Transplant Infectious Diseases Fellowship

Our Mission Statement

"*To have a global impact through our program by providing state of the art patient care, preparing future Transplant Infectious Diseases physicians and advancing translational research in the field of Transplant Infectious Diseases.*"

Infections produce significant morbidity and mortality in transplant recipients. These patients are unique in the complexity of their immune deficits, in their predisposition to opportunistic infection, necessary diagnostic interventions and in the need to understand the management of antimicrobial therapies and possible ensuing drug interactions for optimal clinical care. The goal of the program can be achieved by integrating patient care with the training of superb clinicians and research.

The program strives to achieve excellence by concentrating on three main areas which include Clinical Care, Education and Research.

Clinical Care

- Clinical care will be provided on the cardinal principles of availability, affability and ability. An inpatient consult service is available throughout the year with designated staff. There is an emphasis on multidisciplinary collaboration with each individual transplant program in order to provide optimal patient-centered care in both the inpatient and outpatient settings.
- Outpatient clinics are provided 4 days a week. In the future, clinic expansion may occur with clinics specifically for pre-transplant screening, vaccination, travel issues and management of CMV infections in transplant recipients.
- Clinical Practice Guidelines/Protocols have been created for the management of complex infectious diseases syndromes in the transplant patient population.

Education

- Education is a corner stone of the program. Educational support is provided for each individual in the transplant program tailored to individual objectives but also to ensure that clinical training meets a high standard of care and that physicians are well rounded with both clinical and research experience.
- The program ensures that fellows will acquire the skills and expertise to develop guidelines for the prevention and management of infections for transplant recipients to minimize infection-related morbidity and mortality.
- The program has developed and maintained an updated web-based teaching resource for all individuals related to topics presented at the rounds and conferences of the program.
- The program also offers elective experience in Transplant Infectious Diseases for residents in Infectious Diseases, Medical Microbiology and Critical Care

programs of the University of Toronto as well as other interested individuals from around the world.

- Our goal is to develop a world class Transplant Infectious Disease Fellowship Program that provides advanced training in the clinical care and clinical investigation of Infectious Diseases related to immunocompromised hosts (enclosed).

Research

The program will have a special emphasis on clinical research that enhances translational research in the field of Transplant Infectious Diseases. We plan to do so by developing a close collaboration with the investigators at the University of Toronto in particular, as well as other interested universities.

Clinical research will focus on three main avenues:

1. Exploring the relationship between infections (viral, atypical organisms) and rejection in transplant recipients.
2. Epidemiological studies of infections in solid organ transplant recipients and those with hematological malignancies.
3. Randomized clinical trials assessing newer therapies or various prophylactic therapies in transplant recipients.

Transitional research will primarily focus on:

1. Determining the immunological mechanisms and novel makers for the development of viral or fungal diseases affecting transplant recipients.
2. The development and refinement of new methods for diagnosing viral and fungal infections.

Our Staff

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Associate Professor of Medicine,
Division of Infectious Diseases
Co-Director, Transplant Infectious Diseases
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Dr. Coleman Rotstein

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Research Coordinator,
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Tiffany La

Administrative Assistant,
Fellowship Coordinator,
Transplant Infectious Diseases

What We Do - Education

Education at all levels is mandatory to sustain professional knowledge and skills. Teaching is therefore a noble obligation of all academic staff. The table below summarizes the levels of educational programs offered in our program from 2008-2010.

Educational Programs

Training Program & Duration	Description (Expectations & Opportunities)	Funding
Fellows 2 years	Clinical experience • In-patient Infectious Disease (ID) Consult Service (Solid-Organ Transplant (SOT), Leukemia Serviceand Stem Cell/Bone Marrow Transplantation (BMT)) • Outpatient Transplant ID Clinic (Longitudinal, one half day per week) These rotations specifically cover the following learning objectives: a) To understand the pathobiopogy of the immunocompromised state and the concomitant susceptibility to infection that occurs. b) To appreciate the unique interactions between the host, immuossupprssive agents and the acquisition of infection endogenously or from the environment. c) To understand current donor and recipient screening (both serologic and clinical) and to manage donor derived infections. d) To become familiar with the time course and gain experience in managing viral, fungal and bacterial infections in SOT recipients after transplantation. e) To understand and manage drug interactions and toxicities of antimicrobial agents and immunosuppressive drugs. f) To understand the potential complications that may be associated with various techniques utilized in liver transplantation including deceased donor, living-donor and split liver transplantation. We discuss the relationships between surgical complications such as bile leaks and infectious risks in these patients. g) To learn management of common post-surgical complications such as lymphoceles (kidney) and pleural effusion/empyema/anastamotic leak (lung), bleeding (heart). h) To learn characteristics, advantages, and disadvantages of the main diagnostic modalities utilized for cytomegalovirus (CMV) detection	MOT program (2 fellows per academic year) Other sources include international government/funding agency/employer

	(tissue culture, shell vial, serology, antigenemia, NAT). Differentiate prophylactic and pre-emptive therapy for CMV infection and list advantages and disadvantages of each. Learn about the emergence of resistance and late onset CMV disease in patients. Learn management of resistance and non-resistant CMV infection. i) Learn management issues in HIV transplant recipients. j) Learn management of infections in patients bridged to transplant on ventricular-assist devices (VADs). To learn and understand post-transplant implications and management of these infections. k) Become aware of the transition of infection management in immunocompromised hosts from the inpatient to the outpatient setting. <u>Educational</u> Attendance at Multi-Organ Transplant (MOT) grand rounds, TID Journal Club, ID/Microbiology Rounds, ID case conferences, and research rounds. <u>Research</u> Each fellow is expected to complete at least one independent research project during the course of their fellowship with peer reviewed publications or a presentation in a research meeting.	
Residents (mandated elective) 4-6/year	In-patient ID Consult Service (SOT and Stem Cell/BMT): a) To understand current donor and recipient screening (both serologic and clinical) and to manage donor derived infections. b) To gain experience in managing viral, fungal and bacterial infections in immunocompromised hosts and SOT recipients after transplantation. c) To understand and manage drug interactions and toxicities of antimicrobial agents and immunosuppressive drugs. d) To understand the potential complications that may be associated with various techniques utilized in liver transplantation including deceased donor, living-donor and split liver transplantation. We discuss the relationships between surgical complications such as bile leaks and infectious risks in these patients. e) To learn management of common post-surgical complications such as lymphoceles (kidney) and pleural effusion/empyema/anastamotic leak (lung), bleeding (heart). f) Learn management of infections in patients bridged to transplant on ventricular-assist devices (VADs). To learn and understand post-transplant	N/A

	implications and management of these infections. <u>Educational</u> Attendance at MOT grand rounds, TID journal club, case conference, and research rounds.	
Medical Students 3-4/year	Inpatient rounds with TID attending Attend post-transplant clinics, journal club and seminars	N/A
International Observers 1-2 /year	Inpatient rounds with TID attending Attend post-transplant clinics, journal club and seminars	N/A

Undergraduate and Graduate Education

Observerships

We offer Observerships for international faculty. During the Observership, individuals are exposed to the breadth of clinical experience at our center. They observe patients in both inpatient and outpatient settings for a period of six months.

Electives

We are aptly aware of our responsibility to provide clinical experience in Transplant Infectious Diseases to other Canadian, American and/or international centers. Electives in our program are offered in both solid-organ and stem-cell Transplant Infectious Diseases. These applicants generally are fellows that have been referred to our program seeking specialized experience.

Postgraduate Education

Transplant Infectious Diseases Fellowship

Our fellows are integral to the research endeavors of our program. They have to date published 7 peer reviewed publications and presented more than 10 abstracts at international conferences.

Transplant Infectious Diseases Clinical Fellows 2009-2010

Year	Name	Pre-Fellowship Institution	Post-Fellowship Institution
2009-2012	Samira M. Fallatah, MD	Armed Forces Hospitals, Saudi Arabia	Currently at UHN
2009-2011	Seyed M. Hosseini-Moghaddam, MD	Shaheed Beheshti University of Medical Sciences and Health Services, Iran	Currently at UHN
2010-2011	Chian-Yong Low, MD	Singapore General Hospital, Singapore	Singapore General Hospital, Singapore
2010-2011	Eugene Katchman, MD	Tel-Aviv Sourasky Medical Center, Israel	Tel-Aviv Sourasky Medical Center, Israel
2010-2011	Me-Linh Luong, MD	University of Pittsburgh Medical Centre, United States	CHUM-Hôpital Saint-Luc du CHUM, Quebec, Canada
2010-2012	Mariangela Resende, MD	State University of Campinas, Brazil	UNICAMP, University of Campinas, Sao Paulo, Brasil

Transplant Infectious Diseases Mycology Fellowship

We have recently secured industry sponsorship for a Mycology Transplant Infectious Diseases Fellowship. The first candidate is scheduled to begin July 2012.

What We Do – Research

Research is one of the mission goals of the Transplant Infectious Diseases Program. Our group has been very productive over the last three years. We continue to publish regularly in high impact journals and have secured significant research funding. The following list of publications over the past three years summarizes the areas of active and ongoing research of our Program and details our research funding from 2008 to April 2011.

Publications 2008-2011

Original Manuscripts (peer reviewed)

2008

1. Aujla SJ, Chan YR, Zheng M, Fei M, Askew DJ, Pociask DA, Reinhart TA, McAllister F, Edeal J, Gaus K**, *Husain S***, Kreindler JL, Dubin PJ, Pilewski JM, Myerburg MM, Mason CA, Iwakura Y, Kolls JK. IL-22 Mediates Mucosal Host Defense Against Gram-negative Bacterial Pneumonia. Nat Med. 2008 Mar;14(3):275-81.

2. Silveira FP, ***Husain S.*** Fungal Infections in Lung Transplant Recipients. Curr Opin Pulm Med. 2008 May;14(3):211-8.

3. Sanghavi SK, Abu-Elmagd K, Keightley MC, St George K, Lewandowski K, Boes SS, Bullotta A, Dare R, Lassak M, ***Husain S***, Kwak EJ, Paterson DL, Rinaldo CR. Relationship of Cytomegalovirus Load Assessed by Real-time PCR to pp65 Antigenemia in Organ Transplant Recipients. J Clin Virol. 2008 May 19.

4. Silveira FP, Kwak EJ, Paterson DL, Pilewski JM, McCurry KR, ***Husain S.*** Post-transplant Colonization with Non-Aspergillus Molds and Risk of Development of Invasive Fungal Disease in Lung Transplant Recipients. J Heart Lung Transplant. 2008 Aug;27(8):850-5.

5. Singh N, Lortholary O, Dromer F, Alexander BD, Gupta KL, John GT, del Busto R, Klintmalm GB, Somani J, Lyon GM, Pursell K, Stosor V, Munoz P, Limaye AP, Kalil AC, Pruett TL, Garcia-Diaz J, Humar A, Houston S, House AA, Wray D, Orloff S, Dowdy LA, Fisher RA, Heitman J, Wagener MM, ***Husain S***. Cryptococcal Collaborative Transplant Study Group. Central Nervous System Cryptococcosis in Solid Organ Transplant Recipients: Clinical Relevance of Abnormal Neuroimaging Findings. Transplantation. 2008 Sep 15;86(5):647-51.

6. ***Husain S***, Clancy CJ, Nguyen MH, Swartzentruber S, Leather H, Lemonte AM, Durkin MM, Knox KS, Hage CA, Bentsen C, Singh N, Wingard JR, Wheat LJ. Performance Characteristics of the Platelia(R) Aspergillus EIA for Detection of Aspergillus Galactomannan Antigen in Bronchoalveolar Lavage Fluid. Clin Vaccine Immunol. 2008 Oct 8.2008;46:641.

7. ***Rotstein C***, Evans G, Born A, Grossman R, Light RB, Magder S, McTaggart B, Weiss K, Zhanel GG. Clinical Practice Guidelines for Hospital-Acquired (HAP) Pneumonia and Ventilator-Associated Pneumonia (VAP). Can J Infect Dis Med Microbiol 2008;19:19-53.

8. ***Rotstein C.*** Anidulafungin: A new option for candidaemia. EJHP Practice 2008;14:60-62

9. Ki V, ***Rotstein C.*** Bacterial skin and soft tissue infections in adults: A review of their epidemiology, pathogenesis, diagnosis, treatment and site of care. Can J Infect Dis Med Microbiol 2008;19:173-184.

10. ***Rotstein C,*** Cragin L, Laverdiere M, Garber EJ, Bow A, Scalera C, Roberts SV, Sorenson S. Economic Evaluation of Voriconazole for the Treatment of Candidemia in Canadian Adults. Can J Infect Dis Med Microbiol 2008;19:219-226.

11. ***Rotstein C.*** Invasive candidiasis in the ICU: prophylaxis versus preemptive treatment. Current Infectious Disease Reports 2008, 10:454-458.

2009

1. Danziger-Isakov LA, ***Husain S***, Mooney ML, Hannan MM. ISHLT Infectious Diseases Council. The Novel 2009 H1N1 Influenza Virus Pandemic: Unique Considerations for Programs in Cardiothoracic Transplantation. J Heart Lung Transplant. 2009 Dec;28(12):1341-7.

2. Singh N, ***Husain S***. AST Infectious Diseases Community of Practice. Invasive Aspergillosis in Solid Organ Transplant Recipients. Am J Transplant. 2009 Dec;9 Suppl 4:S180-91.

3. Sun HY, Alexandeer BD, Lotholary O, Dromer F, Forrest GN, Lyon GM, Somani J, Gupta KL, del Busto R, Pruett TL, Sifri CD, Limaye AP, John GT, Klintmalm GB, Pursell K, Stosor V, Morris MI, Dowdy LA, Munoz P, Kalil AC, Garcia-Diaz J, Orloff S, House AA, Houston S, Wray D, Huprikar S, Johnson LB, Humar A, Razonable RR, ***Husain S***, Singh N. Lipid Formulations of Amphotericin B Significantly Improve Outcome in Solid Organ Transplant Recipients with Central Nervous System Cryptococcosis. Clin Infect Dis. 2009 Dec 1;49(11);1721-8.

4. ***Husain S***, Pietrangeli CE, Zeevi A. Late Onset CMV Disease in Solid Organ Transplant Recipients. Transpl Immunol. 2009 Jan 19.

5. Manuel O, Kumar D, Moussa G, Chen MH, Pilewski J, McCurry KR, Studer SM, Crespo M, ***Husain S***, Humar A. Lack of Association Between Beta-Herpesvirus Infection and Bronchiolitis Obliterans Syndrome in Lung Transplant Recipients in the Era of Antiviral Prophylaxis. Transplantation. 2009 Mar 15;87(5):719-25.

6. ***Husain S***. Unique Characteristics of Fungal Infections in Lung Transplant Recipients. Clin Chest Med. 2009 Jun;30(2):307-13.

7. ***Husain S***, Raza K, Pilewski JM, Zaldonis D, Crespo M, Toyoda Y, Shutt K, Spichty K, Bentlejewski C, Pakstis DL, Carey ME, McCurry KR, Zeevi A. Experience with Immune Monitoring in Lung Transplant Recipients: Rorrelation of Low Immunefunction with Infection. Transplantation. 2009 Jun 27;87(12):1852-7.

8. Guery B, Arendrup M, Auzinger G, Azoulay E, Borges Sa M, Johnson E, Muller E, Putensen C, ***Rotstein C,*** Sganga G, Venditti M, Zaragosa Crespo R, Kullberg BJ. Management of invasive candidiasis and candidaemia in adult non-neutropenic intensive care unit patients: Part I. Epidemiology and diagnosis. Intensive Care Med 2009;35:55-62..

9. Guery B, Arendrup M, Auzinger G, Azoulay E, Borges Sa M, Johnson E, Muller E, Putensen C, ***Rotstein C,*** Sganga G, Venditti M, Zaragosa Crespo R, Kullberg BJ. Management of invasive candidiasis and candidaemia in adult non-neutropenic intensive care unit patients: Part II. Treatment. Intensive Care Med 2009;35:206-214.

10. De Beer J, Petruccelli D, ***Rotstein C***, Weening B, Royston K, Winemaker M. Antibiotic Prophylaxis for Total Joint Replacement Surgery: Results of a Canadian Orthopedic Surgeon Survey. Can J Surg 2009:52:E229-E234.

2010

1. Luong ML, Morrissey O, ***Husain S***. Assessment of Infection Risks Prior to Lung Transplantation. Curr Opin Infect Dis. 2010 Dec;23(6):578-83.

2. Osawa R, Alexander BD, Forrest GN, Lyon GM, Somani J, del Busto R, Pruett TL, Sifri CD, Limaye AP, Klintmalm GB, Pursell K, Stoser V, Morris MI, Dowdy LA, Kalil AC, Garcia-Diaz J, Orloff SL, Houston SH, Wray D, Huprikar S, Johnson LB, Razonable RR, Fisher RA, Wagener MM, ***Husain S***, Singh N. Geographic Differences in Disease Expression of Cryptococcosis in Solid Organ Transplant Recipients in the United States. Ann Transplant. 2010 Dec22;15(4):77-83.

3. ***Husain S***, Capitano B, Corcoran T, Studer SM, Crespo M, Johnson B, Pilewski JM, Shutt K, Pakstis DI, Zhang S, Carey ME, Paterson DL, McCurry KR, Venkataramanan R. Intrapulmonary Disposition of Amphotericin B After Aerosolized Delivery of Amphotericin B Lipid Complex (Abelcet; ABLC) in Lung Transplant Recipients. Transplantation. 2010 Dec 15;90(11):1215-9.

4. Sun HY, Alexander BD, Lortholary O, Dromer F, Forrest GN, Lyon GM, Somani J, Gupta KL, del Busto R, Pruett TI, Sifri CD, Limaye AP, John GT, Klintmalm GB, Pursell K, Stoser V, Morris MI, Dowdy LA, Munoz P, Kalil AC, Garcia-Diaz J, Orloff SL, House AA, Houston SH, Wray D, Huprikar S, Johnson LB, Humar

A, Razonable RR, Fisher RA, ***Husain S***, Wagener MM, Singh N; Cryptococcal Collaborative Transplant Study Group. Unrecognized Pretransplant and Donor-Derived Cryptococcal Disease in Organ Transplant Recipients. Clin Infect Dis. 2010 Nov 1;51(9):1062-9.

5. Nguyen MH, ***Husain S***, Clancy CJ, Peacock JE, Hung CC, Kontoyiannis DP, Morris AJ, Heath CH, Wagener M, Yu VL. Outcomes of Central Nervous System Cryptococcosis Vary with Host Immune Function: Results From a Multi-Center, Prospective Study. J Infect. 2010 Nov;61(5):419-26.

6. Han K, Capitano B, Bies R, Potoski BA, ***Husain S***, Gilbert S, Paterson DL, McCurry K, Venkataramanan R. Bioavailability and Population Pharmacokinetics of Voriconazole in Lung Transplant Recipients. Antimicrob Agents Chemother. 2010 Aug 2.

7. Avery R, Clauss H, Danziger-Isakov L, Davis J, Doucette K, van Duin D, Fishman J, Gunseren F, Humar A, ***Husain S***, Isada C, Julian K, Kaul D, Kumar D, Martin S, Michaels M, Morris M, Silveira F, Subramanian A. Recommended Curriculum for Subspecialty Training in Transplant Infectious Disease on Behalf of the American Society of Transplantation Infectious Diseases Community of Practice Educational Initiatives Working Group. Transpl Infect Dis. 2010 Jun;12(3):190-4.

8. Kumar D, ***Husain S***, Chen MH, Moussa G, Himsworth D, Manual O, Studer S, Pakstis D, McCurry K, Doucette K, Pilewski J, Janeczko, R, Humar A. A Prospective Molecular Surveillance Study Evaluating the Clinical Impact of Community-Acquired Respiratory Viruses in Lung Transplant Recipients. Transplantation. 2010 Apr 27;89(8):1028-33.

9. Johnson HJ, Han K, Capitano B, Blisard D, ***Husain S***, Linden PK, Marcos A, Kwak EJ, Potoski B, Paterson DL, Romkes M, Venkataramanan R. Voriconazole. Pharmacokinetics in Liver Transplant Recipients. Antimicrob Agents Chemother. 2010 Feb;54(2):852-9.

10. Sun HY, Alexander BD, Lortholary O, Dromer F, Forrest GN, Lyon GM, Somani J, Gupta KL, del Busto R, Pruett TL, Sifri CD, Limaye AP, John GT, Klintmalm GB, Pursell K, Stosor V, Morris MI, Dowdy LA, Munoz P, Kalil AC, Garcia-Diaz J, Orloff SL, House AA, Houston SH, Wray D, Huprikar S, Johnson LB, Humar A, Razonable RR, Fisher RA, ***Husain S***, Wagener MM, Singh N. Cutaneous Cryptococcosis in Solid Organ Transplant Recipients. Med Mycol. 2010 Jan 26.

11. Osawa R, Alexander BD, Lortholary O, Dromer F, Forrest GN, Lyon GM, Somani J, Gupta KL, del Busto R, Pruett TL, Sifri CD Limaye AP, John GT, Klintmalm GB, Pursell K, Stosor V, Morris MI, Dowdy LA, Munoz P, Kalil AC, Garcia-Diaz, Orloff S, House AA, Houston S, Wray D, Huprikar S, Johnson LB,

Humar A, Razonable RR, Fisher RA, ***Husain S***, Wagener MM, Singh N. Identifying Predictors of Central Nervous System Disease in Solid Organ Transplant Recipients with Cryptococcosis. Transplantation. 2010 Jan 15;89(1):69-74.

12. Allen U, Bow E, Doyle J, Richardson S, Robinson J, ***Rotstein C***, Davies D, Hui C, Le Saux N, Laverdiere M and Read S. Pediatric Antifungal Therapy – Part I: Focus on febrile neutropenia, invasive aspergillosis, combination antifungal therapy and invasive candidiasis in immunocompromised pediatric patients. Minerva Pediatrica 2010;62(1):57-69.

13. Allen U, Bow E, Doyle J, Richardson S, Robinson J, ***Rotstein C***, Davies D, Hui C, Le Saux N, Laverdiere M and Read S. Pediatric Antifungal Therapy – Part II: Neonatal infections. Minerva Pediatrica 2010;62(1):72-78 .

14. Mishra S, Ghazarian D, Lutynski A, Minden M, Bartlett ES, ***Rotstein C***. Malignant mimicry. Am J Med 2010;123:697-700.

15. Patel M, ***Rotstein C***. Echinocandins as first choice for invasive *Candida* infections in non-neutropenic patients. Neth J Crit Care 2010;14:252-256.

16. Bow EJ, Evans G, Fuller J, Laverdiere M, ***Rotstein C*** et al. Canadian clinical practice guidelines for invasive candidiasis in adults. Can J Infect Dis Med Microbiol 2010;21:e122-e150.

17. Williamson DR, Martin A, Perreault MM, Delisle MS, Muscedere J, ***Rotstein C***, Jiang X, Heyland DK. Impact of *Candida* species cultured from the respiratory tract on systemic inflammation in the critically ill. Can J Anesth published online December 14, 2010.

18. Patel M, ***Rotstein C***. Managing invasive candidiasis:what's new in diagnosis and treatment? Infectious Diseases Rounds 2010;5(4):1-6.

Book Chapters 2008-2010

1. ***Husain S***, Silveria FP. Invasive Pulmonary Aspergillosis in Solid Organ Transplant Recipients: Aspergillosis from Diagnosis to Prevention. 1st edition; 2010:567-581.
2. Ayesha Haroon and **Husain. S** Fungal Infections in Lung Transplant. Lung Transplantation 1st edition 2010;243:285-296

Books 2010

1. Mooney M, Hannan M, ***Husain S***, Kirklin J. Diagnosis and Management of Infectious Diseases in Cardiothoracic Transplantation and Mechanical Circulatory Support. ISHLT Monograph Series 2011 Mar;1st edition:Vol 5