

Vaccination In Renal Transplantation



General Consideration

Introduction

Vaccines are an important
preventative tool and
offer protection against
infection

Introduction

At increased risk of infectious complications of vaccine-preventable diseases

Diminished response to many vaccines in organ failure

Transplant candidates and recipients

Full complement of recommended vaccinations prior to transplantation

Immunization early in the course of kidney failure

Pre-Transplant Vaccination

- Ideally, KT recipients should be vaccinated as early as possible as the response to vaccines is diminished in end-organ failure and in states of immunosuppression
- It is recommended to vaccinate patients with CKD, not requiring dialysis, so that they can mount an optimal immunological response

World J Transplantation 2019 January 16; 9(1): 1-13
Clinical Transplantation. 2019;33:e13563

Pre-Transplant Vaccination

- Vaccination status should be reviewed at the first transplant clinic visit
- For patients who are incompletely or unvaccinated prior to transplant, consultation with an infectious disease specialist is recommended

Timing of Vaccination

- If feasible



Vaccines should be administered
prior to planned immunosuppression

Timing of Vaccination

- Live vaccines:
 - ≥ 4 w prior to transplantation
 - Avoided within 2 w of transplantation



Timing of Vaccination

After administration of live viral vaccines:

- Viral replication and immunologic response < 3 w
- Vaccination ≥ 4 w prior to transplant is safe

Live Vaccine

- Live vaccine may interfere with the reading of tuberculin skin test and IGRA
- Therefore, the TST should be performed simultaneously with live vaccine or delayed by at least 28 d

Timing of Vaccination

- Inactivated vaccines should be administered

≥ 2 w

prior to transplantation



Immunosuppression after Transplant

In solid-organ recipients receiving immunosuppression, the immune system will not be able to mount a response as effective as in normal subjects

Immunosuppression after Transplant

Most immunosuppressive regimens
after solid-organ transplant

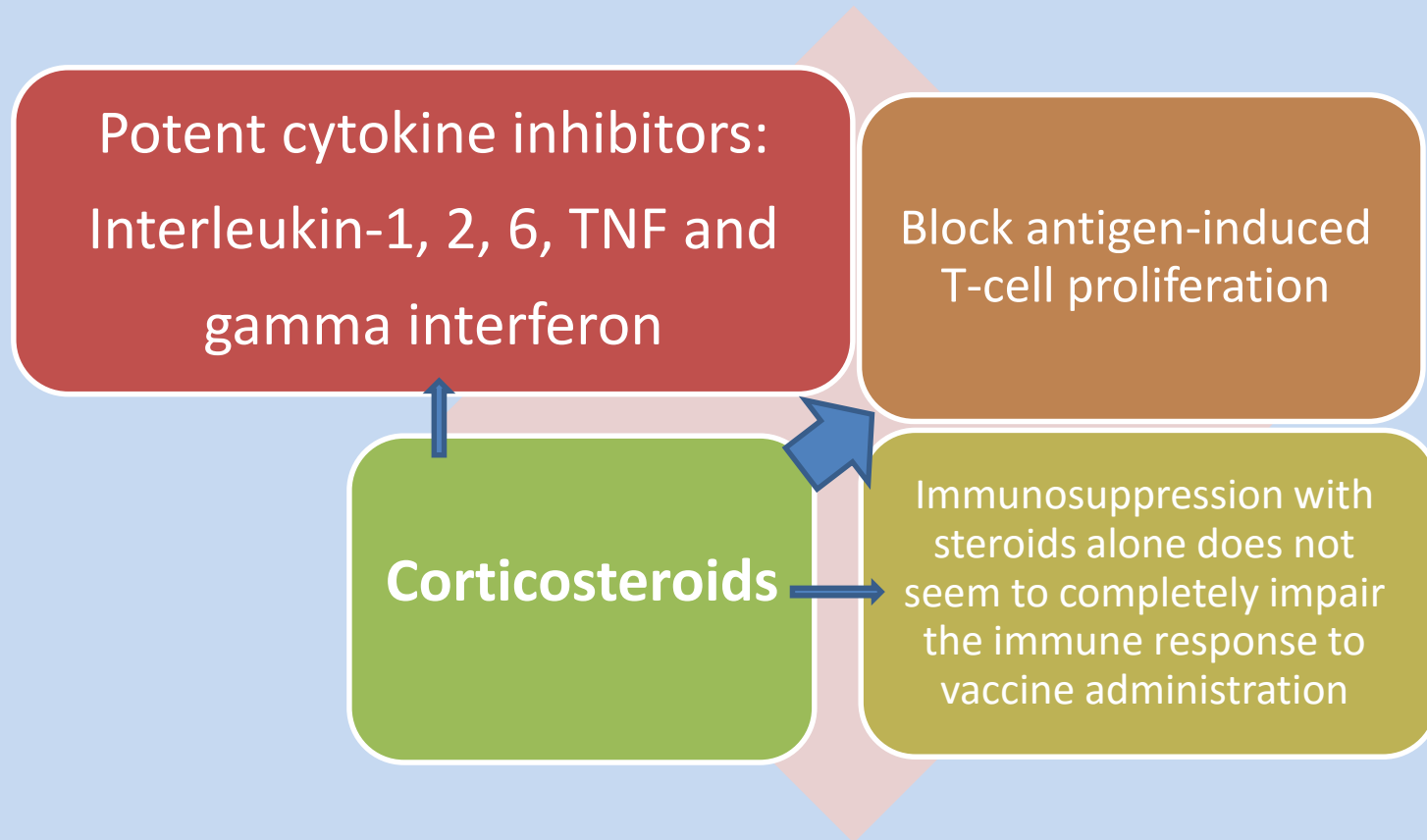
Steroids

Calcineurin
inhibitors

Cyclosporin
and
Tacrolimus

Both T and B cell responses are impaired through blockage of cellular proliferation after antigen stimulation as well as inhibition of cytokine production necessary for such stimulation

Immunosuppression after Transplant



Immunosuppression after Transplant

**Calcineurin
inhibitors**

Directly inhibit interleukin-2
dependent T-cell proliferation

Blocking interleukin-4 and 5
production by T cells with
inhibitory effect on B-cell function
and antibody production

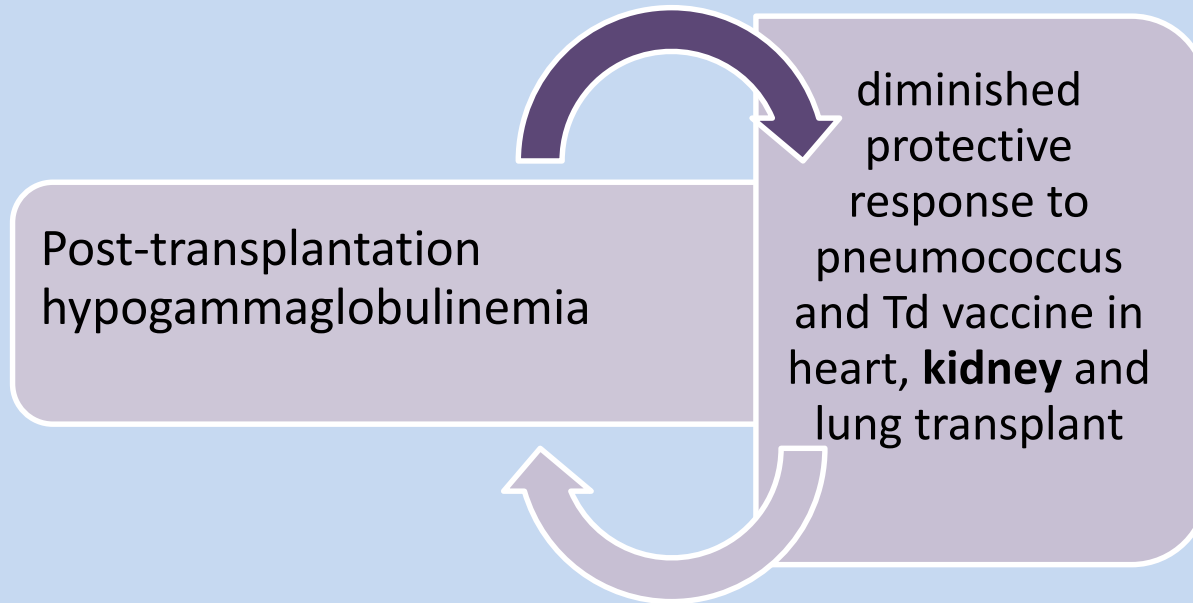
Immunosuppression after Transplant

- Interfere with purine synthesis
- Blocking both T- and B-cell proliferation

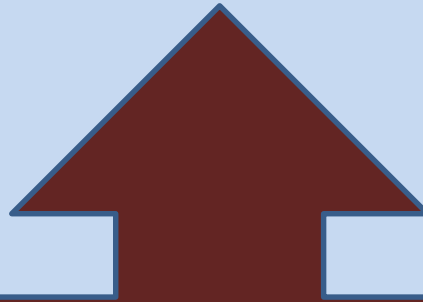


Azathioprine
and
Mycophenolate mofetil

Immunosuppression after Transplant



Immunosuppression after Transplant



The combination of these mechanisms leads to significant impairment of the entire immunologic cascade following antigen presentation to immune cells

Immunosuppression after Transplant

- The production of new memory cells and the survival of memory cells acquired prior to transplantation is critical to an effective response to vaccines
- The effect of immunosuppression on immune memory cells is not completely understood and the specific life span of memory T cells have not been determined in these patients

Timing of Vaccination Post Transplant

- If a vaccination series is initiated pre-transplant but not completed prior to transplantation, continuation can occur in the post-transplant period



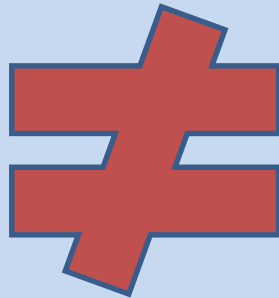
Timing of Vaccination Post Transplant

- Standard age-appropriate inactivated vaccine series should be administered 2 - 6 months after SOT(3-6 m)
- IIV can be administered ≥ 1 month after transplant during a community influenza outbreak

Post Transplant Vaccination

AST 2019

Vaccination during active treatment for rejection should be avoided



IDSA 2013

Vaccination should not be withheld because of concern about transplant organ rejection

Post Transplant Vaccination

- MMR vaccine and VAR should generally not be administered to SOT recipients



Except for varicella:

- ✓ In children without evidence of immunity who are renal or liver transplant recipients
- ✓ Are receiving minimal or no immunosuppression
- ✓ Have no recent graft rejection

Serologic Response in KT

- KTs are on life-long immunosuppression
- After vaccination
 - Lower rates of seroconversion
 - Lower mean antibody titers
 - Waning of protective immunity over shorter periodas compared to general population

Serologic Response in KT

- Seroconversion should be documented by serologic assays where available

**A minimum of 4 weeks should elapse
between vaccine administration and
evaluation for seroconversion**

Vaccination before & after KT

Vaccine	Recommended before KT	Recommended after KT
HBV	Yes	Yes
Influenza	Yes	Yes
Tdap/ Td	Yes	Yes
Pneumococcal vaccine	Yes	Yes
Haemophilus influenza type B	Yes	Yes

Vaccination before & after KT

Vaccine	Recommended before KT	Recommended after KT
HPV	Yes	Yes
Varicella Zoster	Yes	No
Rotavirus	Yes	No
MMR	Yes	No
IPV/OPV	Yes	Yes for IPV No for OPV

Evaluation for Serologic Response

- HBV > 10 mIU/ml
- Tetanus
- *H.influenzae* vaccine-induced anticapsular Ab(polyribosylribitolphosphate) >0.15 mg/L
- MMR

Household Members & HCWs Vaccination



Introduction

- Every effort should be made to ensure that transplant candidates and their household members have completed the full complement of recommended vaccinations prior to transplantation

Household Members Vaccination

Individuals who live in a household with immunocompromised patients can receive inactivated vaccines

Household Members & HCWs

Vaccination

- Possible transmission through close contact
 - Live intranasal influenza
 - Oral polio
 - Smallpox vaccines

should be deferred in HCWs and household members of transplant recipients when possible

Household Members Vaccination

Age ≥ 6 months
should receive
influenza vaccine
annually

Household Members Vaccination

- They should receive either:

(a) IIV

OR

(b) LAIV provided they are healthy, not pregnant, and aged 2–49 y

Household Members Vaccination

If LAIV administered in this situation

Contact with the
immunocompromised
patient should be avoided for
7 d?

Household Members Vaccination

- OPV should not be administered to individuals who live in a household with immunocompromised patients



Household Members & HCWs

Vaccination

Other live attenuated vaccines

- Varicella/Zoster
- MMR
- Rotavirus in infants aged 2–7 m

are unlikely to result in transmission from normal host to immunocompromised host

Household Members Vaccination

Immunocompromised patients should **avoid contact with persons who develop skin lesions** after receipt VAR or ZOS until the lesions clear

Household Members Vaccination

- Transplant recipients caring for infants who have been given rotavirus vaccine should defer diaper changing for 2-4 weeks and otherwise enact scrupulous hand hygiene

Household Members Vaccination

Indicated Vaccines

Inactivated vaccines	Influenza	Live Vaccine
Td/Tdap Pneumococcal HPV	IIV LAIV	MMR Zoster Varicella Rotavirus

Pet Immunization

- Pets should also be fully immunized
- There is little or no risk of transmission following immunization of pets with live vaccines





References

- World J Transplantation 2019 January 16; 9(1): 1-13
- 2013 IDSA Clinical Practice Guideline for Vaccination of the Immunocompromised Host
- Practical guide to vaccination in all stages of CKD.AJKD 2019,article in press

References

- Adv Chronic Kidney Dis 2019;26(1): 72-78
- Curr Opin Nephrol Hypertens 2019, 28:581-586
- Curr Treat Options Infect Dis 2021, 13:47–65
- Clinical Transplantation. 2019;33:e13563
- World J Transplant 2018 June 28; 8(3): 68-74