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Mahidol University
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A Measurement of Pre-transplant Anti-cytomegalovirus (CMV) Immunoglobulin G Titer to Predict Risk of CMV Infection in CMV-seropositive Kidney Transplant Recipients

No. 1198

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Background

- Although CMV-seropositive recipients were considered having a low risk of CMV infection, some patients remain at risk of CMV infection after transplant.
- Low pre-transplant CMV IgG titer has been reported as a predictor of CMV infection in CMV-seropositive liver and heart transplant recipients.
- This association in CMV-seropositive kidney transplant (KT) recipients has not been explored.
- We investigated a pre-transplant CMV IgG titer and other risk factors of CMV infection in CMV-seropositive KT recipients.

Methods

- We conducted a retrospective study at a single transplant center in Bangkok, Thailand, during 2017 and 2018.
- All CMV-seropositive KT recipients age ≥ 18 years old were included.
- Pre-transplant CMV IgG titer was measured with an enzyme-linked fluorescent immunoassay.

Figure 1 Study flow chart

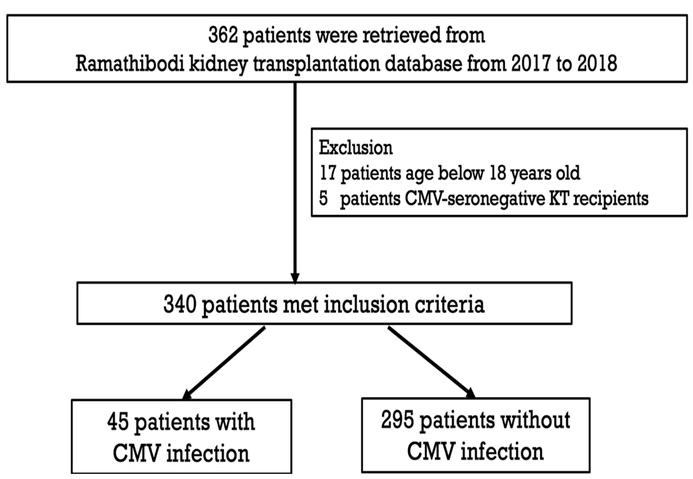


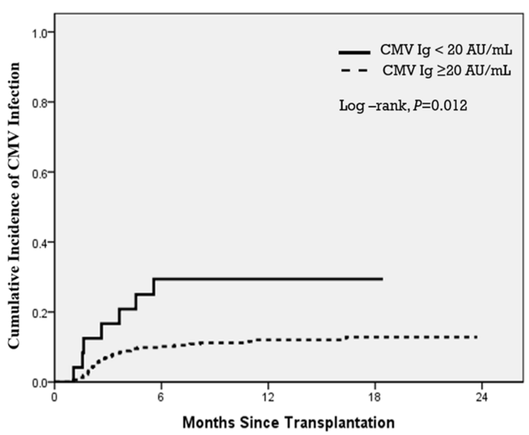
Table 1 Characteristics of KT recipients with and without CMV infection

Recipient variables	CMV infection (n=45)	Non CMV infection (n=295)	P-value
Recipient variables			
Sex			
Male	27 (60)	189 (64.1)	0.597
Female	18 (40)	106 (35.9)	
BMI (kg/m^2), mean (SD)	23.18 ± 3.92	22.66 ± 3.93	0.412
Pre-transplant CMV IgG titer			
< 20 (AU/mL)	7 (15.6)	17 (5.8)	0.027
≥ 20 (AU/mL)	38 (84.4)	278 (94.2)	
Donor variables			
Age, (years), mean (SD)	45 ± 12	39 ± 14	0.005
Donor status			
Living donor	4 (8.9)	104 (35.3)	< 0.001
Deceased donor	41 (91.1)	191 (64.7)	
Transplant variables			
Cold ischemic time (hours) (SD)	16.41 ± 5.95	11.38 ± 8.86	< 0.001
Surgical time (hours) (SD)	5.03 ± 1.80	4.68 ± 1.29	0.215
Induction therapy			
No	15 (33.4)	107 (36.3)	0.052
ATG	6 (13.3)	13 (4.4)	
Anti IL-2 receptor antagonist	24 (53.3)	175 (59.3)	
Post -transplant variables			
Maintenance therapy			
Prednisolone	45 (100)	295 (100)	>0.999
Tacrolimus	29 (64.4)	230 (78)	0.047
Cyclosporin A	16 (35.6)	64 (21.7)	0.041

Table 2 Cox Proportional Hazard Models for risk factors of CMV infection

Risk factor	Univariate Analysis		Multivariate Analysis	
	HR (95%CI)	P value	HR (95%CI)	P value
Recipient age	1.00 (0.98-1.03)	0.798		
Male	0.85 (0.47-1.53)	0.580		
BMI (kg/m^2) (per unit)	1.03 (0.96-1.10)	0.401		
CMV IgG titer <20 AU/mL	2.70 (1.21-6.05)	0.016	2.98 (1.31-6.77)	0.009
Donor age (per year)	1.03 (1.01-1.06)	0.008	1.03 (1.01-1.06)	0.005
Deceased donor	5.17 (1.85-14.45)	0.002		
Cold ischemic time (per hour)	1.07 (1.03-1.12)	0.001	1.06 (1.02-1.10)	0.002
Surgical time (per hour)	1.14 (0.97-1.33)	0.104		
HLA mismatch > 3	0.92 (0.50-1.70)	0.800		
PRA ≥ 51 %	1.40 (0.55-3.54)	0.482		
DFFP	5.30 (1.28-21.91)	0.021		
IVIG	3.48 (0.48-25.27)	0.218		
ATG	3.08 (1.20-7.95)	0.020	2.90 (2.90-1.09)	0.033
Anti IL-2 receptor antagonist	0.99 (0.52-1.88)	0.97		
Tacrolimus	0.55 (0.30-1.02)	0.056		
Cyclosporin A	1.84 (1.00-3.40)	0.049		

Figure 2 Kaplan-Meier plot for cumulative incidence of CMV infection after KT



Results

- During a mean follow-up of 14 months, the cumulative incidence of CMV infection was 14.8% including asymptomatic CMV infection (69%) and tissue-invasive disease (31%).
- In multivariate analysis, pre-transplant CMV IgG titer < 20 AU/mL remained significantly associated with CMV infection (HR, 2.98; 95% CI, 1.31-6.77, [p=0.009]).
- Other significant risk factors of CMV infection included older donor age, anti-thymocyte induction therapy and prolonged cold ischemic time.

Conclusions

❖ **A low pre-transplant CMV-specific humoral immunity is independently associated with post-transplant CMV infection in CMV-seropositive KT recipients.**

❖ **This universally available test could potentially stratify those at risk and target for preventive strategy.**