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Refining Management of CMV After Transplant: Exploiting Recent Advances to Alleviate Patient Burden

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Assessing the Role of Antiviral Therapy in Alleviating the Burden of CMV in the Post-SOT Setting

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CMV: Why is it Important?

Cytomegalovirus (CMV)

- Member of the beta herpesvirus group
- Self-limited infection in healthy persons
- Establishes latency after primary infection
- Risk of reactivation from latency
- Frequent opportunistic pathogen in transplant recipients

Consequences in SOT

- Asymptomatic infection
- CMV syndrome: fever and cytopenia
- Tissue invasive disease (GI tract, lungs, liver, CNS, and retina)
- Opportunistic co-infections (viral, bacterial, and fungal)
- Higher risk of post-transplant lymphoma
- Higher risk of graft rejection
- Increased mortality

SOT, solid organ transplant; GI, gastrointestinal; CNS, central nervous system

Kotton CN, et al. *Transplantation.* 2018;102(6):900-931.

Risk Factors for CMV in SOT

- **Transplant type:** Lung and small bowel at higher risk than kidney or liver
- **Donor/recipient CMV serostatus:** D+/R- highest risk
- **Intensive immunosuppression:** Net state of immunosuppression (type, dose, duration)
- **Acute rejection:** Requires intensive immunosuppression, especially T-cell depletion
- **Advanced age (immune senescence)**

Razonable RR, Humar A. *Clin Transplant*. 2019;33(9):e13512.

Clinical Presentation

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Asymptomatic Infection

Detection of CMV DNA in the blood without clinical signs and symptoms

CMV Syndrome

Fever, malaise, fatigue, leukopenia, thrombocytopenia, elevated ALT + CMV DNAemia

Tissue-invasive Disease

End-organ involvement: gastrointestinal disease, pneumonia, hepatitis, retinitis, encephalitis, allograft involvement

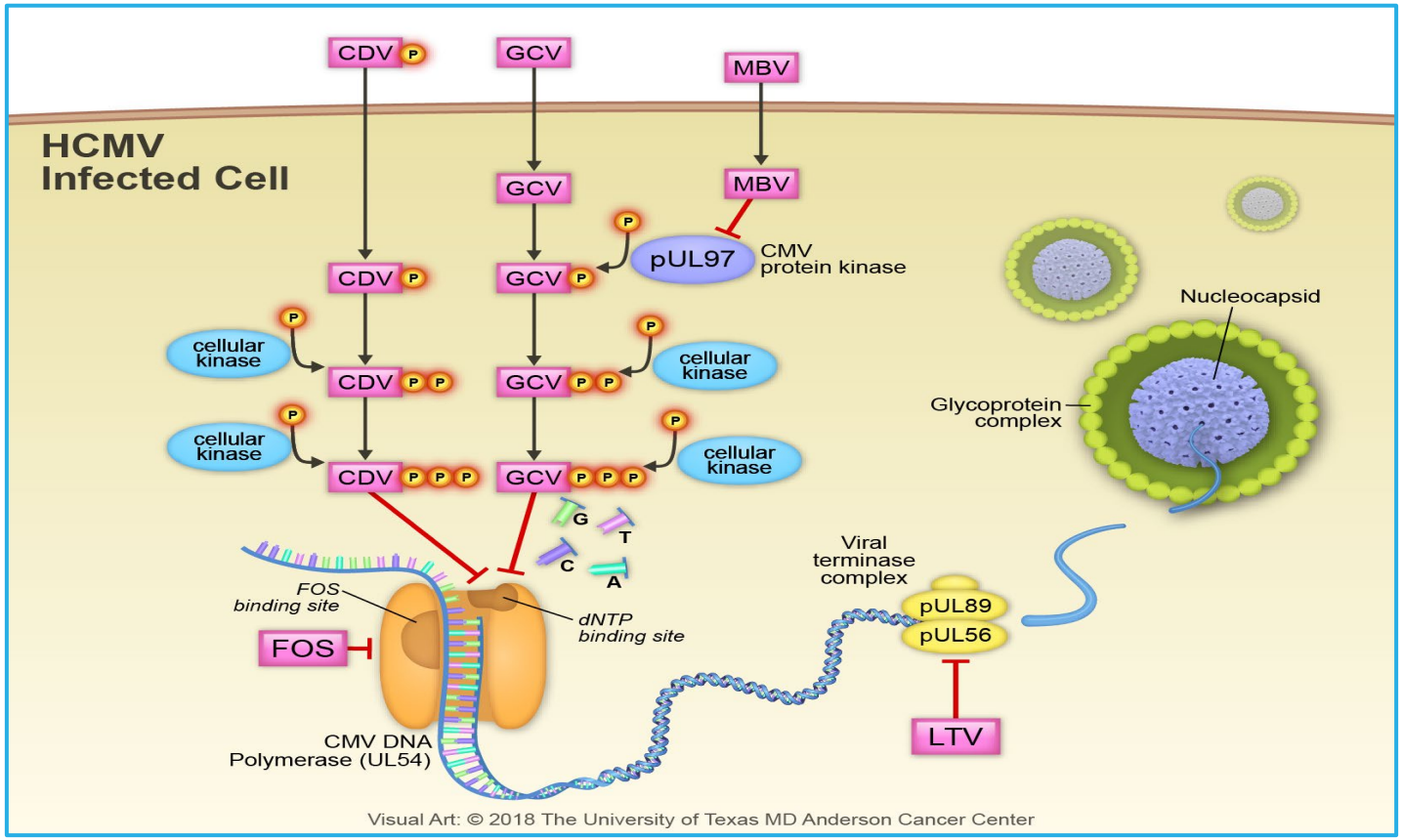
Razonable RR, et al. *Clin Transplant.* 2019;33(9):e13512.

CMV Antivirals

Antiviral Drugs	Route of Administration	CMV Target	Use for CMV in Transplant Patients
Ganciclovir	Intravenous	DNA polymerase (UL54)	Treatment* and prevention
Valganciclovir	Oral	UL54	Treatment* and prevention
Foscarnet	Intravenous	UL54	Treatment*
Cidofovir	Intravenous	UL54	Treatment*
Maribavir	Oral	pUL97 kinase	Treatment of post-transplant (SOT and HCT) refractory/resistant CMV infection/disease
Letermovir	Oral, intravenous	Terminase complex (UL56,51,89)	Prophylaxis in CMV seropositive HCT recipients; prophylaxis in high-risk kidney transplant recipients (Donor+/Recipient-)

*Not FDA approved for the treatment of CMV infection or disease in transplant patients
SOT, solid organ transplant; HCT, hematopoietic cell transplant

Mechanism of Action of Antivirals



HCMV, human cytomegalovirus; CDV, cidofovir; FOS, foscarnet; GCV, ganciclovir; LTV, letermovir; MBV, maribavir

Foolad F, et al. *Expert Rev Clin Pharmacol.* 2018;11(10):931-941.

Side Effects and Toxicities

Antiviral Agent	Bone Marrow	Kidney	Altered Taste	Nausea
Ganciclovir IV/valganciclovir PO	✓			
Foscarnet		✓		
Cidofovir		✓		
Letermovir (HCT and renal transplant approved, CMV prophylaxis only)				✓
Maribavir (SOT and HCT approved, refractory/resistant CMV treatment)			✓	

HCT, hematopoietic cell transplant; SOT, solid organ transplant

Managing CMV Antiviral Side Effects in SOT

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Leukopenia/Neutropenia

- Reduce or stop MMF and/or stop VGCV
- Stop TMP-SMZ
- For (val)ganciclovir, do not dose reduce for low WBC, always dose to GFR
  - Increases risk of resistance (especially with infection)
  - Support WBC with growth factors (G-CSF), *or*
    - If prevention: Switch to preemptive monitoring with weekly blood checks
    - (±HSV/VZV prophylaxis)
    - If treatment: Switch to foscarnet

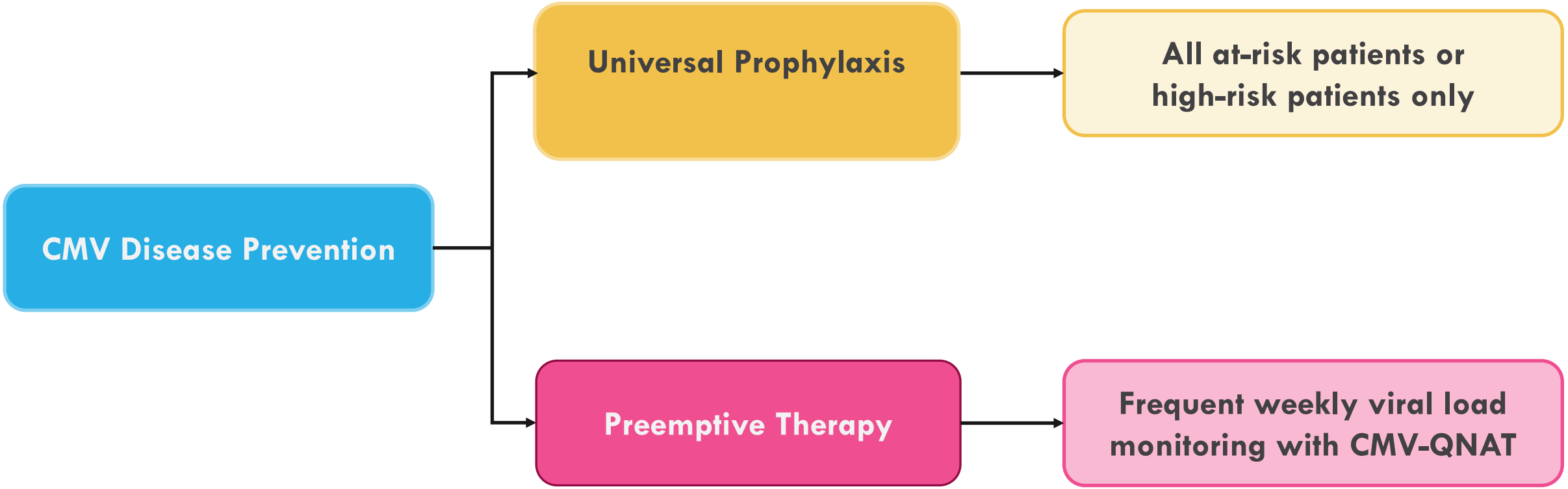
Nephrotoxicity

- Adequate IV hydration
- Avoidance of concomitant nephrotoxic drugs
- Dose adjustment for GFR
- Treatment interruption may be required

MMF, mycophenolate mofetil; TMP-SMZ, Trimethoprim/sulfamethoxazole; WBC, white blood cell; GFR, glomerular filtration rate; G-CSF, granulocyte colony stimulating factor; HSV, herpes simplex virus; VZV, varicella-zoster virus; VGCV, valganciclovir; IV, intravenous

Kotton CN, et al. *Transplantation.* 2018;102(6):900-931.

CMV Prevention Strategies in Transplantation



Comparison of CMV Prevention Strategies

	Universal Prophylaxis	Preemptive Therapy
Description	Antivirals for all patients at risk prior to the onset of CMV infection	Routine monitoring for CMV infection Treatment upon detection of asymptomatic CMV infection
Early CMV DNAemia/infection	Rare	Common
Late CMV	Common	Rare
Prevention of CMV disease	Yes	Yes
Ease of implementation	Easy	Difficult to coordinate No universal threshold to trigger therapy
Cost	Cost of drug, hospitalization, and disease cost of late CMV	Cost of monitoring
Toxicity	More drug toxicity (myelosuppression)	Less drug toxicity

Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.
Razonable RR, Humar A. *Clin Transplant*. 2019;33(9):e13512.

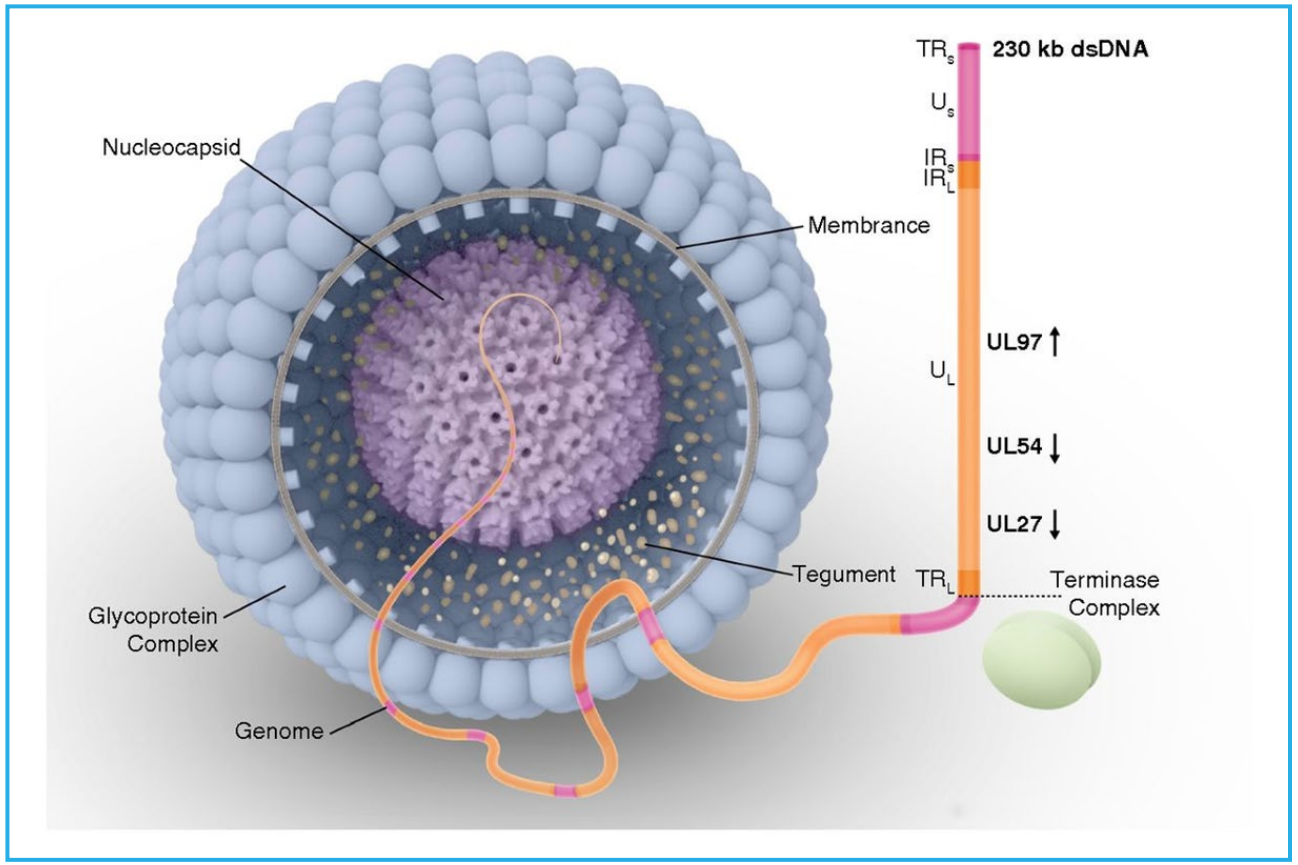
CMV Prevention in SOT: Guideline Recommendations

Organ	CMV Serostatus D+/R-	CMV Serostatus R+
Kidney	VGCV, IV GCV, valacyclovir x 6 months *OR* preemptive	VGCV (preferred), GCV, valacyclovir x 3 months *OR* preemptive
Pancreas, kidney/pancreas	VGCV, IV GCV x 3 to 6 months *OR* preemptive	VGCV, IV GCV x 3 months *OR* preemptive
Liver	VGCV, IV GCV x 3 to 6 months *OR* preemptive	VGCV, IV GCV x 3 months *OR* preemptive
Intestine	VGCV, IV GCV x 6 months ± surveillance after	VGCV, IV GCV x 3 months ± surveillance after
Heart	VGCV, IV GCV x 3 to 6 months *OR* preemptive	VGCV, IV GCV x 3 months *OR* preemptive
Lung	VGCV, IV GCV x at least 6 to 12 months Some centers extend beyond 12 months	VGCV, IV GCV x 6 to 12 months

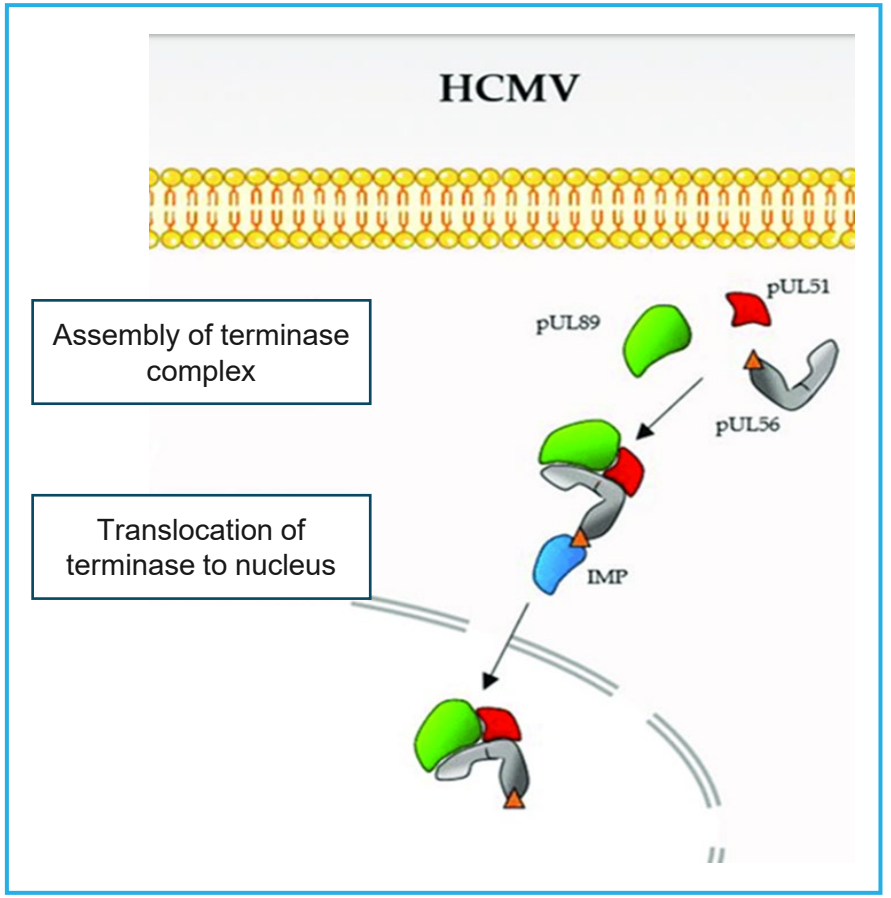
D, donor; R, recipient; SOT, solid organ transplant; VGCV, valganciclovir; GCV, ganciclovir; VGCV preferred over GCV

Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.
Razonable RR, Humar A. *Clin Transplant*. 2019;33(9):e13512.

Letermovir



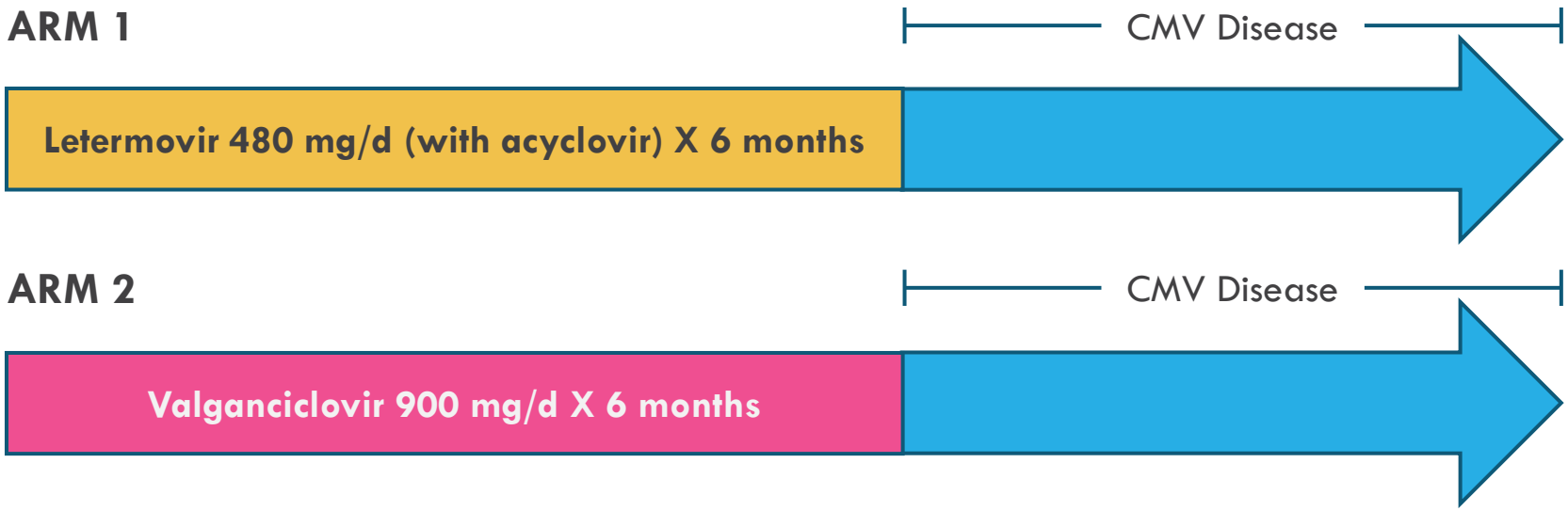
El Chaer F, et al. *Blood*. 2016;128(23):2624-2636.



Ligat G, et al. *FEMS Microbiol Rev*. 2018;42(2):137-145.

Letermovir vs Valganciclovir for Prophylaxis of CMV in High-Risk Kidney Transplant Recipients

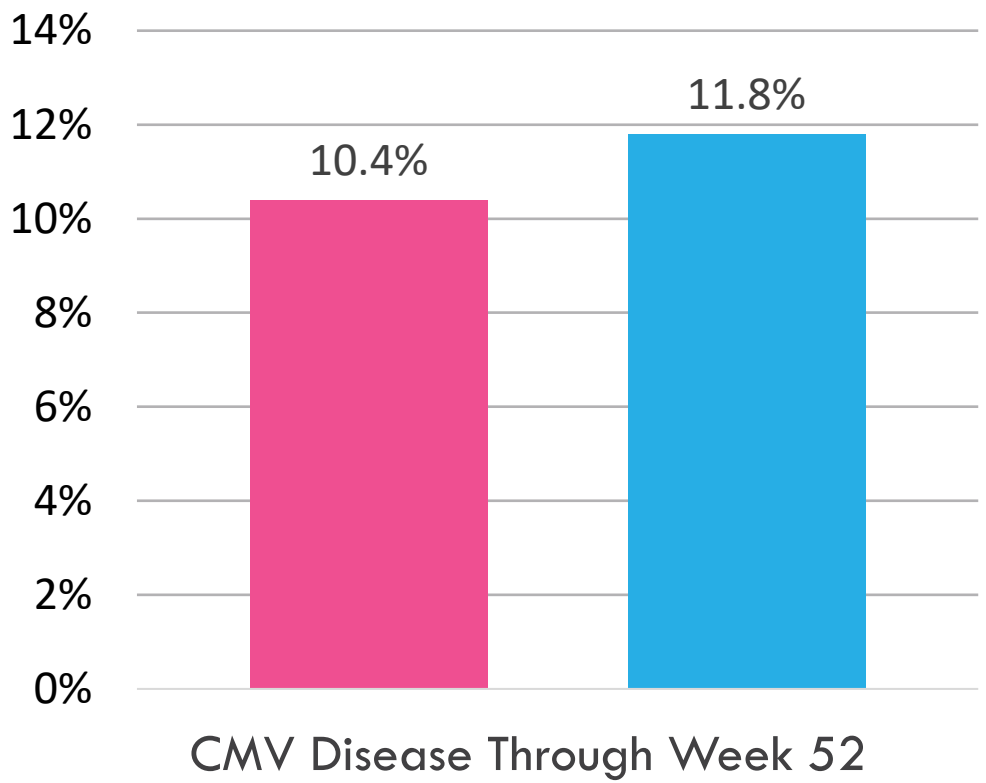
- Placebo controlled, non-inferiority study for CMV prophylaxis with letermovir versus valganciclovir in 601 adult CMV D+/R- kidney transplant recipients
- Patients randomized 1:1 within 7 days post-kidney transplant to Arm 1 or 2

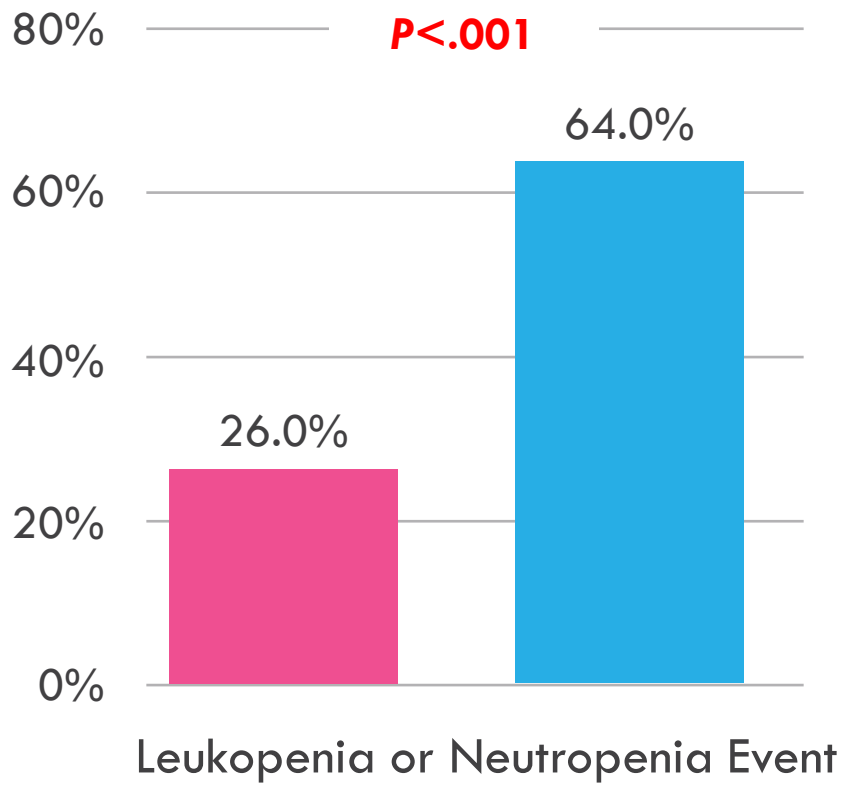


- Endpoint: CMV disease through week 52, adjudicated by independent committee

Limaye AP, et al. *JAMA*. 2023; 330(1):33-42.

Letermovir vs Valganciclovir for Prophylaxis of CMV in High-Risk Kidney Transplant Recipients: Efficacy Through 52 Weeks and Myelosuppression

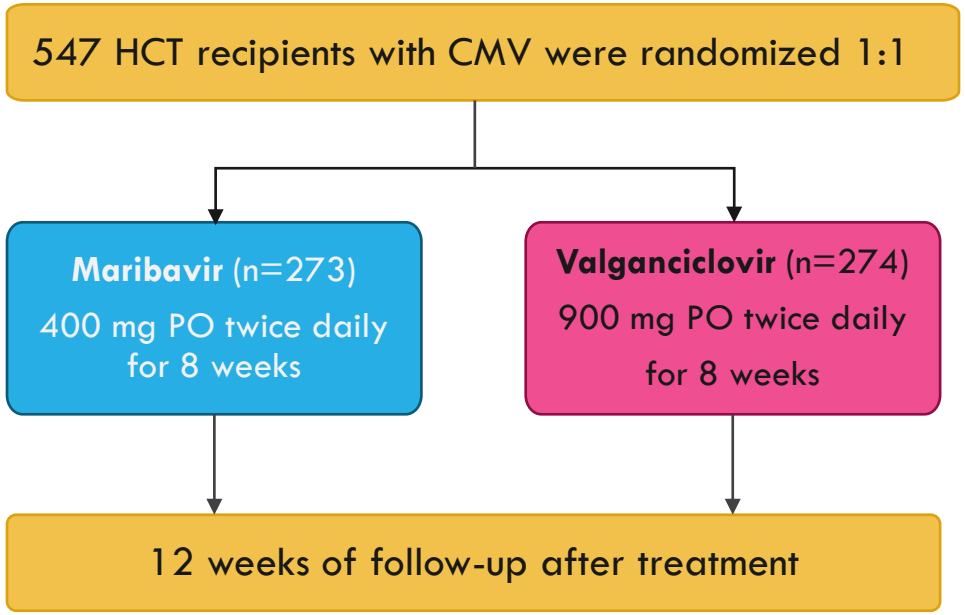


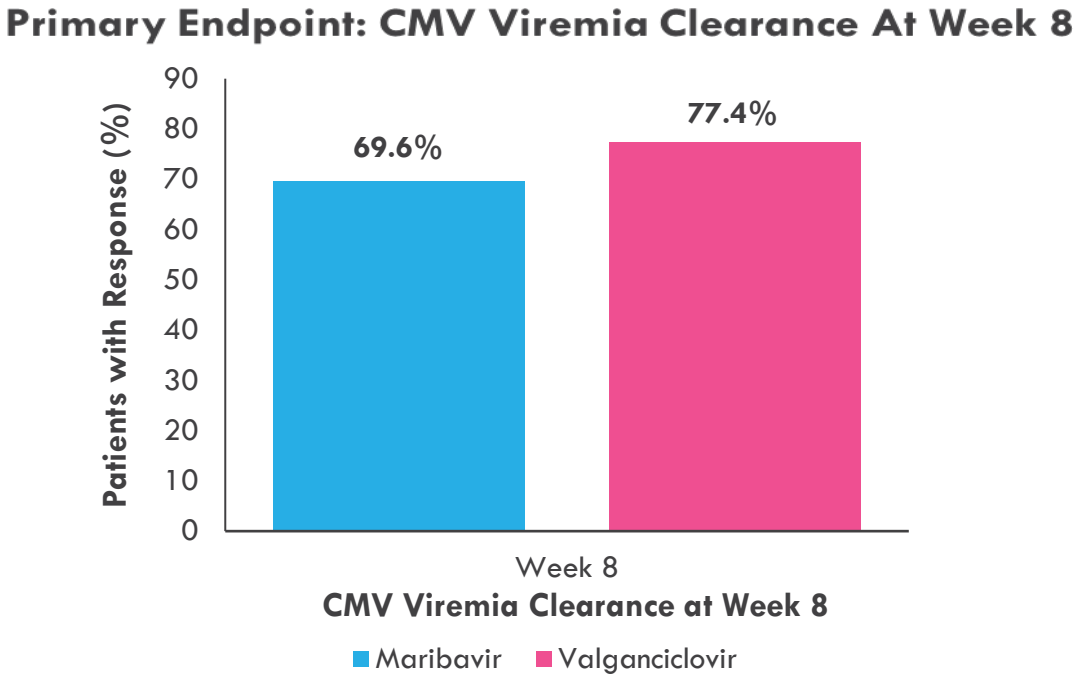


Letermovir Valganciclovir

Limaye AP, et al. *JAMA*. 2023; 330(1):33-42.

Phase 3 AURORA Trial for Maribavir Preemptive Treatment of CMV in HCT





- Maribavir did not meet its primary endpoint of non-inferiority versus valganciclovir based on a prespecified non-inferiority margin of 7% (maribavir 69.6% versus valganciclovir 77.4%; adjusted difference, -7.7%; 95% CI: -14.98, -0.36)

HCT, hematopoietic cell transplant

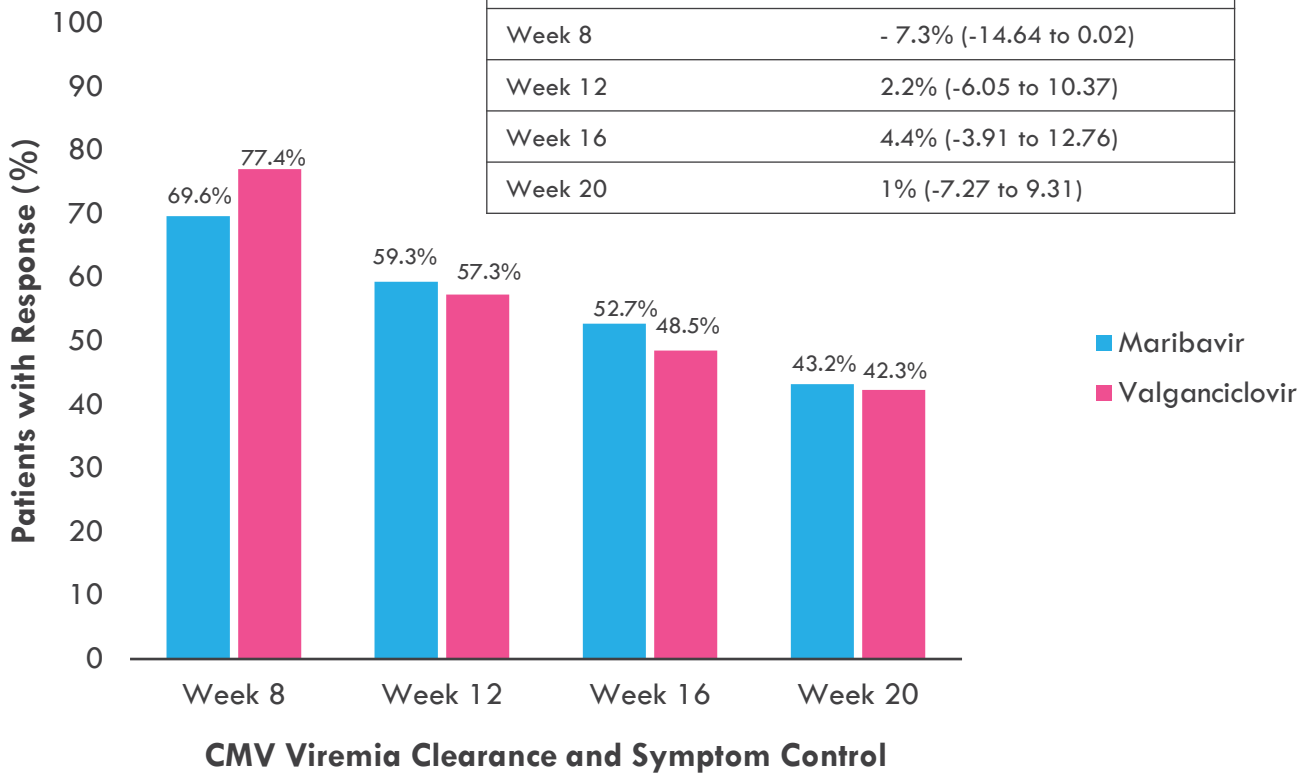
Papanicolaou GA, et al. *Clin Infect Dis*. 2024;78(3):562-572.

Phase 3 AURORA Trial for Maribavir Preemptive Treatment of CMV in HCT (cont'd)

- A sustained maintenance effect was observed with maribavir during post-treatment evaluations at week 12 and week 20.
- Reaffirmed maribavir's favorable safety profile compared to valganciclovir.
  - Treatment-emergent neutropenia was 21.2% for maribavir vs 63.5% for valganciclovir.
  - Rate of premature discontinuation of therapy due to neutropenia was 4% for maribavir vs 17.5% for valganciclovir.

Secondary Endpoint: Confirmed Viremia Clearance and Symptom Control

	Adjusted difference (95% CI)
Week 8	- 7.3% (-14.64 to 0.02)
Week 12	2.2% (-6.05 to 10.37)
Week 16	4.4% (-3.91 to 12.76)
Week 20	1% (-7.27 to 9.31)



HCT, hematopoietic cell transplant

Papanicolaou GA, et al. *Clin Infect Dis*. 2024;78(3):562-572.

Treatment of CMV in SOT Patients

Medication*

Oral VGCV	900 mg q12h
IV GCV	5 mg/kg q12h

Consider IV GCV in:

- Life-threatening disease
- Very high viral load
- Patients with questionable GI absorption

Not Recommended for Treatment of CMV Infection/Disease

- Acyclovir, valacyclovir, letermovir

Weekly Monitoring

- CMV PCR
- Serum creatinine
- Complete blood count
- Frequent monitoring of renal function is recommended to guide dose adjustments

Duration

- Until resolution of clinical symptoms
- Virological clearance is below a pre-defined threshold (LLOQ <200 IU/mL) *or* undetectable on 1 or 2 weekly samples
- Minimum of 2 weeks of therapy

*Adjust dose for renal function
VGCV, valganciclovir; GCV, ganciclovir; SOT, solid organ transplant; LLOQ, lower limit of quantification

Kotton CN, et al. *Transplantation.* 2018;102(6):900-931.

Treatment Individualization

Centers/clinics may wish to define their own local thresholds for starting CMV treatment based on their assay, specimen type, and patient risk factors.

Cautious reduction in immunosuppression

- If feasible, to allow for immunologic recovery
- Severe lymphopenia or deficient T-cell function

Emerging role of immunity

- To predict relapse and guide treatment strategies
  - Low absolute lymphocyte count
  - Absent CMV-specific T-cell immune response

Role of secondary antiviral prophylaxis is debated

Razonable RR, et al. *Clin Transplant.* 2019;33(9):e13512.

Tackling Refractory and Resistant CMV in the Post-SOT Setting

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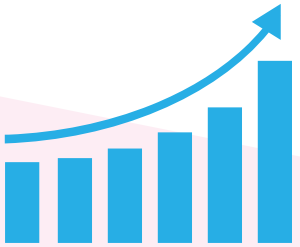
Definition: What is Refractory/Resistant CMV?

R/R CMV Infection or Disease

Refractory*



- Increasing or persistent viral load after at least 2 weeks of adequate antiviral therapy
- Worsening or failure to improve signs and symptoms after at least 2 weeks of adequate antiviral therapy

Resistant

- Viral genetic alteration that decreases susceptibility to one or more drugs

***Not all patients with refractory CMV have resistant virus**

CMV, cytomegalovirus; R/R, refractory/resistant

Chemaly RF, et al. *Clin Infect Dis.* 2019;68(8):1420-1426.

Incidence of Antiviral Drug Resistance

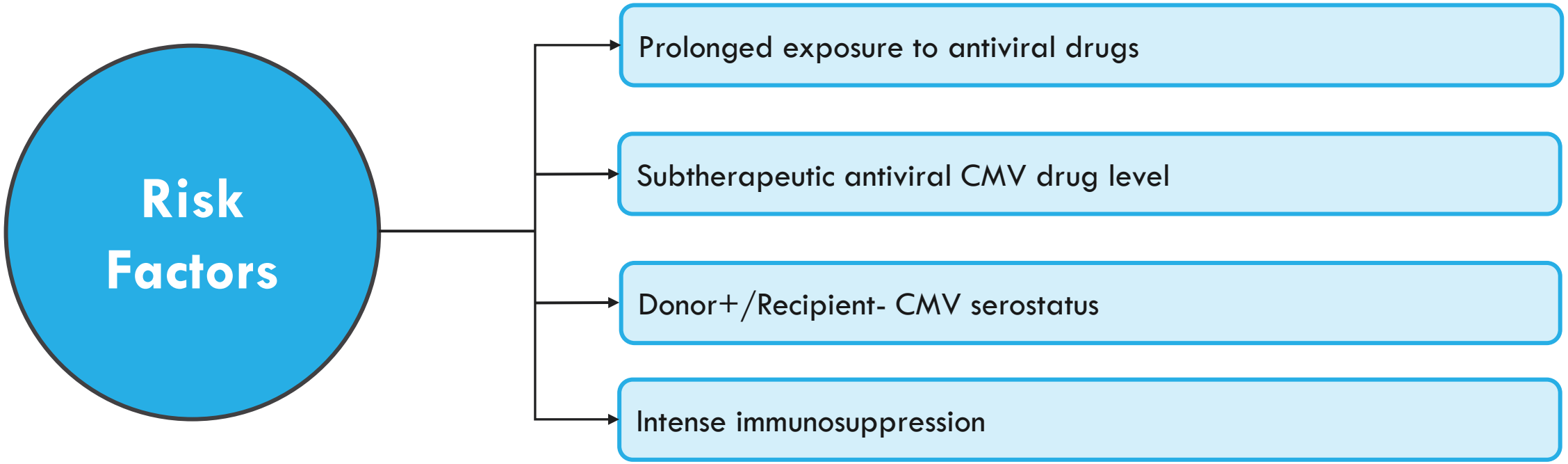
Incidence of Resistance

- 5% to 12% among all SOT recipients
- Up to 18% among lung recipients
- Up to 31% among intestinal/multivisceral recipients
- 0% to 3% after 100 to 200 days of GCV or VGCV prophylaxis in D+/R− kidney recipients

GCV, ganciclovir; VGCV, valganciclovir; D, donor; R, recipient; HCT, hematopoietic cell transplant; SOT, solid organ transplant

Kotton CN, et al. *Transplantation.* 2018;102(6):900-931.

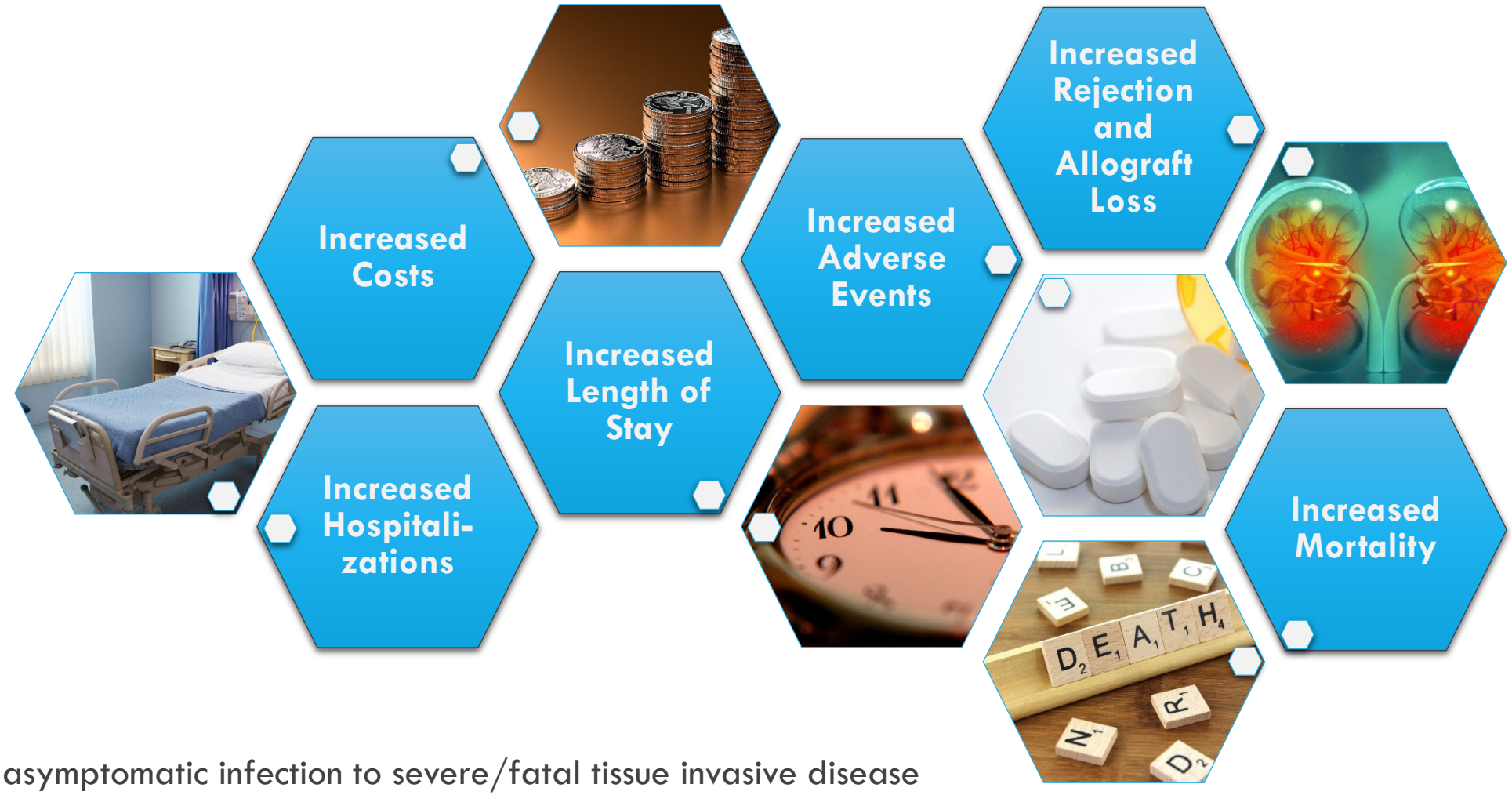
What are the Risk Factors for R/R CMV Infection?



Important Note: Patients may be refractory to antiviral treatment but not have detectable resistance

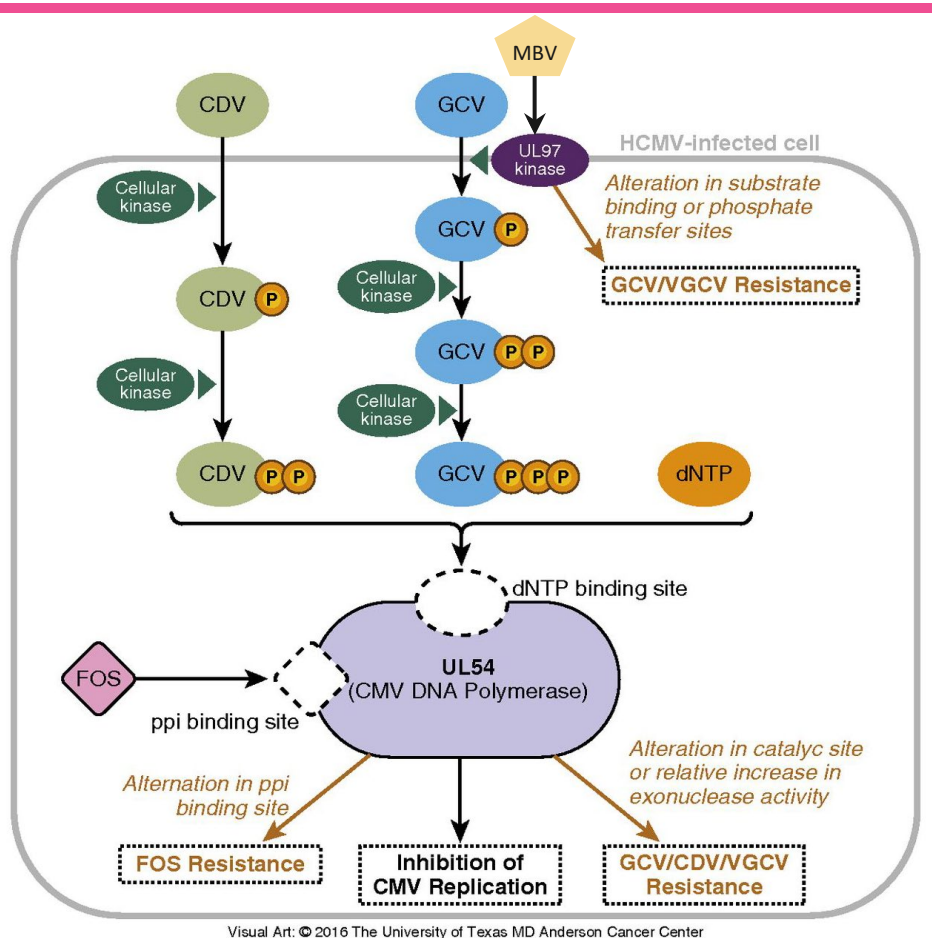
Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.
Razonable RR, Humar A. *Clin Transplant*. 2019;33(9):e13512.

Significance of Resistant CMV



Ranges from asymptomatic infection to severe/fatal tissue invasive disease

Mechanisms of Antiviral Drug Resistance



GCV, ganciclovir; CDV, cidofovir; FOS, foscarnet; MBV, maribavir

El Chaer F, et al. *Blood.* 2016;128(23):2624-2636.

When to Suspect Antiviral Resistance

Antiviral resistance may be present if:

- Rising viral load (VL) on antivirals after initial viral suppression
- Failure of VL to decrease by at least 1 $\log_{10}$ after antiviral induction therapy

Resistance most common when:

- Prolonged exposure to antivirals (>6 weeks)
- Persistent viremia
- Antiviral dosage adjusted due to toxicity or reduced creatinine clearance

Immunosuppressive therapy should be decreased, if feasible

Chemaly RF, et al. *Clin Infect Dis*. 2019;68(8):1420-1426.
Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.

Testing for Resistance

Genotypic Assays

- Performed on viral sequences amplified from blood plasma
- Results are more reliable if the CMV copy number in the specimen is at least 1000 IU/mL
- Quality control concerns:
  - False positives due to mixed populations from low viral-load specimens
  - False negatives due to insensitivity in detecting mutant subpopulations comprising less than 20% to 30% of the total

Genotypic assays to detect UL97 mutation should be performed among patients suspected to have resistance to ganciclovir

Genotypic assays to detect UL54 mutations should be performed among patients suspected to have resistance to ganciclovir, foscarnet, and cidofovir

Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.
Razonable RR, Humar A. *Clin Transplant*. 2019;33(9):e13512.

Mutations Associated With Resistance

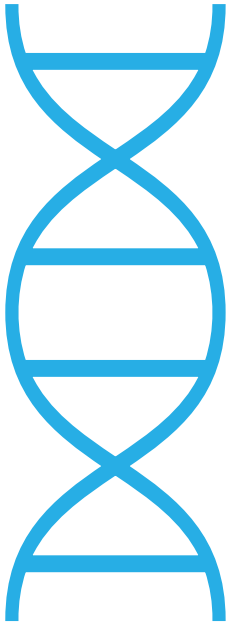
Genotypic resistance testing detects mutations in UL97, UL54, and UL56 genes

UL97

- Mutations common conferring resistance to ganciclovir

UL97: Specific mutations (T409M, H411Y)

- Confer resistance to maribavir



UL54

- Mutations may confer resistance to foscarnet, ganciclovir, or cidofovir

UL56

- Mutations may confer resistance to letermovir only. No cross resistance with ganciclovir, foscarnet, or cidofovir

Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.

GCV Resistance Levels

GCV resistance levels are determined by the fold change in EC50 (drug concentration that reduces viral growth by 50%)

Low Grade

2-fold to 5-fold

Moderate Grade

5-fold to 15-fold

- A level that may result from a single UL97 mutation

High Grade

Greater than 15-fold

- Suggests the combined effect of UL97 and UL54 mutations

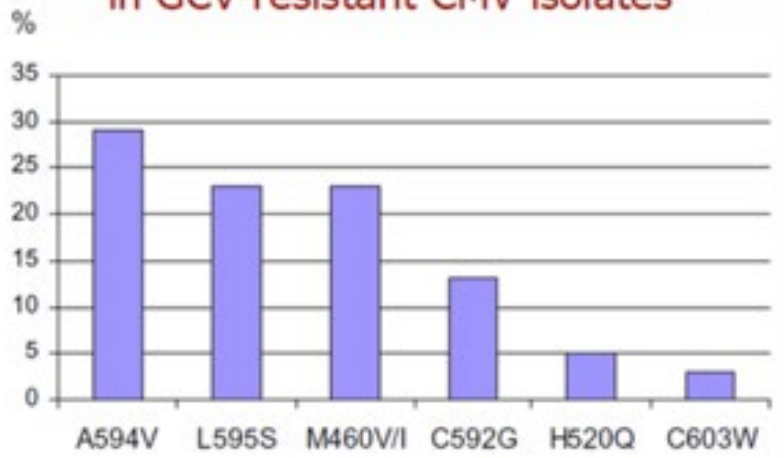
Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.

How Do You Confirm Resistant CMV?

UL97 variants show different levels of GCV resistance

Amino Acid Change	GCV IC_{50} ratio	Level of GCV Resistance
M460V/I, H520Q, A594V, L595S, C603W	5-10	Higher level resistance Alternate therapy indicated
C592G, A594T	2-3	Low level resistance
A591V, N597D	<2	Insignificant resistance
Q449K, H469Y, D605E	<1.5	Baseline polymorphisms No GCV resistance

Most common UL97 mutations detected in GCV-resistant CMV isolates[1]



1. Frequency in set of 79 GCV-resistant CMV isolates

Courtesy S. Chou

Lurain NS, Chou S. *Clin Microbiol Rev.* 2010;23(4):689-712.
Chou S. *Curr Opin Infect Dis.* 2015;28(4):293-299.

Treatment of Drug-Resistant/Refractory CMV

- First step is to reduce immunosuppressive therapy to the lowest feasible amount
- Therapies
  - Maribavir
  - High-dose ganciclovir
  - Foscarnet
  - Cidofovir
- Adjunctive therapies
- Investigational therapies
- Off-label therapies

Kotton CN, et al. *Transplantation.* 2018;102(6):900-931.

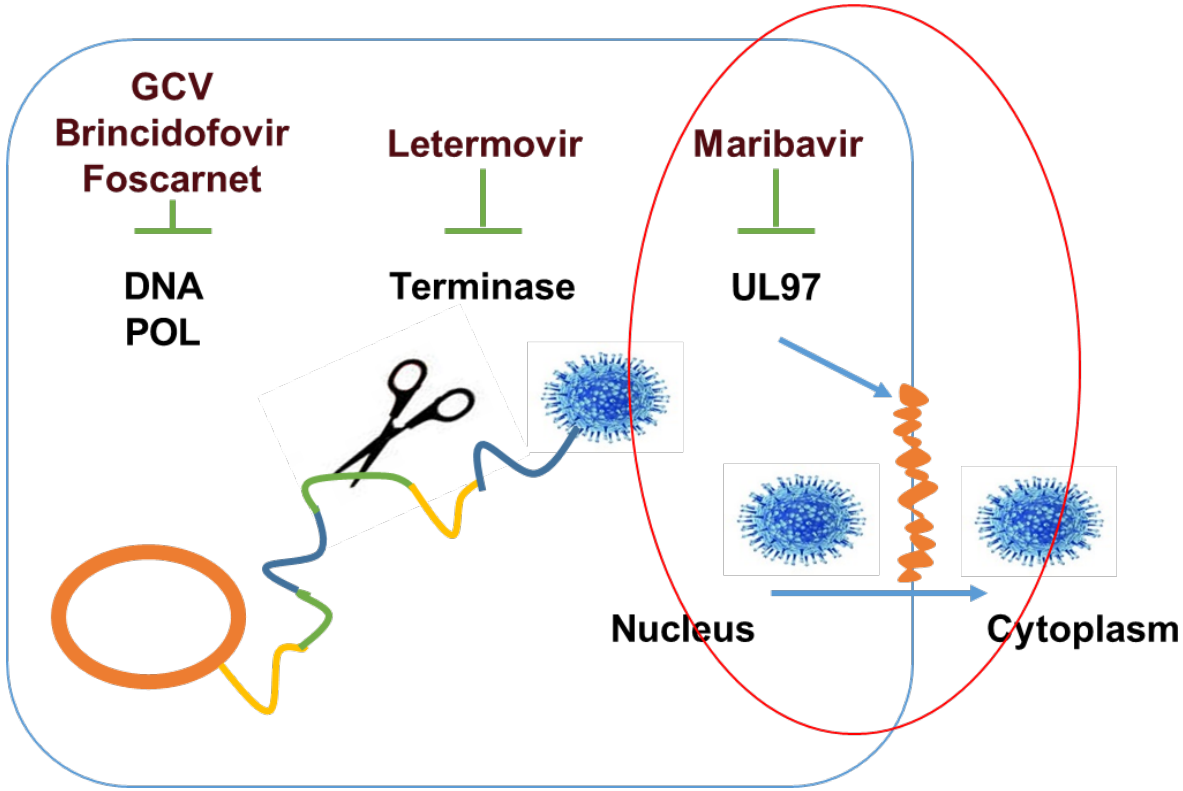
Maribavir

Mechanism of Action

- Inhibits UL97 viral protein kinase
  - Inhibits viral encapsidation
  - Inhibits nuclear egress of viral particles
- Maribavir does not inhibit the UL54 CMV DNA polymerase

Use

- FDA approved for the treatment of adults and pediatric patients (≥12 years) with post-transplant CMV infection/disease that is refractory to treatment (with or without genotypic resistance) with ganciclovir, valganciclovir, cidofovir, or foscarnet
- Orally bioavailable
- Not myelosuppressive or nephrotoxic – main side effect is taste disturbance
- Should not be used in case of encephalitis or retinitis

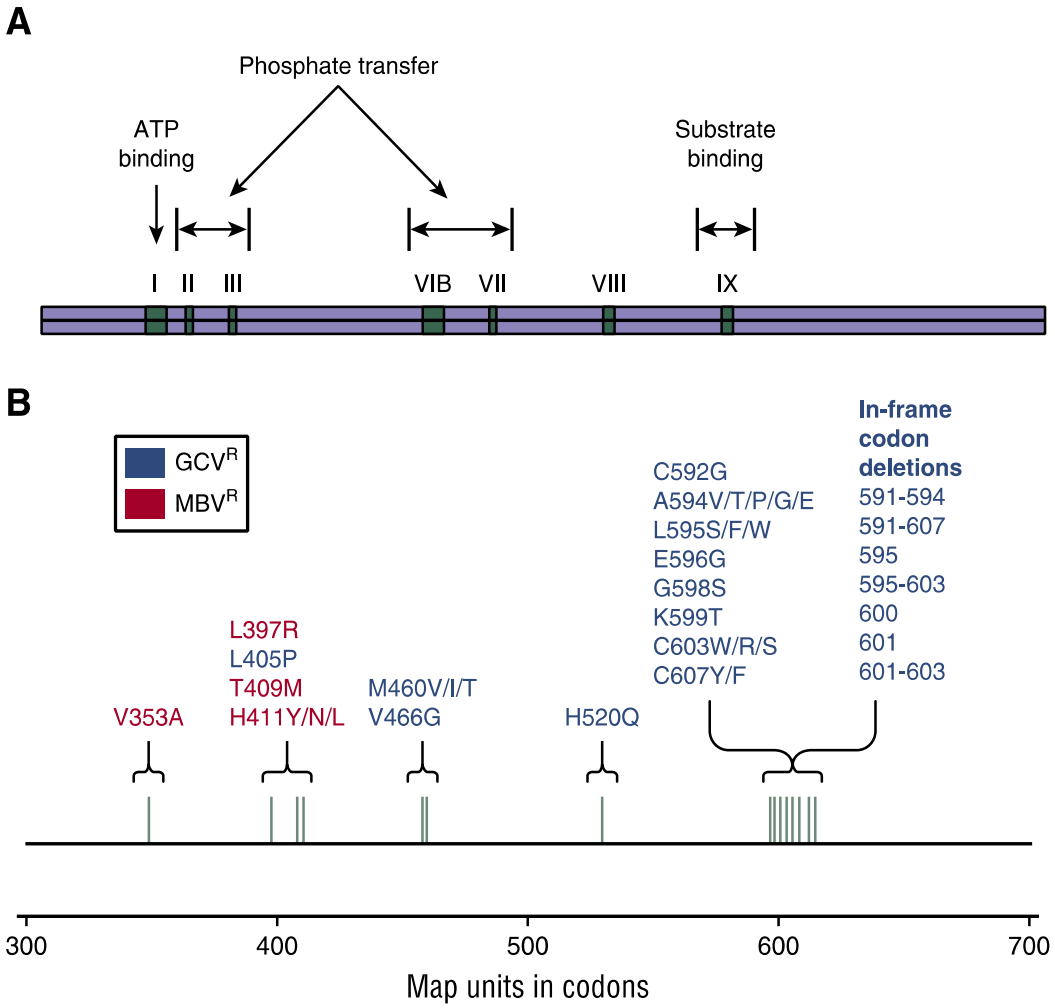


Razonable RR. *Clin Microbiol Infect*. 2023; 29(9):1144-1149.
Sun K, et al. *Clin Transl Sci*. 2024; 17(1):e13696.

Maribavir Resistance Generally Maps to Different Parts of UL97 Compared to GCV Resistance

A. Map of the CMV UL97 Gene: Functional Regions of the UL97 Kinase

B. UL97 Mutations with Corresponding Antiviral Resistance Profiles

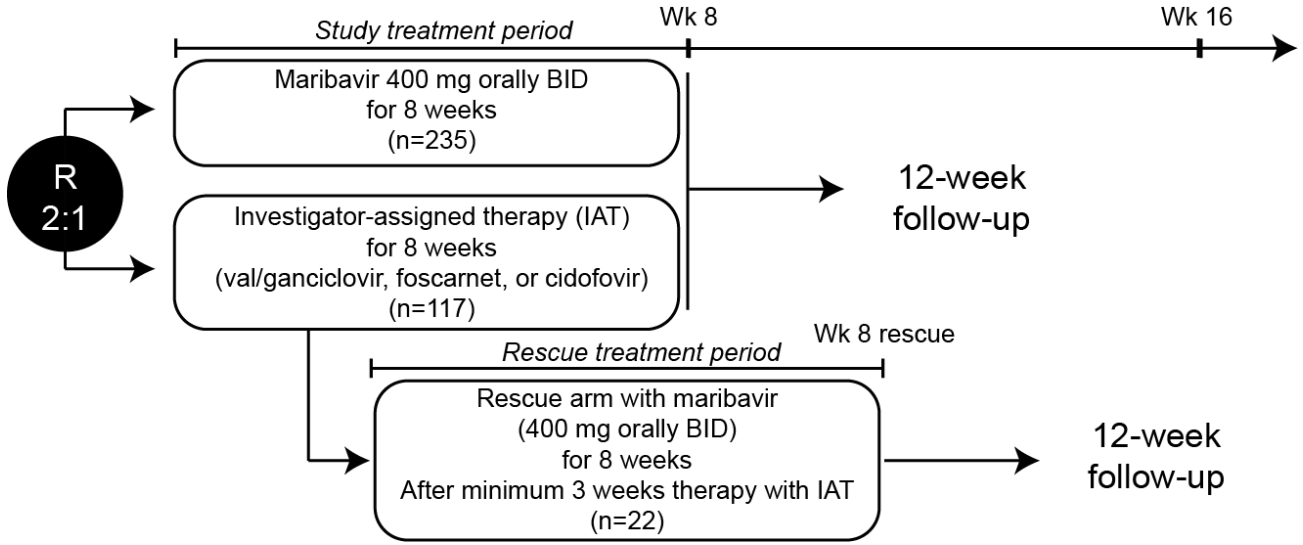


El Chaer F, et al. *Blood.* 2016;128(23):2624-2636.

Maribavir Phase 3 SOLSTICE Trial: Study Design

Key Study Inclusion Criteria

- SOT/HCT recipients
- CMV infection (plasma CMV DNA ≥910 IU/mL)
- Refractory to most recent therapy (failure to achieve >1 $\log_{10}$ decrease in CMV DNA after 14 days)



End Points		
Primary	**Key Secondary**	**Other Secondary**
Confirmed CMV viremia clearance (plasma CMV DNA <LLOQ in 2 consecutive tests ≥5 days apart at central laboratory) at end of Week 8	Composite of CMV viremia clearance and symptom control at end of Week 8 and maintained through Week 16	Assess the efficacy (including symptom control) and safety of maribavir as rescue treatment

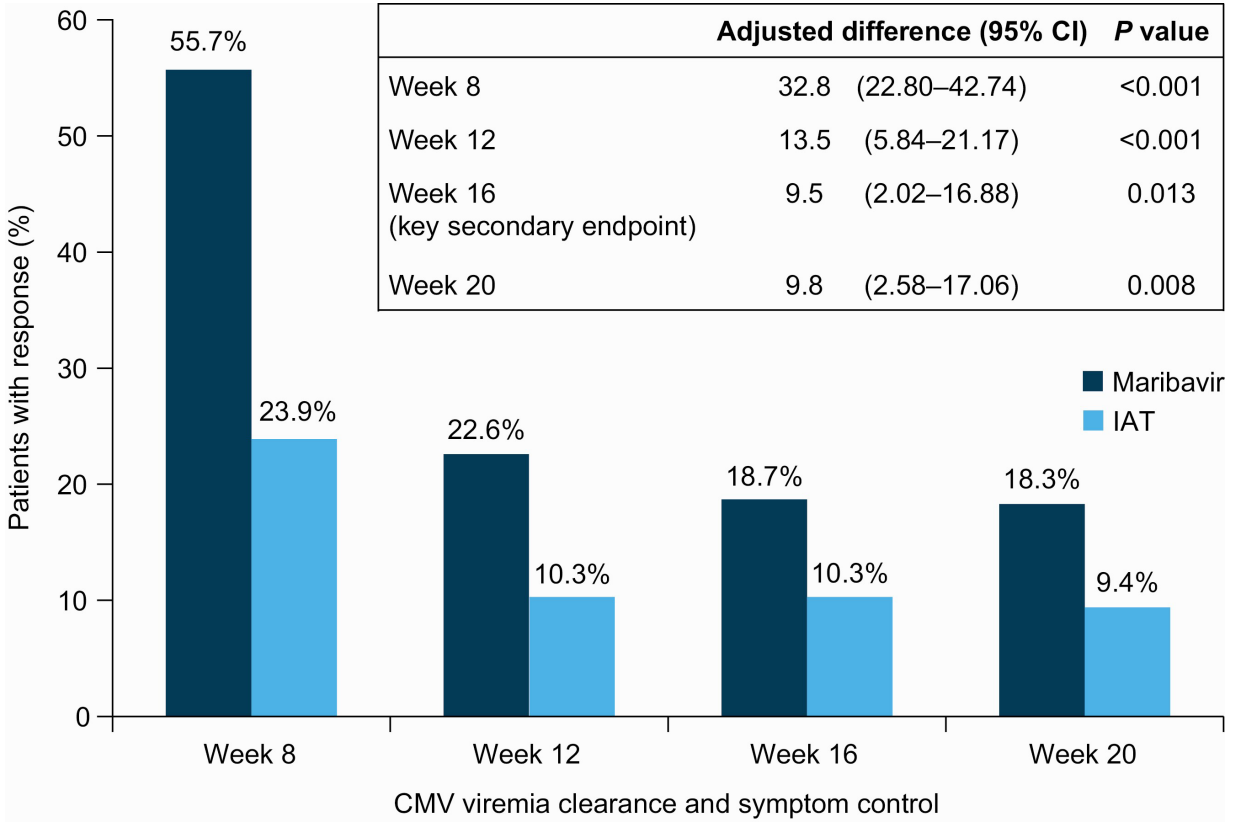
SOT, solid organ transplant; HCT, hematopoietic cell transplant; BID, twice daily; LLOQ, lower limit of quantification

Avery RK, et al. *Clin Infect Dis.* 2022;75(4):690-671.

Maribavir Phase 3 SOLSTICE Trial: Primary and Secondary Endpoint Results

Confirmed Viremia Clearance and Symptom Control

	Adjusted difference (95% CI)		*P* value
Week 8	32.8	(22.80–42.74)	<0.001
Week 12	13.5	(5.84–21.17)	<0.001
Week 16 (key secondary endpoint)	9.5	(2.02–16.88)	0.013
Week 20	9.8	(2.58–17.06)	0.008



Avery RK, et al. *Clin Infect Dis.* 2022;75(4):690-671.

High-Dose Ganciclovir

Appropriate Candidates

Best for those with:

- Low-level resistance UL97 gene mutations (C592G)
- Low-level DNAemia
- Asymptomatic or mildly symptomatic disease

Limitations

Data in SOT limited to few case series:

- 21% clearance rate in 14 patients with genotypic resistance and high-level DNAemia
- Narrow applicability

Regimen

Dose escalation from 7.5 to 10 mg/kg every 12 hours in normal renal function

Adverse Events

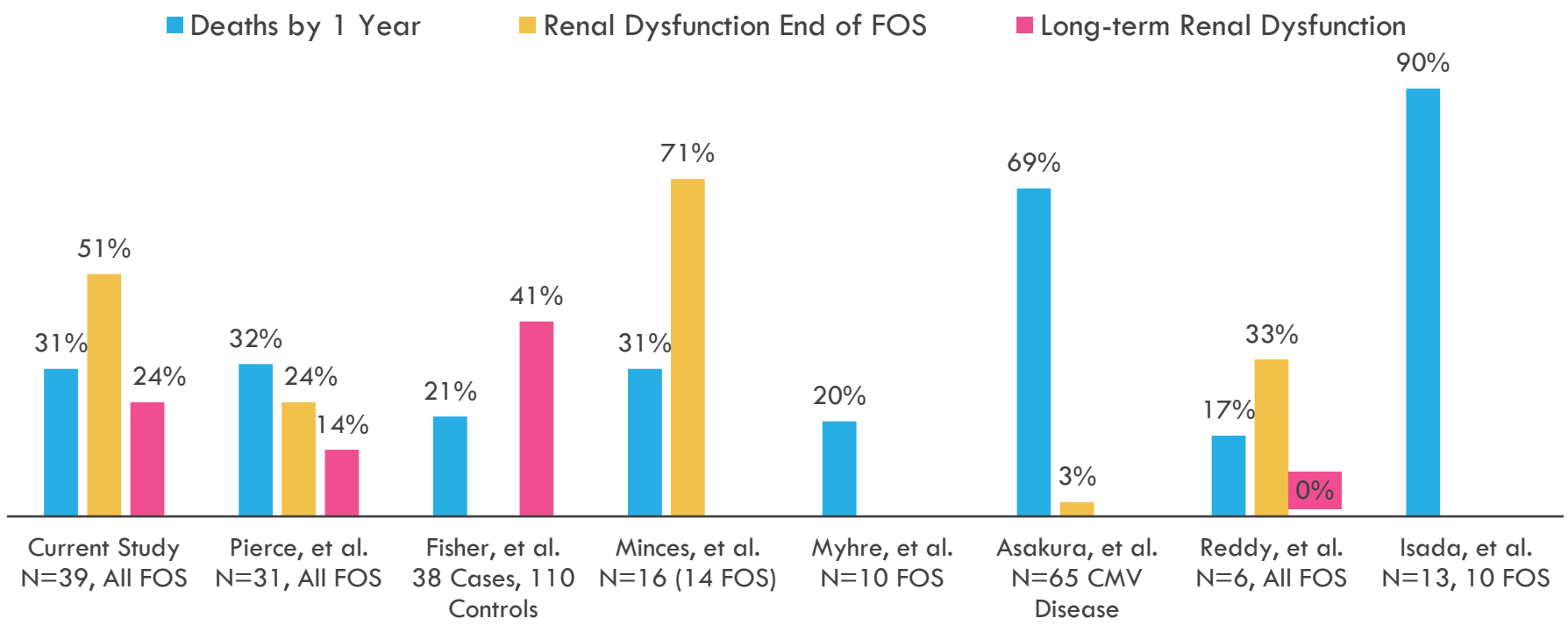
Neutropenia reported in approximately 50% of patients

SOT, solid organ transplant

Kotton CN, et al. *Transplantation*. 2018;102(6):900-931.

Foscarnet

Studies Published After the Year 2000, Reporting Outcomes of 6 or More Transplant Recipients Treated with Foscarnet for Established CMV Infection



Overall

- Virologic clearance: 66%
- CMV relapse: 31%
- Renal dysfunction: 51%
- 1 year mortality: 31%

Limitations:
Metabolic and renal toxicity

Avery RK, et al. *Transplantation.* 2016;100(10):e74-80.

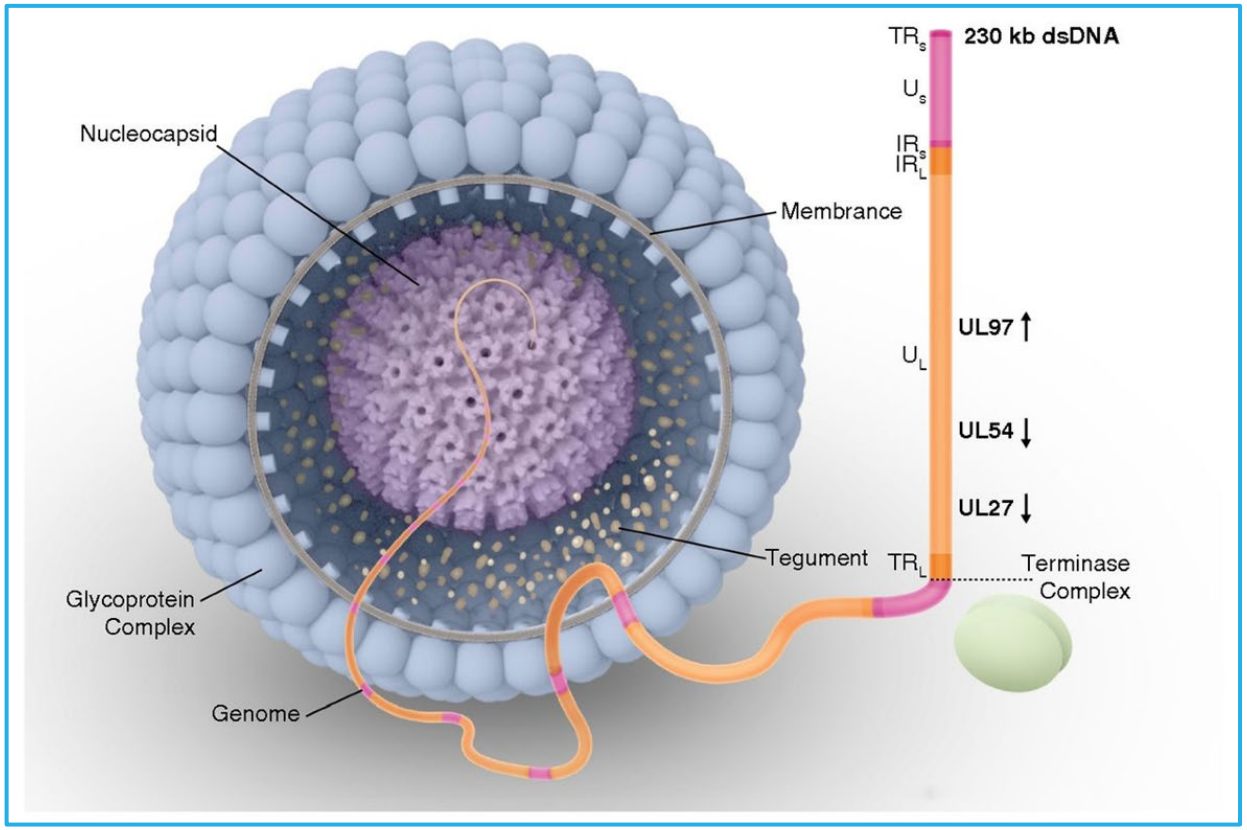
Letermovir

Mechanism of Action

- CMV replication involves cleaving of concatemeric genomic DNA and packaging of each genome into preformed virus capsids by the CMV terminase complex (UL56, UL89)
- Letermovir inhibits the terminase complex by binding to UL56

Use

- FDA approved for prophylaxis of :
  - CMV infection and disease in adult CMV-seropositive recipients of an allogenic HCT
  - High-risk kidney transplant recipients (D+/R-)



HCT, hematopoietic cell transplant

El Chaer F, et al. *Blood*. 2016;128(23):2624-2636.

Letermovir in Transplant Patients and R/R CMV Infection

- Limited clinical studies with R/R CMV infection – off-label, unproven indication
  - Multicenter study of 47 SOT and HCT patients with CMV treated with letermovir[1]
    - 37 patients with low VL (<1000 IU/mL) had good response
    - Only 2 patients had VL increase >1 log by 12 weeks
    - 10 patients with higher VL had mixed response (~60 % response to <1000 IU/mL)
  - Study of 28 lung transplant patients with R/R CMV treated with letermovir[2]
    - 14 patients with VL >10,000 IU/mL
    - 82.1% response with VL decline >1 $\log_{10}$
    - 3 patients developed letermovir resistance mutations (UL56, C325Y)
- Uncertainty about optimal dosing[3] and possible low barrier to resistance[4]
- More studies are needed before letermovir can be recommended for treatment

R/R, refractory/resistant; SOT, solid organ transplant; HCT, hematopoietic cell transplant; VL, viral load

1. Linder KA, et al. *Transpl Infect Dis*. 2021;23(4):e13687.
2. Veit T, et al. *Am J Transplant*. 2021;21(10):3449-3455.
3. Hakki M. *Curr Hematol Malig Rep*. 2020;15(2):90-102.
4. Shigle TL, et al. *Ther Adv Hematol*. 2020;11:2040620720937150.

Adjunctive, Investigational, and Off-label Therapies

CMV-Ig or IVIG

- Adjunctive use in severe disease
- Supply and cost limitations

Adoptive T-cell Therapy

- High rates of response
- Low toxicity
- Logistical and cost limitations
- Phase 1 study in SOT/HCT recipients (NCT03665675)

mTOR Inhibitors as Part of Immunosuppressive Regimen

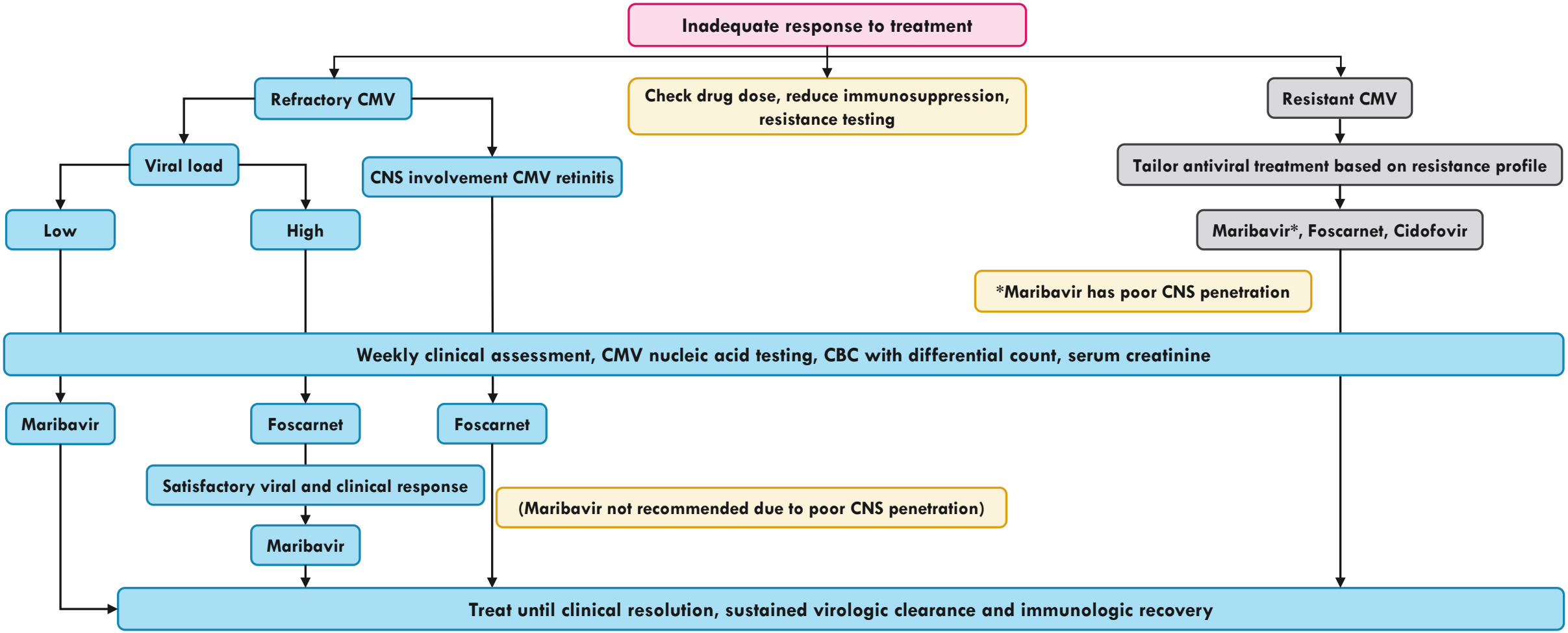
- Reduces risk of CMV infection
- Tolerability an issue

Leflunomide and Artesunate

- Mixed outcomes in very limited data
- Caution advised

Haidar G, et al. *J Infect Dis.* 2020;221(Suppl 1):S23-S31.
Kotton CN, et al. *Transplantation.* 2018;102(6):900-931.

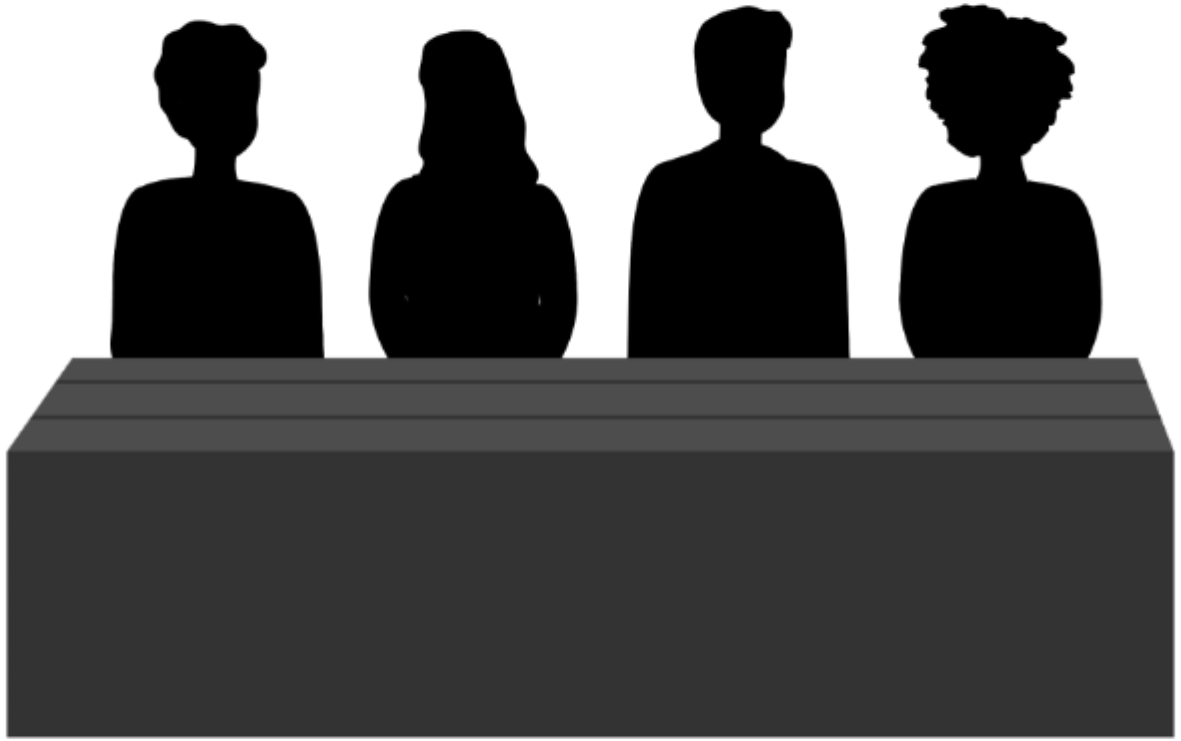
Management of Refractory or Resistant CMV in SOT



Razonable RR. *Clin Microbiol Infect*. 2023;29(9):1144-1149.

CARE TEAM FORUM®

Panel Discussion



Bret: CMV Patient

History

- 63-year-old male underwent double lung transplant for cystic fibrosis
- Basiliximab induction + tacrolimus/mycophenolate mofetil 1000 mg BID/prednisone 5 mg/day
- Methylprednisolone pulse 2 months post-transplant for ACR; CKD from CNI toxicity CrCL ~30 mL/min, listed for kidney transplant
- CMV donor seropositive/recipient seronegative (D+/R-); received 2 years of valganciclovir prophylaxis, renally adjusted
- Approximately 1.5 months later, presents with CMV syndrome, possible GI disease, CMV DNAemia 580,000 IU/mL (whole blood), started on IV ganciclovir

What Happened Next?

- Resolution of symptoms but persistently positive CMV DNAemia (500 to 1600 IU/mL); received CMV IgG; progressive increase of CMV DNAemia to 21,000 IU/mL
- CMV resistance testing: ganciclovir resistance, UL97 mutation (L595S)

BID, twice per day; ACR, acute cellular rejection; CKD, chronic kidney disease; CNI, calcineurin inhibitor; CrCl, creatinine clearance; CMV, cytomegalovirus; GI, gastrointestinal; IV, intravenous; GFR, glomerular filtration rate

Bret: CMV Patient (cont'd)

History (cont'd)

- Started on foscarnet with IV hydration and labs thrice weekly
- After 2 weeks, no significant change in CMV PCR, GFR 31 mL/min
- Foscarnet discontinued and maribavir 400 mg PO BID started
- Mild dysgeusia, CMV PCR not detected after 2 weeks of maribavir
- Received 8 weeks total of maribavir
- Episode of CMV reactivation about 1 year later, responded to VGCV but had neutropenia
- Intermittent, asymptomatic low level CMV DNAemia (250 to 350 IU/mL)
- Renal function stable, excellent lung function, no need for kidney transplant!

IV, intravenous; CMV, cytomegalovirus; PCR, polymerase chain reaction; GFR, glomerular filtration rate; PO; by mouth, BID, twice per day; VGCV, valganciclovir

CMV From the Patient Perspective

What Bret's Case Teaches Us

- High risk for CMV due to lung transplantation and CMV D+/R- status
- Had prolonged exposure to VGCV, a risk factor for development of antiviral resistance
- Renal insufficiency required antiviral dose adjustment
- At increased risk of nephrotoxicity with foscarnet and experienced neutropenia with VGCV
- Did well with maribavir, which allowed him to avoid further foscarnet treatment and maintain stable renal function. He does not need a kidney transplant now!
- Will be able to receive maribavir again, if necessary

CMV, cytomegalovirus; VGCV, valganciclovir

Audience Q&A