Assessing VZV/CMV-IgG and VZV/CMV ELISPOT and early post-transplant dynamics in kidney transplant recipients

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BACKGROUND

Varicella-zoster virus (VZV)-specific cell-mediated immunity (CMI) is critical for protection against herpes zoster after transplantation, but is commonly inferred from **VZV-IgG** rather than measured directly.

Objective: To characterize VZV-specific CMI before transplantation and its early post-transplant dynamics in comparison with CMV-specific CMI.

METHODS

- **Study population:** 130 participants, including 50 healthy kidney transplant (KT) donors, 50 KT candidates, and 30 liver transplant (LT) candidates.
- **VZV-specific immunity:** VZV-IgG serology and IFN-γ ELISPOT assays targeting VZV gE and IE63.
- **CMV-specific immunity:** CMV-IgG serology and IFN-γ ELISPOT assays targeting CMV pp65.
- **Longitudinal analysis after KT:** Nine KT recipients underwent serial VZV and CMV ELISPOT testing before transplantation and at 1 and 3 months after KT.

Characteristics	KT donor	KT candidates	LT candidates	p value
Age (median, IQR)	55.0 (44.0-61.0)	43.5 (34.0-56.0)	56.5 (49.0-65.0)	0.0002
Sex (male, %)	21 (42.0%)	24 (48.0%)	22 (73.3%)	0.0205
VZV IgG positivity	50 (100%)	41 (82%)	30 (100%)	0.0004

PRE-TRANSPLANT CMI

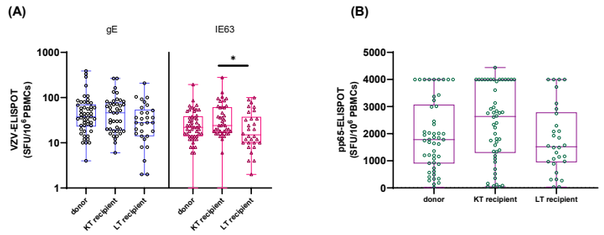


Figure 1. Pre-transplant VZV/CMV-specific CMI by study group. *$P < 0.05$

- Among VZV-seropositive participants (n = 121), IE63-specific ELISPOT responses differed among the three groups ($P = 0.046$) and were higher in KT candidates than in LT candidates.
- gE- and CMV pp65-specific responses did not differ significantly among groups

AGE & SEX EFFECTS

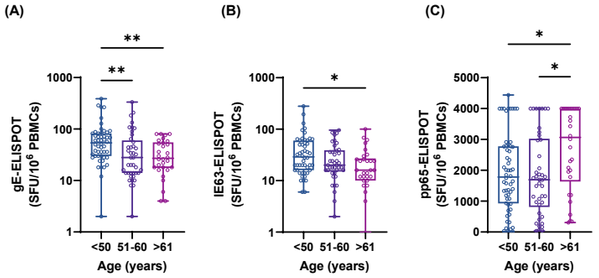


Figure 2. VZV- and CMV-specific cellular immune responses according to age. *$P < 0.05$

- VZV-specific CMI decreased with age (gE, $P = 0.002$; IE63, $P = 0.001$)
- CMV-specific CMI increased with age ($P = 0.016$)
- No significant sex-related differences in VZV/CMV CMI

VZV SEROSTATUS VS ELISPOT

- VZV-IgG–positive participants showed higher IE63-specific ELISPOT responses than seronegative participants ($P = 0.0215$)
- Despite VZV-IgG seropositivity, 9.1% and 15.8% were negative for gE- and IE63-ELISPOT, respectively
- Some VZV-IgG–negative participants retained ELISPOT responses.

EARLY POST-KT DYNAMICS

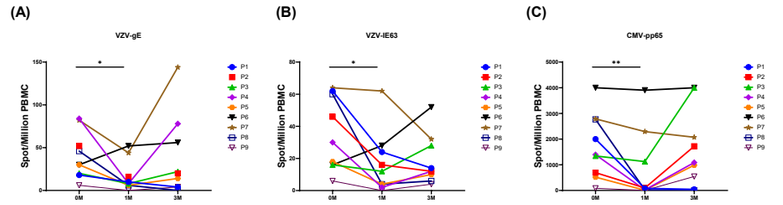


Figure 3. Serial VZV/CMV ELISPOT responses after kidney transplantation. *$P < 0.05$, ** $P < 0.01$

At 1 month: VZV- and CMV-specific CMI declined markedly
By 3 months: CMV pp65 responses showed substantial recovery (82->1,088 SFU), whereas VZV gE and IE63 responses remained lower and heterogeneous.

KEY CONCLUSIONS

1. VZV-specific CMI was relatively preserved before KT but declined markedly early after transplantation.
2. VZV ELISPOT responses decreased with age and showed limited agreement with VZV-IgG serostatus.
3. Serology alone may therefore not fully reflect VZV-specific cellular immunity.
4. VZV-specific ELISPOT may complement serology for immune assessment, warranting further prospective validation.

ELISPOT = enzyme-linked immunospot; CMI = cell-mediated immunity; KT = kidney transplantation; LT = liver transplantation; SFU = spot-forming units