are required to attend the [Hospital Epidemiology Training Course](#) jointly sponsored by CDC and the [Society for Healthcare Epidemiology of America](#). Ideally, the fellows should plan on attending the spring course at toward the end of their first year in training. Alternatively, fellows may elect to attend the fall course at the beginning of the second year.

##### **goals & objectives**

Each fellow should gain the expertise necessary to apply epidemiologic principles to problems frequently encountered in the hospital setting. At the end of this training, fellows should be familiar with the following fundamental aspects of hospital epidemiology:

- epidemiology and surveillance
- epidemic/cluster investigation
- transmission and control of nosocomial infections
- disinfection and sterilization
- employee health
- isolation systems
- regulatory compliance
- quality improvement

### **Infection Control Committee**

During the second year of fellowship, fellows are required to participate in the Infection Control Committee at the Methodist University Hospital. These meetings, and the fellows' experience is orchestrated by Dr. Bryan Simmons, a CDC-trained hospital epidemiologist.

##### **goals & objectives**

- develop expertise in management of common infection control issues
- employ lessons learned in the SHEA/CDC course to practical problems

### **Optional Clinical Elective in Mycobacterial Diseases ([National Jewish Medical and Research Center](#))**

#### **Overview**

The purpose of this rotation is to permit fellows to gain intensive instruction in the management of mycobacterial diseases including Multi-drug resistant tuberculosis (MDR-TB). This is an intensive one-month course at National Jewish Medical and Research Center in Denver, a national referral center for difficult and complex mycobacterial infections. During this clinical rotation, fellows see patients on the inpatient wards where they are supervised by and Infectious Diseases attending from the University of Colorado Health Sciences Center, and

where they have the opportunity to interact with [Dr. Michael Iseman](#), a world expert in the management of mycobacterial disease.

## Goals

Intensive experience in the diagnosis, management and treatment of mycobacterial diseases.

## Objectives

1. gain experience in the management and diagnosis of complex mycobacterial diseases
2. learn to optimize antimycobacterial drug therapy and minimize drug toxicity
3. learn to use pharmacologic studies to optimize therapy
4. acquire and master fundamental knowledge regarding mycobacterial diseases including TB, MDR-TB, and atypical mycobacterial diseases .

## Denver TB Course

### Overview

In recognition of the fact that TB remains a formidable global health threat, particularly in developing countries, fellows are provided with the opportunity to expand their knowledge by attending an intensive didactic course dedicated to the management of TB.

#### **goals & objectives**

During the course fellows are expected to gain expertise in:

- TB chemoprophylaxis
- bacteriology of *Mycobacterium tuberculosis*

*collection and transportation*

*staining and culture*

*mode of action of anti-TB drugs*

*drug levels*

- chemotherapy for TB
- transmission and pathogenesis of TB
- classification of TB
- management of toxicity/hypersensitivity to anti-tuberculous drugs
- public health measures including:

DOT

case finding/contact investigation

tuberculin testing

## Research Rotations

### overview

It is anticipated that most fellows will not come to the fellowship with significant research experience. Therefore the time substantial time allotted to research rotations (particularly during the optional third year of fellowship) affords the fellow to make the time investment required to become an independently functioning investigator.

## Objectives

1. Choose a project and mentor for a project (by the end of the first academic year). Mentors may come from outside of the division, but must be committed to serving in that capacity. Projects (and mentors) must meet with the approval of the program director and the Division Director prior to initiation.
2. complete an academically sound project that leads to one or more publications in peer-reviewed journals.
3. supplement research experience with didactic courses available in the basic sciences, and/or biostatistics. Fellows anticipating a career in basic science are strongly advised to take available introductory molecular biology courses available in the Department of [Molecular Sciences](#).
4. fellows taking advantage of a third year are required to attend courses on grant and manuscript preparation
5. presentation of research project data at a regional, national or international meeting(s).

## Progress evaluations and planning

Near the end of the second academic year, each fellow should meet jointly with their mentor, the program director and the division director to assess progress, make remediation plans, and to discuss career plans. These meetings are especially useful for fellows anticipating careers in academic medicine and before embarking on a third year of fellowship. Progress reports by the mentor should be submitted to the program director on a semiannual or annual basis ([see ABIM site for evaluation form for subspecialty research trainees](#) ).

## Conferences

### 1. Journal Club

#### Overview

Journal Club is designed to be an in-depth review of recent original articles from either the clinical or basic science literature. These reviews are not designed to be an all-inclusive review of the recent literature, but are designed to introduce fellows to a critical appraisal of manuscripts. These conferences take place on a monthly basis, and are given by both faculty and fellows.

#### Goals

Introduce fellows to a critical appraisal of the Infectious diseases literature.

#### objectives

1. discuss the impact of articles on the field of infectious diseases
2. identify the merits and limitations (e.g. statistical, methodological) of each given article.

### 2. Case management conference

#### overview

The weekly case management conference is designed to examine cases from the inpatient ID consultation service, and occasionally cases from the outpatient arena.

**goals**

1. the primary goal is to provide an in-depth examination and critical analysis of issues pertaining to the diagnosis and management of patients on the service.
2. Use the given case to stimulate discussion of differential diagnosis

**objectives**

The fellow should be prepared to:

1. present the case and lead the discussion of differential diagnosis
2. summarize a focused review of the pertinent literature.

**3. Core curriculum lectures****a. Discussions of major clinical topics**

These discussions take one of two forms: talks which are stimulated by recent cases seen on the wards, and those which are mandated by the faculty and program director to review major topics or to keep abreast of the latest developments in the field. Reviews of major topics are rotated on a three year cycle so that fellows will be exposed to most of the topics pertinent to the subspecialty over the course of their fellowship.

**b. Basic Science Lectures**

These lectures alternate weekly with discussions of major clinical topics, and are designed to address basic mechanisms of disease pathogenesis that include host-pathogen interactions, microbial pathogenesis, and basic concepts of immunology. These lectures are liberally supplemented with a host of other conferences available on campus and at St. Jude that are of interest to the fellows and faculty.

**Goals**

The primary goal is to provide each fellow with a broad overview of fundamental topics pertinent to the practice of infectious diseases. A secondary goal is to address rapidly changing disciplines or areas that are not easily covered in other venues.

**Objectives**

1. in-depth reviews of topics of fundamental importance to understanding disease pathogenesis
2. critically review the current state-of-the art with respect to given topic.
3. convey central importance of fundamental pathogenesis and their relationship to clinical infectious diseases. ("why things are")

**4. Reading club****Overview**

The monthly "reading club" conference uses the textbook Principles and Practice of Infectious Diseases as a guide to exploration of the fundamental literature of infectious diseases. While the text is used as the primary source material, it is liberally supplemented with articles from the ID literature, particularly if there is new data that pertinent to the subject matter under discussion.

**goals**

The primary goal of this conference is to give fellows the fundamental knowledge base to required to make informed decisions about patient management.

**Objectives**

1. review material pertaining to fundamental clinical syndromes

2. test knowledge of essential material by exam administered by the program director at the end of each session.

## 5. Joint UT/St. Jude Journal Club

### Overview:

These monthly conferences are sponsored jointly by the Adult & Pediatric Infectious Disease Divisions at UT, and The Infectious Diseases Division at St. Jude Childrens Research Hospital. Currently, conferences are held at the [Spaghetti Warehouse](#). Topics at this conference tend to be heavily oriented toward discussions of basic molecular or immunologic developments pertinent to Infectious Diseases.

### Goals:

fellows will learn about basic scientific developments relevant to the clinical practice of infectious diseases.

### Objectives:

1. learn critical manuscript reading
2. gain new insights into fundamental aspects of microbial pathogenesis.

## 6. Molecular Sciences "Chalk Talks"

These lectures, oriented toward microbial pathogenesis, are given by faculty members, fellows, graduate students or guest speakers that are actively engaged in laboratory research. These lectures are designed to discuss the latest developments in that individual's laboratory and to facilitate an exchange of ideas between the investigators.

### Goals:

The main goal of exposing fellows to these discussions is to give them an opportunity to see "how science works" by permitting them access to recent data from ongoing investigations as well as the thought processes that have stimulated recent and future experiments.

### Objectives:

1. develop an understanding of the inner workings of an investigation
2. participate in an exchange of ideas with other scientists in a casual environment
3. provide opportunities to present their own primary data in an informal setting

## reading list

1. Larson, E.B., Featherstone, H.J. & Petersdorf, R.G. Fever of undetermined origin: diagnosis and follow-up of 105 cases, 1970-1980. *Medicine (Baltimore)* **61**, 269-292 (1982).
2. Drenth, J.P. & van der Meer, J.W. Hereditary periodic fever. *N Engl J Med* **345**, 1748-1757 (2001).
3. Petersdorf, R.G. Fever of unknown origin. *Ann Intern Med* **70**, 864-866 (1969).
4. Gwaltney, J. in Principles and Practice of Infectious diseases, Vol. 1. (eds. G. Mandell, J. Bennett & R. Dolin) 676-686 (Churchill Livingstone, New York; 2000).
5. Musher, D. Medical Progress: How Contagious are Common Respiratory Tract Infections. *N Engl J Med* **348**, 1256-1266 (2003).

6. Bartlett, J.G. et al. Practice guidelines for the management of community-acquired pneumonia in adults. Infectious Diseases Society of America. *Clin Infect Dis* **31**, 347-382 (2000).
7. Marik, P.E. Aspiration pneumonitis and aspiration pneumonia. *N Engl J Med* **344**, 665-671 (2001).
8. Horsburgh, C.R., Jr., Feldman, S. & Ridzon, R. Practice guidelines for the treatment of tuberculosis. *Clin Infect Dis* **31**, 633-639 (2000).
9. Small, P.M. & Fujiwara, P.I. Management of tuberculosis in the United States. *N Engl J Med* **345**, 189-200 (2001).
10. Blumberg, H.M. et al. American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America: treatment of tuberculosis. *Am J Respir Crit Care Med* **167**, 603-662 (2003).
11. Warren, J.W. et al. Guidelines for antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. Infectious Diseases Society of America (IDSA). *Clin Infect Dis* **29**, 745-758 (1999).
12. Li, J.S. et al. Proposed modifications to the Duke criteria for the diagnosis of infective endocarditis. *Clin Infect Dis* **30**, 633-638 (2000).
13. Mylonakis, E. & Calderwood, S.B. Infective endocarditis in adults. *N Engl J Med* **345**, 1318-1330 (2001).
14. Le, T. & Bayer, A.S. Combination antibiotic therapy for infective endocarditis. *Clin Infect Dis* **36**, 615-621 (2003).
15. White, A.C., Jr. Neurocysticercosis: updates on epidemiology, pathogenesis, diagnosis, and management. *Annu Rev Med* **51**, 187-206 (2000).
16. Saag, M.S. et al. Practice guidelines for the management of cryptococcal disease. Infectious Diseases Society of America. *Clin Infect Dis* **30**, 710-718 (2000).
17. Quagliarello, V.J. & Scheld, W.M. Treatment of bacterial meningitis. *N Engl J Med* **336**, 708-716 (1997).
18. Quagliarello, V. & Scheld, W.M. Bacterial meningitis: pathogenesis, pathophysiology, and progress. *N Engl J Med* **327**, 864-872 (1992).
19. Rosenstein, N.E., Perkins, B.A., Stephens, D.S., Popovic, T. & Hughes, J.M. Meningococcal disease. *N Engl J Med* **344**, 1378-1388 (2001).
20. van de Beek, D., de Gans, J., Tunkel, A.R. & Wijdicks, E.F. Community-acquired bacterial meningitis in adults. *N Engl J Med* **354**, 44-53 (2006).
21. Guerrant, R.L. et al. Practice guidelines for the management of infectious diarrhea. *Clin Infect Dis* **32**, 331-351 (2001).
22. Waldvogel, F.A. & Papageorgiou, P.S. Osteomyelitis: the past decade. *N Engl J Med* **303**, 360-370 (1980).
23. Sabrosa, N.A. & Zajdenweber, M. Nematode infections of the eye: toxocariasis, onchocerciasis, diffuse unilateral subacute neuroretinitis, and cysticercosis. *Ophthalmol Clin North Am* **15**, 351-356 (2002).
24. Rubin, R.H., King, M.E. & Mark, E.J. Case record of the Massachusetts General Hospital. Weekly clinicopathological exercises. Case 7-2003. A 43-year-old man with fever, rapid loss of vision in the left eye, and cardiac findings. *N Engl J Med* **348**, 834-843 (2003).
25. Lee, W.M. Hepatitis B virus infection. *N Engl J Med* **337**, 1733-1745 (1997).
26. Lauer, G.M. & Walker, B.D. Hepatitis C virus infection. *N Engl J Med* **345**, 41-52 (2001).
27. Hoofnagle, J.H. & di Bisceglie, A.M. The treatment of chronic viral hepatitis. *N Engl J Med* **336**, 347-356 (1997).
28. Lemon, S.M. & Thomas, D.L. Vaccines to prevent viral hepatitis. *N Engl J Med* **336**, 196-204 (1997).

29. Lemon, S.M. Type A viral hepatitis. New developments in an old disease. *N Engl J Med* **313**, 1059-1067 (1985).
30. Matthay, M.A. Severe sepsis--a new treatment with both anticoagulant and antiinflammatory properties. *N Engl J Med* **344**, 759-762 (2001).
31. Parrillo, J.E. Pathogenetic mechanisms of septic shock. *N Engl J Med* **328**, 1471-1477 (1993).
32. Wheeler, A.P. & Bernard, G.R. Treating patients with severe sepsis. *N Engl J Med* **340**, 207-214 (1999).
33. Rangel-Frausto, M.S. et al. The natural history of the systemic inflammatory response syndrome (SIRS). A prospective study. *Jama* **273**, 117-123 (1995).
34. Lurie, P. et al. Undiagnosed HIV infection in acute care hospitals. *N Engl J Med* **327**, 1815-1816 (1992).
35. Kovacs, J.A. & Masur, H. Prophylaxis against opportunistic infections in patients with human immunodeficiency virus infection. *N Engl J Med* **342**, 1416-1429 (2000).
36. Kahn, J.O. & Walker, B.D. Acute human immunodeficiency virus type 1 infection. *N Engl J Med* **339**, 33-39 (1998).
37. Hughes, W.T. et al. 2002 guidelines for the use of antimicrobial agents in neutropenic patients with cancer. *Clin Infect Dis* **34**, 730-751 (2002).
38. Dykewicz, C.A. Summary of the Guidelines for Preventing Opportunistic Infections among Hematopoietic Stem Cell Transplant Recipients. *Clin Infect Dis* **33**, 139-144 (2001).
39. Kusne, S. & Krystofiak, S. Infection control issues after bone marrow transplantation. *Curr Opin Infect Dis* **14**, 427-431 (2001).
40. Dockrell, D.H., Strickler, J.G. & Paya, C.V. Epstein-Barr virus-induced T cell lymphoma in solid organ transplant recipients. *Clin Infect Dis* **26**, 180-182 (1998).
41. Husain, S. & Singh, N. The impact of novel immunosuppressive agents on infections in organ transplant recipients and the interactions of these agents with antimicrobials. *Clin Infect Dis* **35**, 53-61 (2002).
42. Singh, N. The changing face of invasive aspergillosis in liver transplant recipients. *Liver Transpl* **8**, 1071-1072 (2002).
43. Singh, N. Preemptive therapy versus universal prophylaxis with ganciclovir for cytomegalovirus in solid organ transplant recipients. *Clin Infect Dis* **32**, 742-751 (2001).
44. Paterson, D.L. & Singh, N. Invasive aspergillosis in transplant recipients. *Medicine (Baltimore)* **78**, 123-138 (1999).
45. Singh, N. Infections in solid-organ transplant recipients. *Am J Infect Control* **25**, 409-417 (1997).
46. Kontoyiannis, D.P. & Rubin, R.H. Infection in the organ transplant recipient. An overview. *Infect Dis Clin North Am* **9**, 811-822 (1995).
47. Norman, D.C. Fever in the elderly. *Clin Infect Dis* **31**, 148-151 (2000).
48. Calvet, H.M. Sexually transmitted diseases other than human immunodeficiency virus infection in older adults. *Clin Infect Dis* **36**, 609-614 (2003).
49. Ryan, E.T., Wilson, M.E. & Kain, K.C. Illness after international travel. *N Engl J Med* **347**, 505-516 (2002).
50. Parry, C.M., Hien, T.T., Dougan, G., White, N.J. & Farrar, J.J. Typhoid fever. *N Engl J Med* **347**, 1770-1782 (2002).
51. Wilder-Smith, A. & Schwartz, E. Dengue in travelers. *N Engl J Med* **353**, 924-932 (2005).
52. Ryan, E.T. & Kain, K.C. Health advice and immunizations for travelers. *N Engl J Med* **342**, 1716-1725 (2000).
53. Freedman, D.O. et al. Spectrum of disease and relation to place of exposure among ill returned travelers. *N Engl J Med* **354**, 119-130 (2006).

54. Haque, R., Huston, C.D., Hughes, M., Houpt, E. & Petri, W.A., Jr. Amebiasis. *N Engl J Med* **348**, 1565-1573 (2003).
55. Miro, J.M., del Rio, A. & Mestres, C.A. Infective endocarditis in intravenous drug abusers and HIV-1 infected patients. *Infect Dis Clin North Am* **16**, 273-295, vii-viii (2002).
56. Cherubin, C.E. & Sapira, J.D. The medical complications of drug addiction and the medical assessment of the intravenous drug user: 25 years later. *Ann Intern Med* **119**, 1017-1028 (1993).
57. Hopkins, R.J., Rothman, M., Fiore, A. & Goldblum, S.E. Cerebral mucormycosis associated with intravenous drug use: three case reports and review. *Clin Infect Dis* **19**, 1133-1137 (1994).
58. Sapico, F.L. & Montgomerie, J.Z. Vertebral osteomyelitis in intravenous drug abusers: report of three cases and review of the literature. *Rev Infect Dis* **2**, 196-206 (1980).
59. Johnson, L.B. & Kauffman, C.A. Voriconazole: a new triazole antifungal agent. *Clin Infect Dis* **36**, 630-637 (2003).
60. Flexner, C. HIV-protease inhibitors. *N Engl J Med* **338**, 1281-1292 (1998).
61. Groll, A.H. et al. Comparative efficacy and distribution of lipid formulations of amphotericin B in experimental *Candida albicans* infection of the central nervous system. *J Infect Dis* **182**, 274-282 (2000).
62. Lekstrom-Himes, J.A. & Gallin, J.I. Immunodeficiency diseases caused by defects in phagocytes. *N Engl J Med* **343**, 1703-1714 (2000).
63. Mussini, C. et al. Discontinuation of secondary prophylaxis for *Pneumocystis carinii* pneumonia in human immunodeficiency virus-infected patients: a randomized trial by the CIOP Study Group. *Clin Infect Dis* **36**, 645-651 (2003).