

# Viral infection rates and associated serious complications in pediatric umbilical cord blood transplant patients over the last decade

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## Background

In this study, we utilize a database of all pediatric umbilical cord blood transplants at UCLA Mattel Children's Hospital from 2008-2017, and report an assessment of these cases focusing on viral diseases and clinical outcomes. This work strives to determine risk factors for post-transplant viral disease.

## Objectives

- Characterize the distribution of various post-transplant viral diseases by demographics and timing of presentation.
- Describe the effects of viral disease on mortality
- Characterize the UCB transplant population at UCLA Mattel from 2008-2017

### UCB Transplanted Diseases 2008-2017

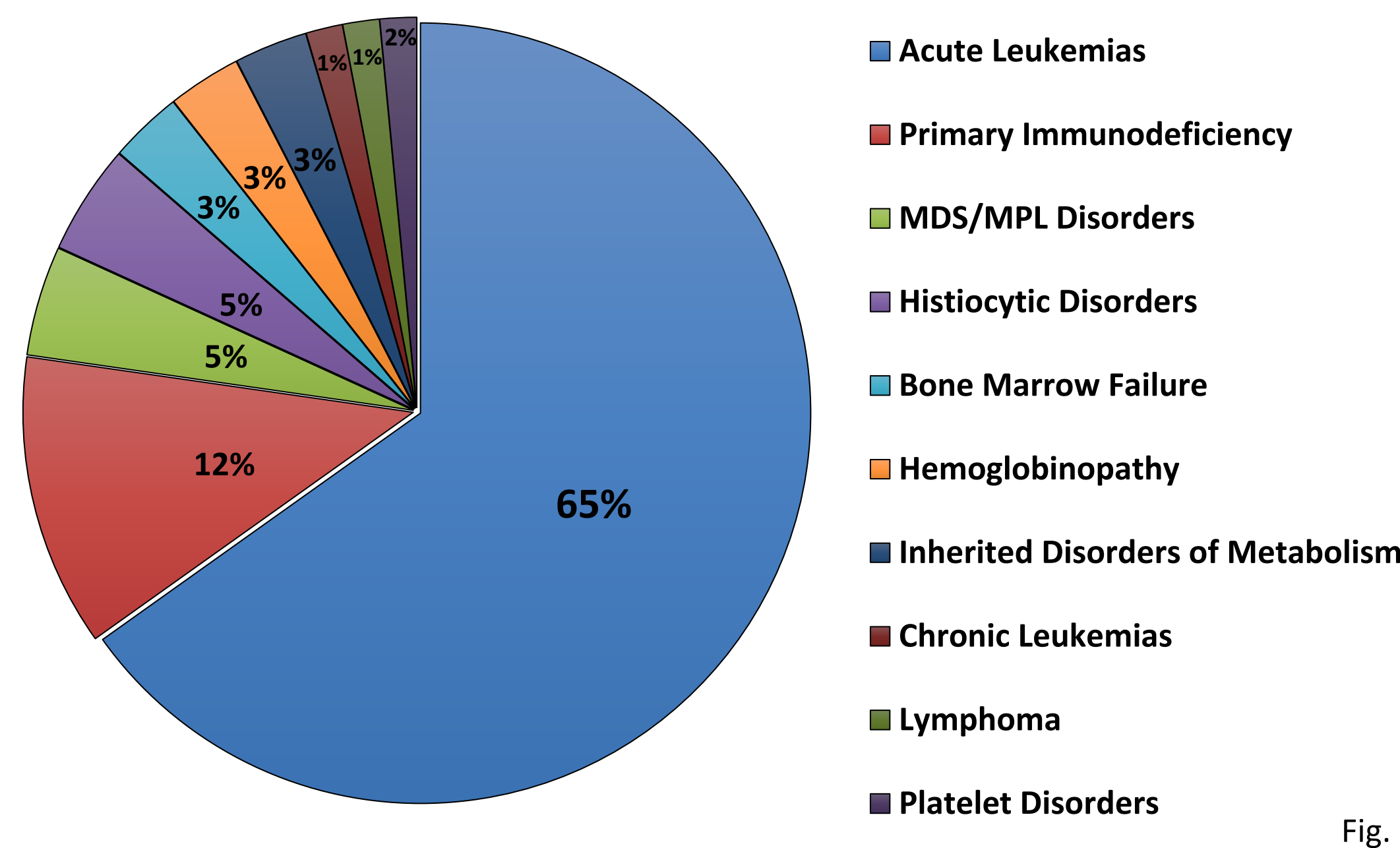


Fig. 1

### UCB Transplants (n=66) 2008-2017

Fig. 2

Race	Count	Conditioning Regimens	Count	Diagnosis	Count
White	10	BU/CY	24	ALL	18
African-American	4	BU/CY/ETOP/ATG	3	AML	24
Hispanic	49	BU/CY/ATG	4	Bilineage Leukemia	1
Middle Eastern	2	BU/FLU/ATG	4	CML	1
Asian	1	BU/FLU/Cy/ATG	1	JMML	3
Disease Status		BU/FLU/Cy/ATG	1	HLH	3
CR1	23	FLU/MEL/Alemtuzumab	1	Lymphoma	1
CR1, MRD+	3	TBI/ARA-C/CY	18	Beta-thalassemia Major	1
CR2	15	TBI/ARA-C/CY/ATG	1	Sickle Cell Disease	1
CR2, MRD+	1	TBI/ARA-C	2	Aplastic Anemia	1
CR3	3	TBI/ARA-C/Clofarabine/ATG	2	Fanconi Anemia	1
CR4	1	TBI/FLU/Cy	2	Glanzmann's Thrombasthenia	1
PR	3	TBI/FLU/Cy/Thiotepa	1	SCID	1
Aplastic	1	TBI/FLU/Cy/ATG	1	CGD	2
Active Disease	2	TBI/FLU/Cy/Thiotepa	1	Hyper IgM	1
N/A	14	TBI/FLU/Cy/ATG	1	MHC Class II Deficiency	2
Time to Engraftment		TBI/CY/Alemtuzumab	1	Omenn Syndrome	1
Less than 28d	45	TBI/CY/ATG	1	Immunodeficiency NOS	1
29-42d	11	TBI/ETOP/CY	2	X-ALD	1
Longer than 42d	2			Metachromatic Leukodystrophy	1
Graft Failure	9				

### Distribution of Viral Disease by Age

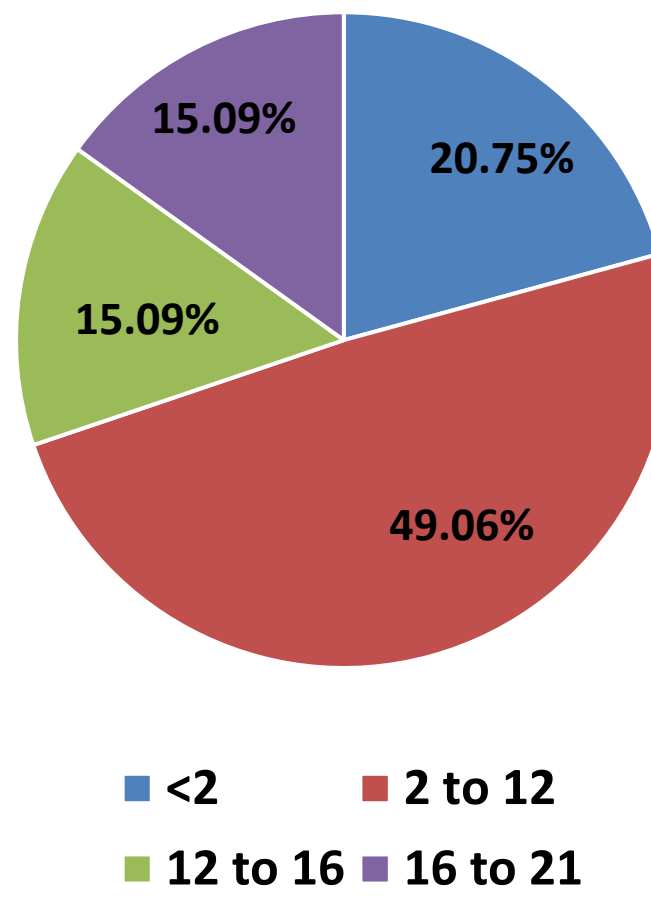


Fig. 3

### Viral diseases by Age Group

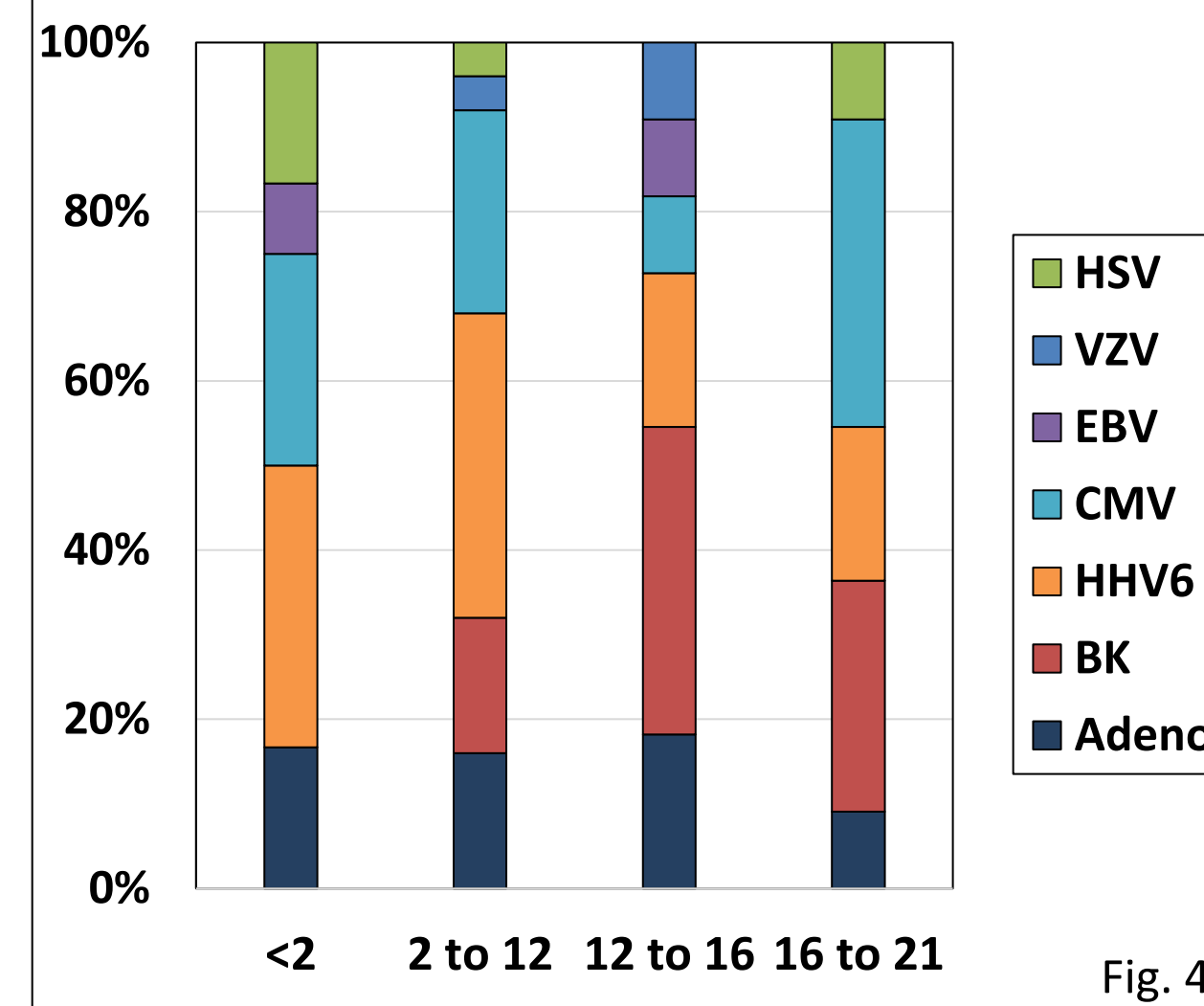


Fig. 4

CMV Serology	# of patients	Rate of Infection	Infectious Event 0-30d	Infectious Event 31-100d	Infectious Event 100-730d	CMV Disease
R-/D-	12	0.0%	0	0	0	0
R-/D+	18	5.5%	1	0	0	0
R+/D-	12	50.0%	2	4	0	5
R+/D+	19	52.6%	2	6	2	4
Total	61	27.8%	5	10	2	9

### Viral diseases by time from transplant (% of diagnoses)

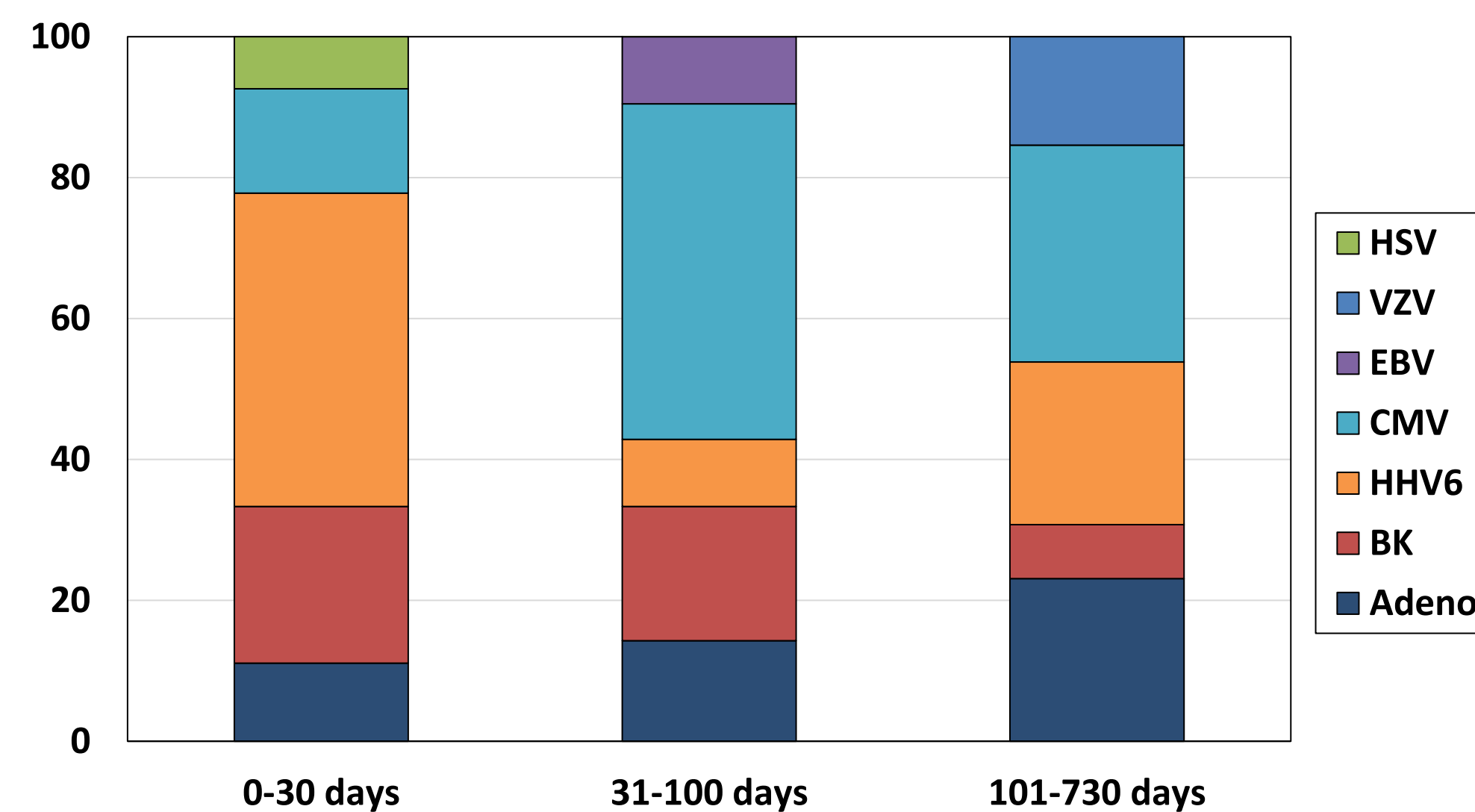


Fig. 5

## Conclusions

- Viral disease is a serious post-transplant complication for UCB transplant patients
- Age at transplant may influence likelihood of developing viral diseases
- Prophylaxis against CMV demonstrates moderate efficacy in seropositive patients, but the risk of CMV disease in these patients is still about 30%
- Viral encephalitis contributes significantly to mortality
- Respiratory viral infection (influenza, parainfluenza, RSV) were associated with respiratory failure and death
- With regards to mortality, infection is the leading primary cause of death

### Deceased Patients

Patient	Diagnosis	Primary Cause of Death	Comorbidities (AMI-Acute Respiratory Failure, BS-Bacterial Sepsis, F+Fungal Sepsis, GF-Graft Failure, RV-Respiratory Viral Inks)
D1	Fanconi Anemia	Infection	RVI, CMV, ARF
D2	JMML	Relapse	
D3	Omenn Syndrome	Cerebral Edema	
D4	CML	Infection	FS, GF
D5	ALL	Infection	BS, FS, BK, HHV-6 Encephalitis
D6	AML	Infection	FS, bronchiolitis obliterans
D7	ALL	GvHD	FS, ARF
D8	CGD	Infection	FS, ARF
D9	AML	GvHD	HHV-6, hemorrhagic stroke
D10	ALL	Malignant Disease	FS
D11	MHC-class II deficiency	Infection	ARF, RVI, GF
D12	Immunodeficiency NOS	Infection	FS, ARF
D13	AML	Malignant Disease	
D14	HLH	GvHD	FS, HHV-6, ARF
D15	AML	Malignant Disease	disseminated ADNV, disseminated HSV, HHV-6
D16	ALL	Infection	FS, disseminated ADNV, HHV-6, ARF
D17	AML	GvHD	BS, ARF
D18	AML	Malignant Disease	FS, HHV-6, BK, ARF
D19	AML	GvHD	CMV
D20	AML	GvHD	BS, ADNV encephalitis
D21	CGD	Infection	BS, FS, VOD
D22	AML	Malignant Disease	BS
D23	AML	Infection	GF, VOD
D24	ALL	Malignant Disease	

### Primary Causes of Death by Time

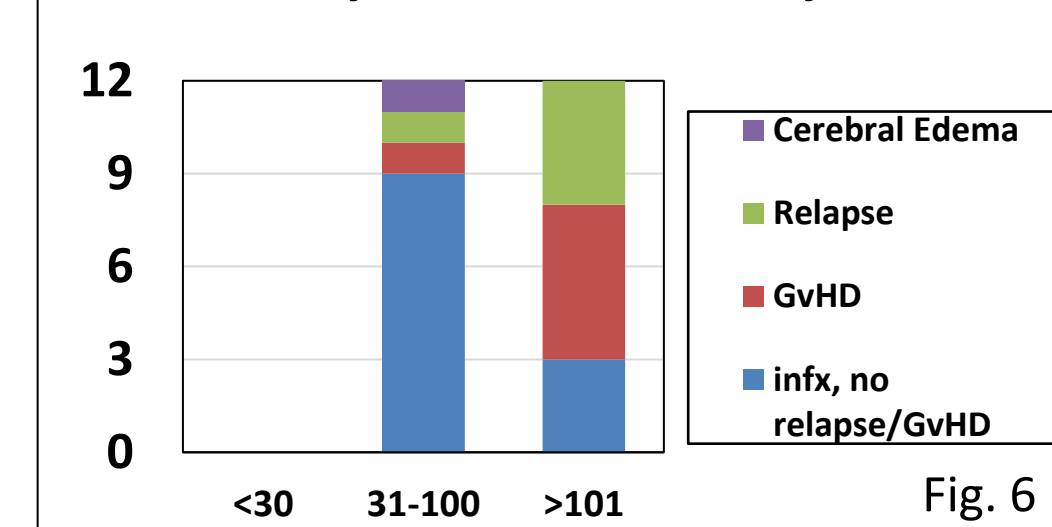
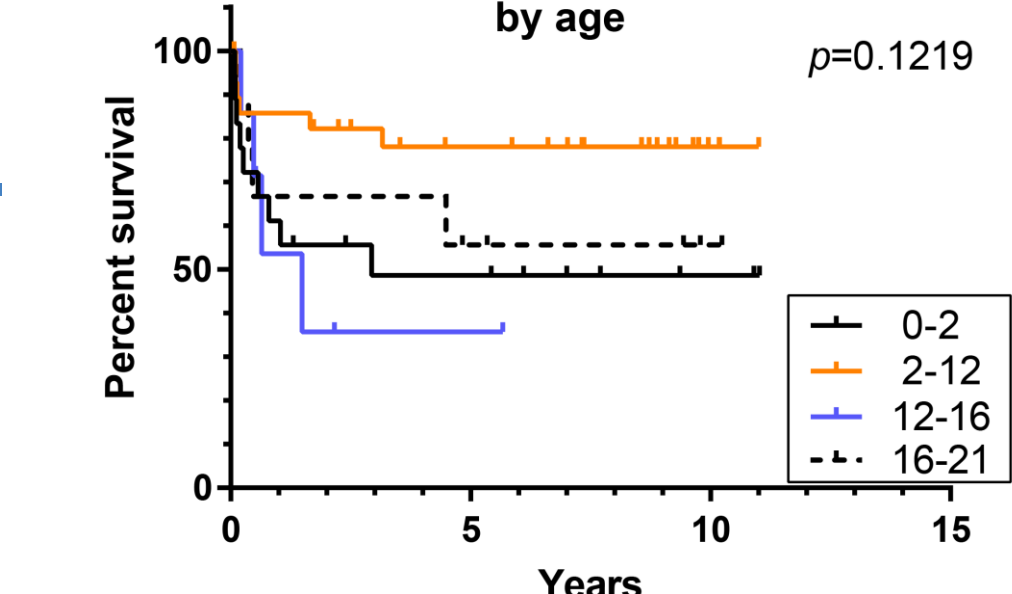


Fig. 6

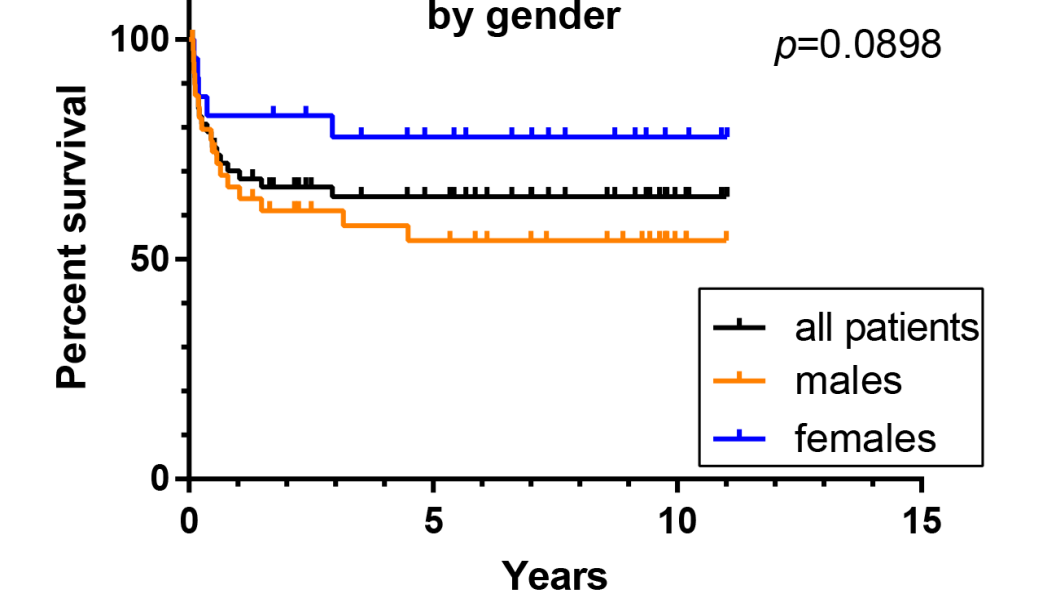
### Overall survival of all patients at first transplant by age



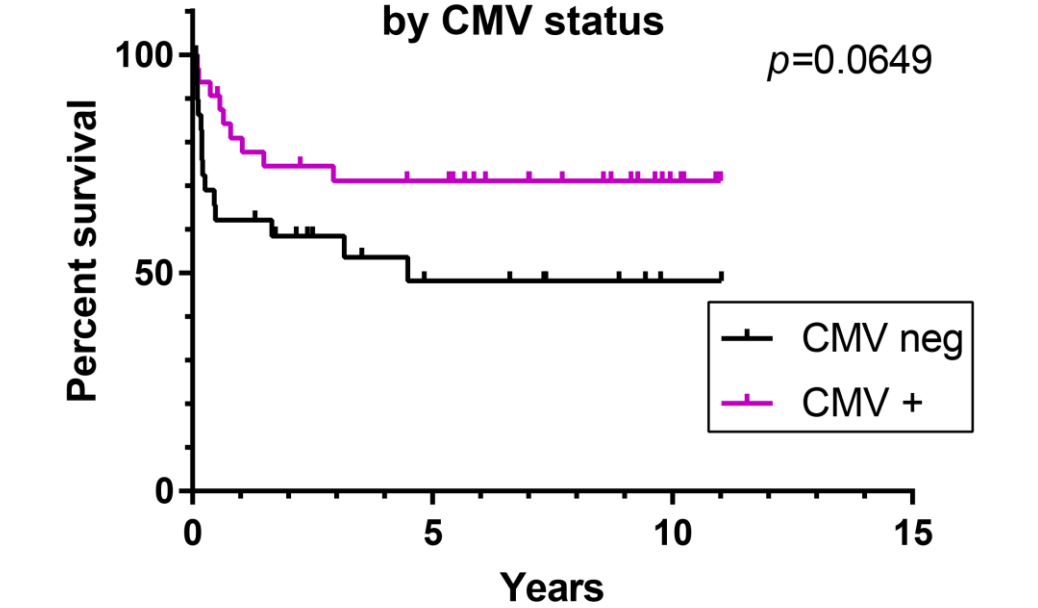
### Cases of Encephalitis

Patient (age)	Diagnosis (Primary Disease/Etiology/ Time from UCBT)	Comorbidities	Outcome (Treatment/Status/ Cause of Death)
E1 (19)	ALL HHV6 <30d	-BK Hemorrhagic Cystitis -Bacterial Sepsis -Fungal Sepsis	Foscarnet, Ganciclovir/ Deceased 139 days from encephalitis, Day +166/ BS, FS, HHV6, BK
E2 (5)	AML HHV6 <30d	-HHV6 viremia -GvHD -ADNV enteritis	Foscarnet, Ganciclovir/ Recovered from encephalitis, Deceased at Day +602/ relapsed disease, BS.
E3 (20)	AML ADNV 31-100d	-HHV6 viremia -GvHD -ADNV enteritis -VRE UTI	Cidofovir/ Deceased 43 days from encephalitis, Day +70/ AMS, AKI, GvHD, HHV6
E4 (4)	AML HHV6 <30d	-HHV6 viremia -BK hemorrhagic cystitis -Klebsiella UTI	Ganciclovir/ Alive
E5 (8)	ALL HHV6 <30d	-ADNV enteritis -HSV viremia -Aspergillus pneumonia -C.diff colitis	Acyclovir/ Deceased 39 days from encephalitis, Day +64/ FS, HHV-6, ADNV, ARF
E6 (9)	AML HHV6 <30d	-Graft failure -Fungal Sepsis -HHV-6 -ADNV	Foscarnet, Ganciclovir/ Deceased 17 days from encephalitis, Day +39/ GF, FS, HHV-6, ADNV, ARF
E7 (5 mo)	Omenn Sd. congenital infection suspected <30d	-Pseudomonas bacteremia	Acyclovir/ Deceased 21 days from encephalitis, Day +45/ Cerebral Edema
E8 (15)	AML Herpesvirus 100-730d	-GvHD -CMV viremia -BK viremia -Fungal Sepsis -ADNV enteritis	Acyclovir/ Deceased/ GF, lost to follow up

### Overall survival of all patients at first transplant by gender



### Overall survival of all patients at first transplant by CMV status



## Acknowledgements

Support was provided by NCI 1K23CA222659, American Society of Hematology Scholar Award, Hyundai Hope on Wheels Scholar Award, Miranda D. Beck Pediatric Cancer Research Foundation, and the Gwynne Hazen Cherry Memorial Fund, and the Short Term Training Program at the David Geffen School of Medicine at UCLA.