



**IDBR
INFECTIOUS
DISEASE
BOARD REVIEW**
AUGUST 16-20, 2025



Infections in Solid Organ Transplant Recipients

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8/5/2025

1



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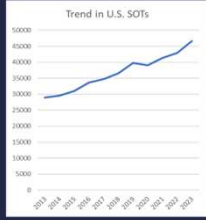
Disclosures of Financial Relationships with Relevant Commercial Interests

- **Consultant:** Scynexis, GSK, Astellas, Pulmocide, HealthTrackRx, Basilea, TFF Pharma
- **Research Grant to My Institution:** Karius
- **Clinical Trials (Site PI/Study PI):** Scynexis, F2G
- **Royalties (Chapter Author):** UpToDate

2

Infections in Solid Organ Transplant (SOT) Recipients

- SOT is a life-saving intervention
 - 1,032,217 SOTs performed in U.S. since 1988
 - 48,149 SOTs performed in 2024
 - ~40% increase over past decade
- SOT recipients
 - Have compromised immunity / increased infection risk
 - Are targets for common, emerging & opportunistic pathogens encountered pre- and post-transplant
 - Often have atypical infection presentation owing to their compromised immunity / decreased inflammatory response
 - Are on complex medical regimens; drug interactions common



Data from Organ Procurement and Transplantation Network database as of May 19, 2025

3

What You Should Know for the Board Exam

- Infection risk varies based on
 - Organ transplanted
 - Time post transplant
 - Degree of immunosuppression
 - Prophylaxis regimen
 - Unique exposures
- Key drug interactions and drug-induced syndromes
 - Calcineurin inhibitors and azoles, macrolides, rifampin (covered in another lecture)
 - Sirolimus associated pneumonitis
 - Calcineurin inhibitors and TTP and PRES

4

What You Should Know for the Board Exam

- The following major clinical syndromes:
 - CMV syndrome & disease
 - EBV & Post Transplant Lymphoproliferative Disorder (PTLD)
 - BK virus nephropathy
 - Aspergillosis, Mucormycosis & Cryptococcosis
 - Tuberculosis
 - Toxoplasmosis
 - Donor-derived infections

5

Play the Odds

The data in the stem let's you "play the odds" as to the most likely diagnosis

- Patient completing valganciclovir prophylaxis 6 weeks prior presenting with fatigue, low grade fever and leukopenia
 - CMV
- Donor died from skiing accident in freshwater lake in Florida and recipient presents 3 weeks post transplant with encephalitis
 - Naegleria
- Renal transplant recipient on valganciclovir prophylaxis presents with asymptomatic renal dysfunction
 - BK Virus
- Lung transplant recipient planted vegetable garden 2 weeks prior while on posaconazole prophylaxis and presents with productive cough and cavitary lung lesion
 - Nocardia

6

Frequency, Type & Infection Source in the 1st Post Transplant Year

Transplant Type	Infection Episodes per Patient	Bacteremia	CMV Disease * (%)	Fungal Infections (%)	Most Common Source
Lung	3.19	8-25	39	8.6	Pulmonary
Liver	1.86	10-23	29	4.7	Abdomen & Biliary tract
Heart	1.36	8-11	25	3.4	Pulmonary
Kidney	0.98	5-10	8	1.3	Urinary tract

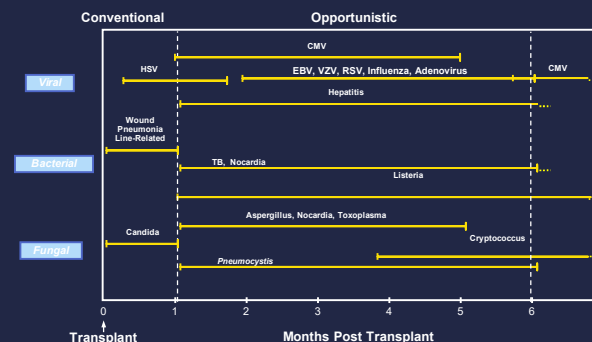
*CMV, Cytomegalovirus; CMV disease rates in the absence of routine antiviral prophylaxis

Table Modified from: Principles and Practices of Infectious Diseases, 8th Edition, Chapter 513 Infections in Solid Organ Transplant Recipients by Nina Singh and Ajit Limaye. Editors: Bernard J. Gold, R. and Steven M. Cherner Saunders, Philadelphia, PA, 2015. Page 9 of 11. CID 2015;50:1101-1111

7

Classic Timing of Infections Following Solid Organ Transplantation

- Timing altered by:
- Enhanced immunosuppression
 - Prophylaxis regimen
 - Unique exposures



8

“Early” Bacterial Infections Following SOT

Type & site of early bacterial infection varies based on organ transplanted, surgical approach/technique & transplant center

- Risk of peritoneal soilage/infection greater in liver transplantation with Roux-en-Y biliary drainage
- Recipient colonization with resistant organisms (e.g. MRSA, VRE, CRE) pre-transplant, confers risk of post-transplant infection
- Cluster with unusual pathogen - environmental problem? (e.g., *Legionella*, *M. abscessus* from hospital water distribution systems)

9

“Late” Bacterial Infections Following SOT

80% of Late Bacterial Infections are Community Acquired

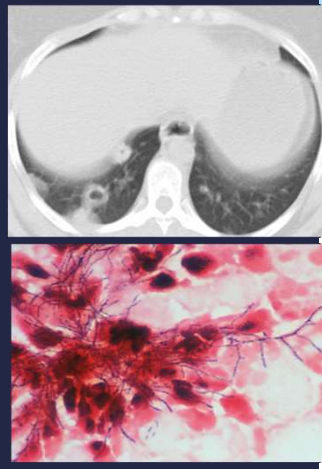
- *Streptococcus pneumoniae*
 - Incidence significantly > in SOT (146/100,000) vs general population (12/100,000)
 - Vaccination recommended
- *Listeria monocytogenes*
 - Bacteremia (Gram + Rods) / Diarrhea / Meningitis
 - Ampicillin treatment of choice
 - High relapse rate, treat for at least 3-6 wks

Kumar D et al., Am J of Transplant 2007;7:1209

10

“Late” Bacterial Infections (Cont.)

- *Nocardia* species
 - 1%-6% of all SOT recipients
 - Presents most often as pulmonary nodules, CNS (15-20%), skin (15%), or bone (2-5%) lesions
 - Diagnosis: Culture and/or histopathology
 - Branching, filamentous Gram + Rods
 - Partially acid-fast by modified Kinyoun stain
 - *Nocardia* is *Neurotropic*; brain imaging critical
 - Treatment:
 - High dose TMP-SMX drug of choice
 - Otherwise, based on susceptibility data & site of infection
 - TMP-SMX dose used for PCP prophylaxis not protective



11

CMV Disease After SOT Indirect and Direct Effects

INDIRECT Effects:

- Acute and Chronic Rejection
- Opportunistic Super-Infections (Gram negative bacteria & Molds)

DIRECT Effects:

- CMV Syndrome – most common presentation
 - CMV in blood + fever + malaise, leukopenia, atypical lymphocytosis, thrombocytopenia
- Tissue Invasive Disease
 - Evidence of CMV on biopsy + compatible signs/symptoms

12

Risk of CMV Disease After SOT

CMV Serologic Status	Risk Category	Incidence of Disease (%)
D+/R-	High	50+
D+or D-/R+	Intermediate	10-15
D-/R-*	Low	0
ALA Therapy (R+)		
Induction	Intermediate	25-30
Rejection	High	65

D, Donor; R, Recipient; ALA, Antilymphocyte Antibody

*Should receive leukocyte depleted blood products

13

CMV Disease After SOT Prophylactic Approaches

UNIVERSAL

All SOT recipients receive therapy during highest risk periods

- Expensive
- May induce resistance
- Some pts exposed unnecessarily

PREEMPTIVE

Treatment based on asymptomatic viral replication in blood

- Optimal viral threshold for initiating therapy not well defined
- Requires serial weekly monitoring with detection assay

NOTE: Typically Valganciclovir or IV Ganciclovir used for prophylaxis
Letermovir now approved for use after Renal Transplant

14

CMV Prophylaxis After SOT

Bottomline:

- D+/R- or ALA for rejection → Universal
 - First 3-6 months post-transplant
 - At least 1 month post-ALA for rejection
- R+ → Universal or Preemptive
 - First 3-6 months post-transplant

15

CMV Disease After SOT

- Typically occurs 1-3 months post-transplant
 - Or after prophylaxis is stopped ("late onset")
- Disease of GI Tract and Eye may not have concurrent viremia
 - Diagnosis often requires biopsy/aspiration
- Viral load may continue to rise during first 2 weeks of Rx
 - Don't repeat PCR until Day 14 of treatment, then weekly until negative
- Treat for 2-3 weeks...
 - Resolution of symptoms AND clearance of CMV DNAemia
 - DO NOT STOP TIL VIREMIA CLEARs (high risk for relapse)

16

CMV Disease After SOT

Ganciclovir Resistance

- **Suspect resistance if prolonged (> 6 weeks) (val)ganciclovir exposure AND:**
 - No reduction in viral load after 14 days of treatment
 - No clinical improvement after 14 days of treatment
- **Management of suspected ganciclovir resistance:**
 - Reduce immunosuppression
 - Switch to maribavir or foscarnet (± CMV hyperimmune globulin)

Lurain et al JID 2002; Limaye et al Lancet 2000; Limaye et al JID 2002; Kotton et al Transplantation 2013.

17

CMV Disease After SOT

Key mutations have been associated with resistance

- UL97 CMV Phosphotransferase gene mutations (most common)
 - Imply ganciclovir resistance

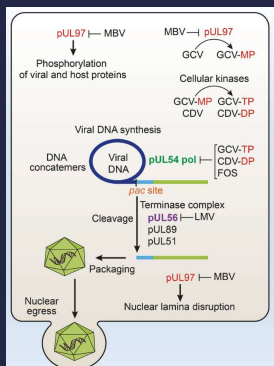
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- UL54 CMV DNA Polymerase gene mutations
 - May confer resistance to ganciclovir, foscarnet, & cidofovir

Lurain et al JID 2002; Limaye et al Lancet 2000; Limaye et al JID 2002; Kotton et al. Transplantation 2018;102(6):900-931. Torre-Cisneros et al Transplantation Reviews 2016.

18

CMV Resistance: New Drug



Maribavir (MBV)

- Multi-modal CMV activity
 - Inhibits CMV DNA replication
 - Interferes with nuclear egress of viral capsid by inhibiting UL97 kinase
- UL97 kinase activates ganciclovir (GCV), thus MBV inhibits GCV activity
 - ⚠ • MBV & GCV should not be used together
- MBV is active against many GCV resistant strains
 - Superior to SOC (Valgan/Gan, Foscarnet, or Cidofovir) in HSCT & SOT pts with refractory/resistant CMV infection
 - Cleared CMV viremia & resolved symptoms at 8 weeks
 - FDA approved Nov 2021 for "CMV (with or without genetic mutations that cause resistance) that does not respond to available antiviral treatment..."
 - ⚠ • No activity against other herpes viruses (HSV/VZV)

Piret J, Boivin G. *Antiviral Research* 2019;163:91-105.
Avery RK, et al. *Clin Infect Dis*. 2021 Dec: Online ahead of print.

19

Question #1

54-year-old male 60 days post-cardiac transplant was treated for rejection with steroids when fever and a non-tender anterior cervical mass appeared.

Biopsy showed nodal replacement by lymphocytes, many of which stained positively for Epstein-Barr virus as well as for the B cell marker, CD20.

His plasma EBV viral load was 10,000 copies /ml.

What is the most appropriate treatment for this condition?

- A. Cidofovir
- B. Ganciclovir
- C. Acyclovir
- D. Cyclophosphamide
- E. Rituximab

20

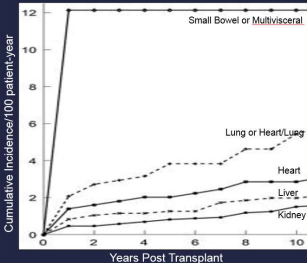
Epstein Barr Virus: Post Transplant Lymphoproliferative Disorder (PTLD)

- Virus establishes latency in B-lymphocytes which serve as lifelong reservoirs
- EBV transformed B-lymphocytes give rise to PTLD (a few cases may arise from T-lymphocytes)
- Risk factors:
 - 1° EBV infection
 - Donor seropositive, Recipient seronegative
 - Anti-lymphocytic antibody therapy (T-cell depletion)
 - Organ transplanted (Intestine > Lung > Heart > Liver > Kidney)

21

Epstein Barr Virus: Post Transplant Lymphoproliferative Disorder (PTLD)

- ~3% Cumulative 10-year incidence in SOT population
- Incidence varies based on organ transplanted
 - Small Bowel / Multivisceral – up to 32%
 - Lung / Heart / Liver - 3-12%
 - Kidney - 1-2%
- Biphasic pattern of disease after SOT:
 - First peak (20% cases) occurs 1st post-tx year
 - Second peak occurs 7-10 years post-tx



Olagne, J. et al. Am J Transplant. 2011 Jun;11(6):1260-9.

22

Epstein Barr Virus: Post Transplant Lymphoproliferative Disorder (PTLD)

Clinical manifestation - wide range

- Febrile mononucleosis-like illness with lymphadenopathy
- Solid tumors
 - Often involve transplanted graft
 - 50% are extranodal masses
 - 25% involve CNS

Definitive diagnosis requires tissue biopsy

- WHO Pathology Classification based is gold standard for diagnosis
- Molecular (PCR) tests available
 - WHO Standard for Assay Calibration available
 - Whole Blood vs Plasma controversial
 - Misses EBV-negative and some localized cases
 - Used as an aid for Diagnosis and Pre-emptive monitoring with stepwise reduction in immunosuppression to reduce PTLD rates

Petit B et al. Transplantation. 2002;73(2):265.
Peters AC et al. Transplantation. 2018; 102(9):1553.

23

Epstein Barr Virus: Post Transplant Lymphoproliferative Disorder (PTLD)

Treatment:

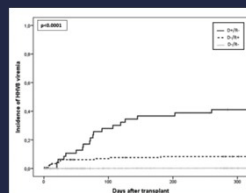
- Antivirals not effective on latently infected lymphocytes (antivirals only work in lytic phase)
- Reduce Immunosuppression (Response ~ 45%)
- Rituximab: Anti-CD20 monoclonal antibody (Response ~ 55%)
- Cytotoxic Combination (CHOP, ACVBP) Chemotherapy
 - Reserved for non-responsive disease
 - High treatment associated mortality (13%-50%)
- Adoptive Immunotherapy (EBV cytotoxic T-cells)
 - Under study

Allen et al. Clin Transplant. 2019;33(9):e13652.

24

HHV-8 After Solid Organ Transplant

- Seroprevalence in U.S. considered low overall
- High seroprevalence among MSM in Southern United States
 - 68% among MSM w/ HIV ; 37% among MSM
- Higher seroprevalence in Persons Who Inject Drugs
 - 36% among women who inject drugs
- U.S. OPTN DTAC 2018-2020 data:
 - 6 cases of HHV-8 transmission/KS from deceased organ donors
 - 6 donors -> 22 recipients -> 14 w/ post transplant HHV-8 infection
 - 6 developed KS; 4 died due to KS or associated complications
- Incidence of post-transplant KS 12.4 per 100,000 person years



Knights SM, et al. Open Forum Infect Dis. 2023 Mar 24;10(4):ofad160. Salyards M, et al. J Infect Dis. 2024 May 15;229(5):1387-1392. Cannon MJ, et al. N Engl J Med. 2001 Mar 1;344(6):637-43. Dollard SC, et al. American Journal of Transplantation. 2021; 21(2): 681-688. Cahoon EK et al. Int J Cancer. 2018 Dec 1;143(11):2741-2748. Mularoni A, et al. American Journal of Transplantation. 2025; 25(5):10070-1085.

25

HHV-8 Oncovirus Presentations

- Kaposi Sarcoma
 - Skin, oral lesions
 - Visceral involvement
- Primary effusion lymphoma; other large cell lymphomas
 - Cytopathology alone may be insufficient for dx
 - Flow cytometry and special staining required
 - HHV-8 NAT from blood/fluid can be clue to dx
- Multicentric Castleman Disease (polyclonal B cell lymphoproliferative disorder)
- Kaposi Sarcoma Herpesvirus (KHSV) Inflammatory Cytokine Syndrome (KICS):
 - Systemic inflammatory syndrome, often severe with shock/ multiorgan failure
 - Most often occurs concurrently w/ KS
 - Poor prognosis



KICS could show up on the Boards!

26

KICS: Working Definition

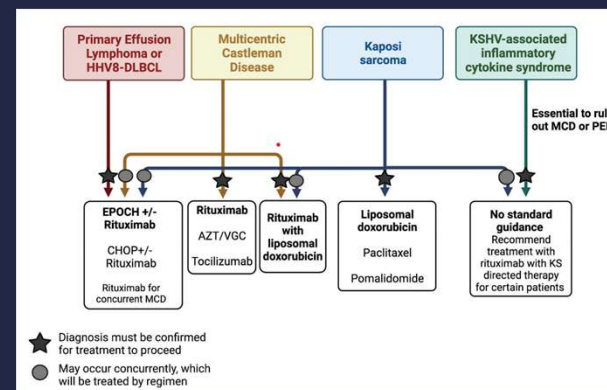
1. At least 2 **Clinical Manifestations** from at least 2 categories
 - **Symptoms:** Fever, Fatigue, Edema, Cachexia, Respiratory Symptoms, GI disturbance, Arthralgia/myalgia, Altered mental state, Neuropathy
 - **Laboratory:** Anemia, Thrombocytopenia, Hypoalbuminemia, Hyponatremia
 - **Radiographic:** Lymphadenopathy, Splenomegaly, Hepatomegaly, Body Cavity, Effusions
2. **Systemic Inflammation:** CRP ($\geq 3\text{g/dL}$)
3. **Elevated KSHV plasma viral load:** HHV-8 ≥ 1000 copies/mL
4. **No pathologic evidence of MCD or PEL**
(Requires biopsy of any lymphadenopathy if present)

Polizzotto, M. N., et al. Clinical Features and Outcomes of Patients With Symptomatic Kaposi Sarcoma Herpesvirus (KSHV)-associated Inflammation: Prospective Characterization of KSHV Inflammatory Cytokine Syndrome (KICS). Clinical Infectious Diseases. 2016;62(6):730-738.

27

Management of HHV8-Associated Diseases

- Consider KICS in SOT presenting with sepsis/multi-organ failure
- May be donor-derived or primary infection
- Management differs based on disease presentation



Patel R, Lurain K, Yarchon R, Ramaswami R. Clinical management of Kaposi sarcoma herpesvirus-associated diseases: an update on disease manifestations and treatment strategies. Expert Rev Anti Infect Ther. 2023 Jul-Dec;21(9):929-941.

28

Question #2

- 52-year-old female S/P cadaveric renal transplant receiving tacrolimus, prednisone and mycophenolate
- Week 30 post transplant serum creatinine rose from 1.5 to 2.3 mg/dl
- Tacrolimus levels were in therapeutic range
- Urinalysis revealed one plus protein and no cells or casts

29

Question #2

Which would be most helpful in understanding if BK virus was causing her renal failure?

- A. Presence of decoy cells in urine cytology
- B. Urine BK viral load
- C. Urine culture for BK virus
- D. Plasma BK viral load
- E. Demonstration of BK inclusions in renal tubular epithelium on renal biopsy

30

Polyomavirus *BK Virus Nephropathy*

- Ubiquitous, DNA virus
 - 1° infxn – URI during early childhood
 - 80% worldwide population sero+
 - Renal & uroepithelial cells, site of latency
- Cause of nephropathy post renal transplant
 - Up to 15% of renal recipients effected
 - Time to onset 28-40 weeks (majority within 1st yr post tx)
 - Manifests as unexplained renal dysfunction (as does rejection)

Hayashi RY et al. UNOS Database; Abstract 76, 2006 World Transplant Congress; Ramos et al. J Am Soc Nephrol 2002;13:2145; Hirsch et al. Transplantation 2005;79:1277-1286

31

BK Virus Nephropathy *Diagnosis*

- Replication in urine precedes replication in blood precedes nephropathy
- Renal Bx - "Gold Standard" for diagnosis
- Blood PCR
 - Sensitive (100%) but less specific (88%)
 - Cannot rule out rejection
 - Useful as indicator for biopsy
- Urine Cytology, Electron microscopy, & PCR
 - Detection in urine: Low PPV but High NPV

Hirsch et al. Transplantation 2005;79:1277-1286; Nicklel et al. NEJM 2000;342 (18):1309-1315; Ramos et al. J Am Soc Nephrol 2002;13:2145

32

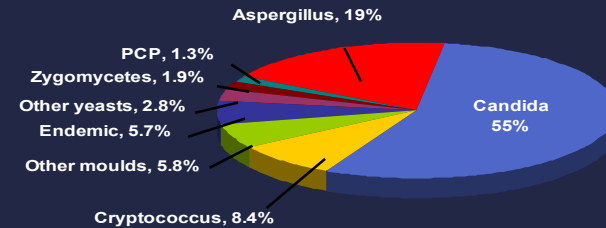
BK Virus Nephropathy Treatment

- Reduce immunosuppression
- Case series with variable success using:
 - Low-dose cidofovir
 - Leflunomide
- New drugs & randomized controlled trials needed
- Preemptive monitoring key to prevention

Hirsch et al. Transplantation 2005;79:1277-1286; Farasati et al. Transplantation 2004;79:116; Vats et al. Transplantation 2003;75:105; Kabambi et al. Am J Transplant 2003;3:186; Williams et al N Engl J Med 2005;352:1157-58.

33

Invasive Fungal Infections in Solid Organ Transplant Recipients



Type of fungal infection varies depending on organ transplanted

Pappas P et al. CID. 2010;50:1101-1111.

34

Invasive Fungal Infections According to Organ Transplanted

N=16,808

	Kidney	Heart	Pancreas	Liver	Lung	Small Bowel
12 Month IFI Incidence (%)	1.3	3.4	4.0	4.7	8.6	11.6
IFI Type (%)					70% Moulds	
Candidiasis	49	49	76	68	23	85
Aspergillosis	14	23	5	11	44	0
Other molds	7	10	3	6	26	0
Cryptococcosis	15	10	5	6	2	5
Endemic	10	3	6	5	1	0
Pneumocystosis	1	3	1	0	2	0
Other	4	2	4	4	2	10

Pappas P, Alexander B, Andes D, et al. CID 2010;50:1101-1111

35

Invasive Fungal Infections Risk Factors After SOT

Each solid organ group will have unique risks for IFIs

Strongly influenced by medical & surgical factors including technical complexity

Liver

- Re-transplantation
- Pre-tx fulminant hepatic or renal failure
- Heavy *Candida* colonization peri-tx
- Large volume intra-operative transfusions
- Bleeding complications requiring re-operation
- Choledochojejunostomy

Lung

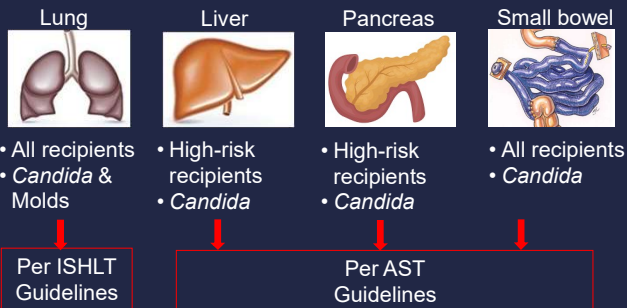
- Vulnerable anastomotic site
- Continuous environmental exposure
- *Aspergillus* colonization of airways
- CMV pneumonitis
- Acute rejection
- Obliterative bronchiolitis

CANDIDA

ASPERGILLUS

36

Antifungal Prophylaxis for Solid Organ Transplant Recipients



Husain S, et al. *J Heart Lung Transpl.* 2016;35:261-82.
 Aslam S, Rotstein C. *AST ID COP. Am J Transpl.* 2019;33:e13623.
 Husain S, Camargo J. *AST ID COP. Am J Transpl.* 2019;33:213544.

37

Tuberculosis

- 34-74 fold higher risk of active disease in SOT recipients than general population
- Incidence 1% - 6% (up to 15% in endemic areas)
- Median onset 9 months post-tx (0.5-144 months)
- 33% of infections are disseminated at diagnosis
- Treatment
 - Rifampin-based regimens associated with graft loss/rejection in 25%
- Mortality ~30%
- Treat latent TB prior to transplant when possible

38

Question #3

- 35-year-old female s/p heart transplant in France 90 days prior presented with fever, dyspnea and a diffuse pneumonia on chest CT.
- She was receiving prednisone, tacrolimus & mycophenolate.
- Both recipient & donor were CMV negative; she was not on CMV prophylaxis.
- She was on inhaled pentamidine for PCP prophylaxis.

39

Question #3: Chest CT



40

Question #3

Trimethoprim-sulfamethoxazole was started empirically, and she began improving.

Bronchoalveolar lavage (BAL) was negative for:

- Pneumocystis by direct fluorescent antibody stain & PCR,
- Fungi by calcofluor white / potassium hydroxide stain,
- Mycobacteria by AFB smear,
- Bacteria by gram stain, and
- Respiratory viruses by multiplex PCR

Routine bacterial BAL and blood cultures were negative.

41

Question #3

Assuming trimethoprim-sulfamethoxazole was causing her improvement, which additional test on the BAL might have explained her improvement?

- A. PCR for CMV
- B. PCR for toxoplasmosis
- C. PCR for tuberculosis
- D. Galactomannan
- E. Cold enrichment culture for Listeria

42

Toxoplasmosis

- After SOT, acute toxoplasmosis can develop from reactivation, acquisition via blood transfusion or ingestion of contaminated food or water, or from the donated organ
- Donor seropositive/Recipient seronegative at high risk
- HEART > LIVER > KIDNEY TRANSPLANT
- Presents with myocarditis, pneumonitis & meningitis
- DIAGNOSIS:
 - PCR
 - Giemsa smear of BAL
 - Brain aspirate for tachyzoites
 - Immunoperoxidase stain of endocardial biopsy or other tissue
- TREATMENT: sulfadiazine-pyrimethamine-leucovorin

43

Question #4

Liver transplant recipient on Bactrim & valganciclovir prophylaxis

presented 21 days post transplant with confusion, tremors, lethargy, anorexia

- Rapid progressive neurologic decline → agitation & delirium → intubation
- Brain MRI: non-revealing
- Blood & urine cultures: negative
- CSF: lymphocytic pleocytosis (25 WBCs/mm³) & elevated protein
 - Gram stain, bacterial, fungal cultures negative for organisms
- Empiric intravenous ganciclovir, vancomycin, ceftriaxone & ampicillin
- Day 6 Repeat MRI: diffuse encephalitis
- Expired 13 days after neurologic symptom onset
- Donor was previously healthy presenting with subarachnoid hemorrhage
 - Toxicology screen: + cocaine & marijuana
 - Brain CT: expanding subarachnoid hemorrhage
 - Recently on camping trip

44

Question #4

What is this presentation is most consistent with?

- A. CMV encephalitis
- B. HHV6 encephalitis
- C. VZV encephalitis
- D. Rabies encephalitis
- E. Cryptococcal meningitis

45

“Expected” Donor Derived Infections

➤ Expected = known before tx or for which there are recognized standard prevention guidelines

- Cytomegalovirus (CMV)
- Epstein–Barr virus (EBV)
- Toxoplasmosis

*United Network for Organ Sharing /
Organ Procurement and Transplant Network

Isom M et al. Am J Transplant. 2009;9:1929-1935.

46

“Unexpected” Donor Derived Infections Viruses, Viruses, & Parasites, Oh My...

- Lymphocytic choriomeningitis virus (LCMV)
 - Hamsters and rodents
 - 4 outbreaks (3 USA, 1 Australia); 9 deaths
- Rabies virus
 - Unreported bat bite in donor
 - 3 outbreaks (2 USA, 1 Germany); 8 deaths
- Chagas' Disease (*Trypanosoma cruzi*)
 - Reduviid bug (Latin America)
 - Screening tests lack sensitivity
 - Multiple transmissions reported
- HIV, Hep C, Hep B, West Nile Virus (WNV)
 - Remember the “Window” prior to development of antibodies
 - Nucleic Acid Tests decrease “window” to ~5-10 days (HIV), 6-9 days (HCV)



Fisher SA et al. N Engl J Med. 2006;354:2235-2249. MMWR Morb Mortal Wkly Rep. 2008;57:799-801. Kusne S et al. Transpl. 2005;11:1295-1297. Maier T et al. CID 2010;50:1112-1119 Maltner F et al. Infection. 2007;35(4):219-24. Grossi PA, et al. Am J Transpl. 2009;9:S19-S26.

47

Typical Presentations Of Unexpected Donor Derived Infections

- Most present in the first 3 months post transplant
- Look for epidemiologic clues for potential donor exposure in the stem (e.g. possible bat bites, new pet hamsters, tap water nasal irrigations, recent travel to a region endemic for certain pathogens)

PATHOGEN	PRESENTATION
LYMPHOCYTIC CHORIOMENINGITIS VIRUS	ENCEPHALITIS
RABIES	ENCEPHALITIS
TOXOPLASMOSIS	DIFFUSE PNEUMONIA MYOCARDITIS RETINITIS ENCEPHALITIS
WEST NILE VIRUS	MENINGITIS ENCEPHALITIS POLIOMYELITIS-LIKE FLACCID PARALYSIS
CHAGAS' DISEASE	FEVER MYOCARDITIS
ACANTHAMOEBA	SKIN LESION ENCEPHALITIS
BALAMUTHIA MANDRILLARIS	ENCEPHALITIS
VISCERAL LEISHMANIASIS	PANCYTOPENIA HEPATOSPLENOMEGALY
MALARIA	FEVER

48

Vaccination Recommendations for SOT

Update vaccinations pre-SOT:

- COVID
- Hepatitis A, Hepatitis B, Flu, Tdap, Pneumococcal
- Live Varicella, MMR vaccines (≥4 wks pre-tx)
- Hib, Meningococcal if planned splenectomy (e.g. Multivisceral Tx)

Recommended post-SOT:

(Delay 1 month post-tx; 3–6 months to maximize response)

- COVID
- Pneumococcal
- Tetanus-diphtheria toxoid
- Inactivated Influenza

Live vaccines are NOT recommended after SOT including:

- Measles Mumps Rubella
- Varicella
- Inhaled influenza
- Oral polio
- Yellow fever
- BCG
- Small pox
- Salmonella typhi (oral)

49

Solid Organ Transplant Patient Travel

• REGIONAL EXPOSURES

- COCCIDIOIDOMYCOSIS: Southwest U.S.
- HISTOPLASMOSIS: Central/Mid-Atlantic U.S.
- VISCERAL LEISHMANIASIS: Spain, Mediterranean Basin
- MALARIA: Tropics
- BABESIA MICROTI: Northeast & Upper Midwest U.S.

• AND ALL THE “NORMAL” RISKS TO TRAVELERS

- DIARRHEA
- STIs
- MDR-TB
- BLOOD SUPPLY (need for TRANSFUSIONS), etc...
- AVOID LIVE VACCINES: Yellow Fever, Oral typhoid, etc.
- DRUG INTERACTIONS → Transplant meds + travel related prophylactic agents

50

Key Drug Toxicities / Syndromes

- Calcineurin inhibitors and TTP and PRES (RPLS)
- Sirolimus-induced pneumonitis
 - Progressive interstitial pneumonitis (22% in one study)
 - Risk factors: late switch to sirolimus & impaired renal function
 - Symptoms: dyspnea, dry cough, fever, and fatigue
 - Radiographic & bronchoalveolar lavage consistent with bronchiolitis obliterans organizing pneumonia & lymphocytic alveolitis
 - Recovery with sirolimus withdrawal

Euvrard S et al. N Engl J Med. 2012;367(4):329. Champion L et al. Ann Intern Med 2006;144:505. Weiner SM et al. Nephrol Dial Transplant. 2007;22(12):3631.

51

Other Pearls for Boards...

If you're thinking PCP but its not → think TOXO

Patient presenting atypically during first month post transplant → think donor transmitted infection

- Rabies, WNV, Coccidioides, Chagas, LCMV (look for epidemiologic clues in stem)

Remember drug interactions and syndromes

- Addition of mold active azole leading to acute kidney injury from elevated CNL
- TTP and PRES induced by calcineurin inhibitors
- Sirolimus-induced pneumonitis

Remember *Strongyloides* hyperinfection syndrome

TB- Don't miss a case!

BKV, CMV and EBV/PTLD – know how to diagnose and manage

52

Thank You!

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53