NİÇG KLİMİK DERNEĞİ NAKİL İNFEKSİYONLARI ÇALIŞMA GRUBU

BİLİMSEL PROGRAM

13:45–14:45 **Nakil Alıcılarında Bağışıklama**

Oturum Başkanı: **Yaşar Bayındır**

SOT Öncesi Bağışıklama: Köprüden Önce Son Çıkış
Sibel Altunışık Toplu

KİT'te Yeniden Bağışıklama
Damla Ertürk

Solid Organ Nakli Adaylarında Aşılama "Köprüden Önce Son Çıkış"

Doç.Dr. Sibel Altunışık Toplu
İnönü Ünversitesi Tıp Fakültesi
Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji AD,
10-11 Ocak 2026, Ankara

Neden önemli

- SOT alıcılarında enfeksiyonlar → mortalite ve greft kaybının başlıca nedenlerinden
- Aşıyla önlenebilir enfeksiyonlar:
  - İnfluenza
  - Pnömokok
  - HBV
  - Varisella / Kızamık
- Nakil sonrası:
  - Aşı yanıtı ↓
  - Canlı aşılar **çoğunlukla kontrendike**

SPECIAL ISSUE-TRANSPLANT INFECTIOUS DISEASES

Clinical TRANSPLANTATION WILEY

Vaccination of solid organ transplant candidates and recipients: Guidelines from the American society of transplantation infectious diseases community of practice

Lara Danziger-Isakov[1] | Deepali Kumar[2] | On Behalf of The AST ID Community of Practice

[1]Pediatric Infectious Diseases, Cincinnati Children's Hospital Medical Center & University of Cincinnati, Cincinnati, Ohio

[2]Transplant Infectious Diseases, University Health Network, Toronto, Ontario, Canada

Correspondence
Deepali Kumar, Transplant Infectious Diseases, University Health Network, PMB 11-174, 585 University Avenue, Toronto, ON, Canada M5G 2N2.
Email: deepali.kumar@uhn.ca

Abstract

These updated guidelines of the AST IDCOP review vaccination of solid organ transplant candidates and recipients. General principles of vaccination as well as the use of specific vaccines in this population are discussed. Vaccination should be reviewed in the pre-transplant setting and appropriate vaccines updated. Both inactivated and live vaccines can be given pre-transplant. The timing of vaccination post-transplant should be taken into account. In the post-transplant setting, inactivated vaccines can be administered starting at 3 months post-transplant with the exception of influenza which can be given as early as one month. Inactivated vaccines can be safely administered post-transplant. There is accumulating data that live-attenuated vaccines can also be given to select post-transplant patients. Close contacts of transplant patients can receive most routine live vaccines. Specific vaccines including pneumococcal, influenza, hepatitis B, HPV, and meningococcal vaccines are discussed. Newer vaccines for seasonal influenza vaccine and herpes zoster are highlighted. Live-attenuated vaccines such as measles, mumps, rubella, and varicella are also discussed. Emerging data on live-attenuated vaccines post-transplant are highlighted.

AST IDCOP 2019: Vaccination status should be reviewed at first transplant clinic visit.

Immunization of Solid Organ Transplant Candidates and Recipients: A 2022 Update

Hannah Bahakel, MD[a], Amy G. Feldman, MD, MSCS[b], Lara Danziger-Isakov, MD[a,c,*]

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lates and

Aşılanma oranları düşündüğümüzden çok daha düşük

Böbrek nakli adaylarında:

- **İnfluenza: %55**
- **Pnömokok: %36**
- **Zona: %7**
- **Tetanoz: %2**

Pediatrik karaciğer nakli hastalarında:

- **Nakil sırasında tam aşılı olanlar yalnızca %29**

Lee DH et al., Transpl Infect Dis 2015;
Feldman AG et al., JAMA 2019
(AST/IDSA Review 2022)

İmmünolojik Arka Plan

- Son dönem organ yetmezliği → **immün disfonksiyon**
- İmmünsüpresyon:
  - B-hücre ve T-hücre yanıtı baskılanır
  - Antikor titresinde hızlı düşüş
- Mikofenolat, steroid, anti-CD20 → zayıf aşı yanıtı

Scanlon N, Saklawi Y, Rouphael N. The Role of Systems Vaccinology in Understanding the Immune Defects to Vaccination in Solid Organ Transplant Recipients. Front Immunol. 2020

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Review Article

Vaccination strategies for transplantation in Japan (solid organ transplantation and hematopoietic stem cell transplantation)

Takeshi Tanaka [a,*], Satoshi Kakiuchi [a], Ayumi Fujita [a], Masato Tashiro [a,b], Koichi Izumikawa [a,b]

[a] Infection Control and Education Center, Department of Infectious Diseases, Nagasaki University Hospital, Nagasaki, Japan
[b] Department of Infectious Diseases, Nagasaki University Graduate School of Biomedical Science, Nagasaki, Japan

ARTICLE INFO

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Vaccine
Solid organ transplant
Hematopoietic stem cell transplant
Immunogenicity
Subsidy
Co-payment

ABSTRACT

The management of infectious diseases in immunocompromised patients represents a critical component of managing severe and refractory conditions, with early diagnosis and prompt therapeutic intervention serving as fundamental principles. Vaccine-preventable disease (VPD) management is equally essential. From a health economics perspective, this approach is pivotal in preventing potentially intractable scenarios. This article reviews immunization strategies in adult patients undergoing solid organ transplantation (SOT) and hematopoietic stem cell transplantation (HSCT) in Japan, two distinct categories of immunocompromised individuals. Although many recommended vaccines overlap between these groups, the timing and significance of vaccination prophylaxis differ. Patients who undergo SOT remain immunocompromised long-term, whereas those who have received HSCT experience a period of immune reconstitution following the cessation of immunosuppressive therapy. Additionally, numerous recommended vaccinations must be completed within a defined timeframe, and their management is more complex than that for immunocompetent individuals. Recently, several new vaccines, such as those for Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), recombinant zoster, pneumococcal (Pneumococcal conjugate vaccine (PCV)15, 20, 21), and Respiratory syncytial virus (RSV), have been introduced. Recommended vaccination guidance varies across countries, combining established and new information, although some updates may not yet be incorporated. This article provides an overview of current vaccination guidance for SOT and HSCT recipients, highlighting country-specific issues in Japan as well as common challenges faced globally, and proposes optimal strategies for future vaccination policies in Japan.

- Aşılar greft reddini artırmaz – meta-analiz düzeyinde kanıt
- Aşı sonrası rejeksiyon riski son derece düşük
- Aksine greft kaybını azaltır

Zamanlama -“Ne Zaman?”

- Nakil öncesi
  - İnaktive aşılar → tercihen **≥2 hafta önce**
  - Canlı aşılar → **≥4 hafta önce**
- Nakil sonrası
  - Çoğu aşı → **3. aydan sonra (3- 6. ay)**
  - İnfluenza → **1. aydan itibaren yapılabilir**

American Society of Transplantation – Infectious Diseases Community of Practice, Vaccination of Solid Organ Transplant Candidates and Recipients (2019), Clin Transplant 2019;33:e13563

Vaccines	Indications	Comments
Live-attenuated		
Measles, Rubella, Mumps, Varicella	Solid organ transplant recipients who have not previously received vaccination and/or lack evidence of measles, mumps, rubella, or varicella immunity (i.e., IgG seronegative) [9,13,23,25,26,35].	Vaccines should be administered to transplantation candidates a minimum of 4 weeks before transplantation. Immunization is contraindicated post-transplantation and/or for immunosuppressed patients [9,13,23,25,26,35].
Inactivated and mRNA		
Pneumococcal (See Table 3)	All SOT candidates and recipients who have not been previously vaccinated or who require booster doses should be immunized [9,13,23,25,26,35,55,59].	The selection of vaccine formulation depends on age, national guidelines, and availability (i.e., PCV15, PCV20, PCV21* or PPSV 23) [25,26,55,56,59].
Seasonal influenza virus	Annually for all SOT candidates and recipients [9,13,23,25,26,35].	
HBV	All SOT candidates and recipients are nonimmune based on HBsAb-negative status [9,13,23,25,26,35].	
VZV (aRZV)	It is recommended for adult SOT candidates and recipients aged ≥18 years old [9,25,26,106].	Vaccination is generally not applicable for varicella-naïve patients unless a necessity is determined (i.e., IgG seronegative) [101].
SARS-CoV-2	Annually for all SOT candidates and recipients [13,25,26].	
DTaP	Adults who have not previously received DTaP should receive a dose of the primary series of DTaP. Adults who have previously received a primary series of three doses as part of the primary immunization, followed by DTaP boosters every 10 years, are suggested. (authors' opinions based on other countries' practices [9,23,25,124]).	Adults who have not previously received Tdap should receive a dose of the Tdap. Adults who have previously received a Tdap, followed by Td or Tdap boosters (every 10 years), are recommended in other countries [9,23,25,124]. Tdap is not licensed in Japan; therefore, any comments regarding Tdap refer to practices in other countries.
Meningococcal	Patients at elevated risk who have not previously received vaccination, including individuals with compromised splenic function or those treated with eculizumab [9,23,25,26].	
Hib	Patients at elevated risk who have not previously received vaccination, including individuals with compromised splenic function [9,13,23,25,26].	
RSV	Individuals should consult with their physician regarding their vaccine eligibility. The decision to proceed with vaccination may be informed by shared clinical decision-making [25,26,78,142].	The elevated disease burden, coupled with potential risks, may affect lung transplant recipients, individuals with underlying pulmonary conditions (e.g., COPD), and those who are frequently exposed to young children or reside in communal living environments [25,26,142].
HPV	Vaccination is recommended for young people within the specified age group (9–25 years old). It is indicated for individuals as per general guidelines [9,13,23,25].	For people >25 years of age, physicians should perform a risk assessment to determine their need for vaccination and individuals should consult with their physician regarding their vaccine eligibility [25].
Others (JEV, Poliovirus)	Vaccination (primary or booster shot) is administered following the general recommendations in Japan, vaccination history, or other specific risk factors based on the risk of exposure (authors' opinions).	Adults who received routine polio vaccinations during childhood are advised to get a booster every 10 years if they plan to travel to polio-endemic areas or have an occupational risk of polio exposure, such as laboratory workers [25].

(continued on next page)

Tanaka T, Kakiuchi S, Fujita A, Tashiro M, Izumikawa K. Vaccination strategies for transplantation in Japan (solid organ transplantation and hematopoietic stem cell transplantation). J Infect Chemother. 2025 Sep;31(9):102772.

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PERSPECTIVE

OPEN ACCESS Check for updates

Vaccination strategies for solid organ transplant candidates and recipients: insights and recommendations

Christopher Radcliffe [a] and Camille N. Kotton [b,c,d]

[a]Department of Medicine, Massachusetts General Hospital, Boston, MA, USA; [b]Transplant Infectious Disease and Compromised Host Program, Division of Infectious Diseases, Massachusetts General Hospital, Boston, MA, USA; [c]Travelers' Advice and Immunization Center, Division of Infectious Diseases, Massachusetts General Hospital, Boston, MA, USA; [d]Department of Medicine, Harvard Medical School, Boston, MA, USA

ABSTRACT

Introduction: Vaccines save lives. They are integral to reducing the morbidity and mortality of vaccine-preventable infections in solid organ transplant recipients. Pre-transplant vaccination provides a unique opportunity for administration of live, viral vaccines, and enhanced vaccine efficacy, compared to the post-transplant period with decreased vaccine response due to immunosuppression.

Areas covered: We discuss a general approach to pre- and post-transplant vaccination in solid organ transplant candidates and recipients. We then review guideline statements and recent literature related to individual vaccines, including the recently developed respiratory syncytial virus vaccine. Travel and occupation-related vaccines are also discussed.

Expert opinion: The challenge of vaccination for immunocompromised patients expands as the prevalence of immunocompromised adults rises, excluded from vaccine trials. In an age of vac infections, well-powered, prospective studies a vaccines in solid organ transplant candidates an

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KEYWORDS
Coronavirus disease 2019; herpes zoster; immunocompromised; influenza; solid organ transplantation; travel medicine; vaccination

Tüm SOT hastalarında mutlaka gözden geçirilmesi gereken aşılar

Hepatit B (anti-HBs <10 IU/mL ise revaksinasyon)

Pnömokok (konjuge + PPSV23)

İnfluenza (yıllık, tercihen yüksek doz/adjuvanlı)

COVID-19 (güncel booster'lar)

Rekombinant zona aşısı (RZV)

İnaktive Aşılar

- İnfluenza (her yıl)
- Pnömokok
- HBV / HAV
- Td / Tdap
- HPV
- COVID-19
- Rekombinan Zona

📌 **AST 2019 – Temel İlke**

- İnaktive aşılar **post-transplant güvenli**

Canlı Aşılar

- MMR
- Varisella
  - Nakil öncesi

📌 **AST 2019 – Temel İlke**

- İnaktive aşılar **post-transplant güvenli**
- Canlı aşılar **rutin olarak kontrendike**
- **Seçilmiş pediatrik olgular istisna**

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4 percentage and count		Men who have sex with men	Asplenia, complement deficiency	Heart or lung disease	Kidney failure, End-stage renal disease or on dialysis	Chronic liver disease; alcoholism[a]	Diabetes	Health care Personnel[b]
			<15% or <200/mm³	≥15% and ≥200/mm³							
COVID-19	See Notes	Additional doses may be necessary (See Notes)		See Notes							
Influenza inactivated Influenza recombinant		Solid organ transplant (See Notes)	1 dose annually								
LAIV3					1 dose annually if age 19–49 years		1 dose annually if age 19–49 years				
RSV	Seasonal administration. (See Notes)	See Notes				See Notes			Liver disease (See Notes)	See Notes	
Tdap or Td	Tdap: 1 dose each pregnancy	1 dose Tdap, then Td or Tdap booster every 10 yrs									
MMR	*										
VAR	*			See Notes							
RZV		See Notes									
HPV	*	3-dose series if indicated									
Pneumococcal											
HepA											
HepB	See Notes									Age ≥ 60 years	

Hepatit B

- SOT adaylarının önemli kısmı **yanıtsız**
- Anti-HBs <10 IU/L → booster / yüksek doz
- Diyaliz ve karaciğer yetmezliğinde yanıt ↓

American Society of Transplantation – Infectious Diseases Community of Practice, Vaccination of Solid Organ Transplant Candidates and Recipients (2019)

Pnömokok

- Nakil sonrası invaziv pnömokok hastalığı riski ↑
- PCV (13/15/20) → PPSV23
- İnterval: en az 8 hafta

- PCV20 yapıldıysa PPSV23 gerekir mi?

Bahakel H, Feldman AG, Danziger-Isakov L. Immunization of Solid Organ Transplant Candidates and Recipients: A 2022 Update.

Tanaka T, et al. Vaccination strategies for transplantation in Japan (solid organ transplantation and hematopoietic stem cell transplantation). J Infect Chemother. 2025

İnfluenza

SOT hastalarında:
- Pnömoni
- Rejeksiyon
- Ölüm riski ↑

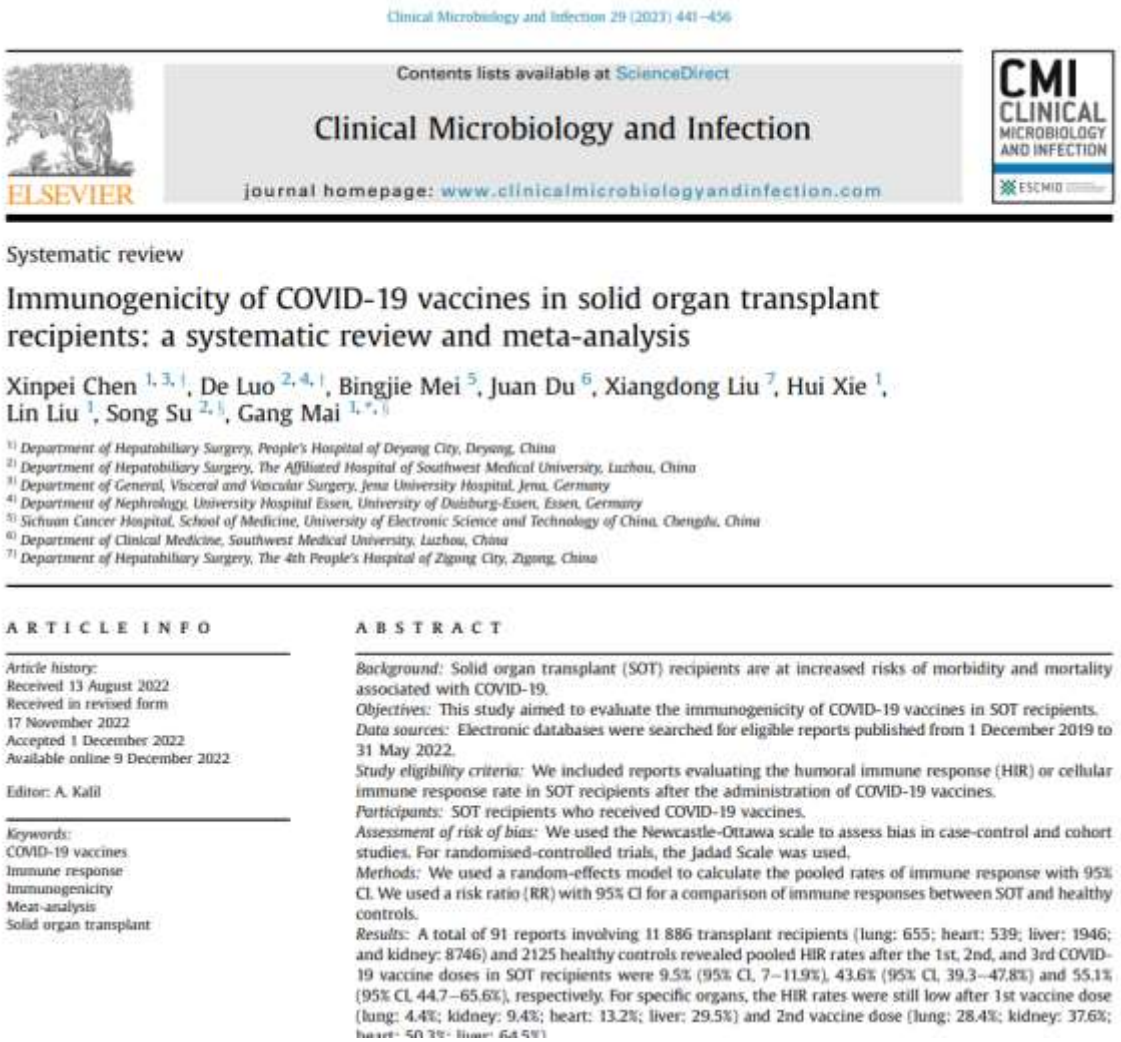
Yüksek doz influenza aşısı, standart doza göre:
- Daha yüksek serokonversiyon
- Daha güçlü $CD4^+$ ve $CD8^+$ T-hücre yanıtı

- Her yıl
- Yüksek doz / adjuvanlı aşılar daha etkili olabilir
- Nakil sonrası erken dönemde bile yapılabilir

Bahakel et al, Infect Dis Clin N Am 37 (2023) 427–441

AST IDCOP 2019

COVID-19



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Systematic review

Immunogenicity of COVID-19 vaccines in solid organ transplant recipients: a systematic review and meta-analysis

Xinpei Chen [1, 3, †], De Luo [2, 4, †], Bingjie Mei [5], Juan Du [6], Xiangdong Liu [7], Hui Xie [1], Lin Liu [1], Song Su [2, †], Gang Mai [1, *, †]

[1] Department of Hepatobiliary Surgery, People's Hospital of Deyang City, Deyang, China
[2] Department of Hepatobiliary Surgery, The Affiliated Hospital of Southwest Medical University, Luzhou, China
[3] Department of General, Visceral and Vascular Surgery, Jena University Hospital, Jena, Germany
[4] Department of Nephrology, University Hospital Essen, University of Duisburg-Essen, Essen, Germany
[5] Sichuan Cancer Hospital, School of Medicine, University of Electronic Science and Technology of China, Chengdu, China
[6] Department of Clinical Medicine, Southwest Medical University, Luzhou, China
[7] Department of Hepatobiliary Surgery, The 4th People's Hospital of Zigong City, Zigong, China

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Meat-analysis
Solid organ transplant

ABSTRACT

Background: Solid organ transplant (SOT) recipients are at increased risks of morbidity and mortality associated with COVID-19.
Objectives: This study aimed to evaluate the immunogenicity of COVID-19 vaccines in SOT recipients.
Data sources: Electronic databases were searched for eligible reports published from 1 December 2019 to 31 May 2022.
Study eligibility criteria: We included reports evaluating the humoral immune response (HIR) or cellular immune response rate in SOT recipients after the administration of COVID-19 vaccines.
Participants: SOT recipients who received COVID-19 vaccines.
Assessment of risk of bias: We used the Newcastle-Ottawa scale to assess bias in case-control and cohort studies. For randomised-controlled trials, the Jadad Scale was used.
Methods: We used a random-effects model to calculate the pooled rates of immune response with 95% CI. We used a risk ratio (RR) with 95% CI for a comparison of immune responses between SOT and healthy controls.
Results: A total of 91 reports involving 11 886 transplant recipients (lung: 655; heart: 539; liver: 1946; and kidney: 8746) and 2125 healthy controls revealed pooled HIR rates after the 1st, 2nd, and 3rd COVID-19 vaccine doses in SOT recipients were 9.5% (95% CI, 7–11.9%), 43.6% (95% CI, 39.3–47.8%) and 55.1% (95% CI, 44.7–65.6%), respectively. For specific organs, the HIR rates were still low after 1st vaccine dose (lung: 4.4%; kidney: 9.4%; heart: 13.2%; liver: 29.5%) and 2nd vaccine dose (lung: 28.4%; kidney: 37.6%;

SOT alıcılarında COVID-19 aşılarına humoral yanıt dramatik derecede düşüktür.
İlk doz sonrası serokonversiyon yalnızca **%9.5**, ikinci dozdan sonra **%43.6** düzeyindedir
Üçüncü dozdan sonra humoral yanıt **%55.1**'e çıksa da hastaların neredeyse yarısı ölçülebilir antikor geliştirememekte

Organ tipine göre yanıt belirgin farklılık gösterir.
*En kötü yanıt: **Akciğer nakli** (2. doz sonrası **%28**)
*En iyi yanıt: **Karaciğer nakli** (2. doz sonrası **%65**)

vaccines

MDPI

Review

SARS-CoV-2 Vaccination in Solid-Organ Transplant Recipients

Maddalena Peghin *, Elena Graziano and Paolo Antonio Grossi

Infectious and Tropical Diseases Unit, Department of Medicine and Surgery, University of Insubria-ASST-Sette Laghi, 21100 Varese, Italy
* Correspondence: maddalena.peghin@uninsubria.it; Tel.: +39-0332-393075 or +39-0332-393389

Abstract: The coronavirus disease 2019 (COVID-19) pandemic has posed significant global challenges for solid organ transplant (SOT) recipients. Mortality rates of COVID-19 in this patient population remain high, despite new available therapeutic options and Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) vaccination. Priority access to SARS-CoV-2 vaccination for waitlisted candidates and for SOT patients and their family members is recommended since the advantage from vaccination reduces the risk of COVID-19-related complications. However, immunogenicity and efficacy of COVID-19 vaccines are lower in waitlisted candidates and SOT recipients than in the general population. Routine systematic assessment of humoral and cellular immune responses after SARS-CoV-2 vaccination is controversial, although highly recommended for investigation and

3. doz minimum standart: antikor ve T-hücre yanıtı artıyor ama **herkesi korumuyor**
4.–5. dozlar bazı yanıtsızlarda fayda sağlıyor
Hücresel bağışıklık, antikordan bağımsız olarak **kısmi koruma sağlayabilir**
Nakil öncesi aşılama en etkilisi; nakil sonrası yanıt belirgin düşüyor
Aşı ≠ tam koruma → maske, temaslı aşılaması ve **pasif antikorlar** (uygun hastada) gerekli

Table 1. COVID-19 Vaccination Guidance by Immunocompromised Population[2-8]

Group	Suggested timing of 2025-2026 COVID-19 vaccine*,**
Solid organ transplant	• At least 2 weeks pre-SOT; or ≥3 months post-SOT
Hematologic malignancy	• Optimal timing includes ≥2 weeks before starting treatment and ≥ 3 months after last infusion ○ For B-cell depletion, consider ≥3-6 months after last infusion • If optimal timing not feasible, administer during treatment (blunted immune response likely)
HCT/CAR-T	• Optimal timing includes ≥3 months after transplant or CAR-T treatment ○ For B-cell depletion, consider ≥3-6 months after last infusion • If optimal timing not feasible, administer during treatment (blunted immune response likely)
Solid tumor chemotherapy	• At least 2 weeks before starting therapy; during/after is acceptable
Primary Immuno-deficiency	• Align with IVIG/SCIG or clinic access
Autoimmune immunosuppression	• Optimal timing includes ≥2 weeks before starting treatment and ≥ 3 months after last infusion ○ For B-cell depletion, consider ≥3-6 months after last infusion • If optimal timing not feasible, administer during treatment (blunted immune response likely)
HIV	• Align with preventive routine care

IDSA

COVID-19

- Nakil öncesi
- Nakil sonrası:
  - Ek dozlar
  - Heterolog şemalar
  - Gerekirse pasif antikorlar

✓ Güncellenmiş COVID-19 aşıları (ör. Omicron bivalent veya daha yeni varyantlara uyarlanmış mRNA aşıları) birçok ülkede kullanılıyor veya onaylanmış durumda
✓ Bunlar mevcut varyantlara daha iyi uyum sağlamak amacıyla tasarlanmış aşılar
✓ Dünya Sağlık Örgütü (WHO) aşı içeriğini yeni dolaşımdaki varyantlara göre güncelleme yönünde tavsiye vermekte

Chen X, et al. Immunogenicity of COVID-19 vaccines in solid organ transplant recipients: a systematic review and meta-analysis. Clin Microbiol Infect. 2023

RSV

- Özellikle ≥65 yaş bireylerde, KOAH, kalp yetmezliği, diyabet gibi komorbid hastalığı olanlarda, **immünosupresif kişilerde** ve bakım evinde yaşayanlarda hastalık daha ağır seyretmekte ve mortalite riski artmakta
- Ülkemizde de ruhsatlandırılarak kullanıma sunulan RSV aşılarının:
  - 75 yaş ve üzeri tüm bireylere, 60-74 yaş arası altta yatan hastalığı olan bireylere tek doz olarak uygulanması çalışma grubumuzun da erişkin aşı önerilerindendir.
  - Gebeliğin 32. ila 36. haftaları arasında, Eylül ile Ocak ayları arasında tek doz maternal (gebe onaylı) RSV aşısı yaptırmalıdır.

Respiratuvar Sinsityal Virus (RSV) İnfeksiyonları ve Aşı Önerileri | Klimik

Zona (Herpes zoster)

- Rekombinant zona aşısı (RZV):
  - **Canlı değil**
  - Hücresel + humoral yanıt oluşturur
  - Böbrek ve akciğer naklinde **güvenli ve etkili**
- ACIP:
  - **≥19 yaş, tüm immünsüprese hastalara 2 doz**

- **Immunocompromising conditions (including persons with HIV regardless of CD4 count)**:** 2–dose series recombinant zoster vaccine (RZV, Shingrix) 2–6 months apart (minimum interval: 4 weeks; repeat dose if administered too soon). For detailed information, see www.cdc.gov/shingles/hcp/vaccine–considerations/immunocompromised–adults.html

Bahakel H, et al. Immunization of Solid Organ Transplant Candidates and Recipients: A 2022 Update. Infect Dis Clin North

MMR

- Seronegatifse → **nakil öncesi mutlaka**
- Nakil sonrası:
  - Genel olarak kontrendike
  - Seçilmiş pediatrik olgular = istisna

Pediatrik SOT

- Çocuklar çoğu enfeksiyona **naif**
- Aşı takvimi hızlandırılmalı
- Canlı aşılar:
  - Nakil öncesi agresif
  - Seçilmiş düşük immünsüpresyonda post-tx veri var

JAMA Network Open

Original Investigation | Infectious Diseases

Safety and Immunogenicity of Live Viral Vaccines in a Multicenter Cohort of Pediatric Transplant Recipients

Düşük doz immünsüpresyon, >1 yıl post-transplant, Rejeksiyon yoksa → Seçilmiş böbrek ve karaciğer nakli hastalarında MMR ve Varisella mümkün olabilir
15 merkezli çalışmada 211 pediatrik SOT hastasında ciddi yan etki yok

Abstract

IMPORTANCE Live vaccines (measles-mumps-rubella [MMR] and varicella-zoster virus [VZV]) have not been recommended after solid organ transplant due to concern for inciting vaccine strain infection in an immunocompromised host. However, the rates of measles, mumps, and varicella are rising nationally and internationally, leaving susceptible immunocompromised children at risk for life-threating conditions.

OBJECTIVE To determine the safety and immunogenicity of live vaccines in pediatric liver and kidney transplant recipients.

DESIGN, SETTING, AND PARTICIPANTS This cohort study included select pediatric liver and kidney transplant recipients who had not completed their primary MMR and VZV vaccine series and/or who displayed nonprotective serum antibody levels at enrollment between January 1, 2002, and February 28, 2023. Eligibility for live vaccine was determined by individual US pediatric solid organ transplant center protocols.

EXPOSURES Exposure was defined as receipt of a posttransplant live vaccine. Transplant recipients received 1 to 3 doses of MMR vaccine and/or 1 to 3 doses of VZV vaccine.

MAIN OUTCOME AND MEASURE Safety data were collected following each vaccination, and

Key Points

Question What are the safety and immunogenicity of live vaccines (measles-mumps-rubella and varicella-zoster virus) in select pediatric solid organ transplant recipients?

Findings In this cohort study of 281 pediatric liver and kidney transplant recipients from 18 US transplant centers, no serious adverse events were observed following live vaccination, with the majority of children developing protective antibodies (72% varicella, 86% measles, 83% mumps, and 99% rubella).

Meaning These findings suggest that administration of live vaccines to select transplant recipients can offer seroprotection against the ongoing risk of exposure to circulating measles.

Table 1. Characteristics of All Participants (n = 281)

Characteristic	No. (%)
Posttransplant vaccine received	
MMR only	64 (23)
VZV only	45 (16)
MMR and VZV	172 (61)
Organ type	
Liver	270 (96)
Kidney	9 (3)
Liver and kidney	2 (1)
Age at transplant, median (IQR), y	0.9 (0.6-1.7)
Age at first posttransplant vaccine, median (IQR), y	8.9 (4.7-13.8)
Time between transplant and enrollment, median (IQR), y	6.3 (3.4-11.1)
History of at least 1 dose of pretransplant vaccine	
MMR	102 (36)
VZV	95 (34)
History of preenrollment use of thymoglobulin, rituximab, or alemtuzumab biologic	15 (5)
History of receiving blood products within the year of enrollment	11 (4)
History of any rejection in the 2 y before enrollment	35 (12)
Epstein-Barr viral DNA quantification enrollment (n = 218)	
Negative or <2000 IU/mL	203 (93)
≥2000 IU/mL	15 (7)
Age-appropriate absolute lymphocyte count at enrollment, lymphocytes/μL (n = 244)	240 (98)
Age-appropriate immunoglobulin G level, mg/dL (n = 127)	124 (98)
Age-appropriate CD4 count, cells/μL (n = 82)	71 (87)
Immunosuppression at enrollment (n = 275)	
Low: monotherapy with tacrolimus (trough <5 ng/mL), sirolimus (trough <5 ng/mL), or cyclosporine (trough <100 ng/mL)	202 (73)
Medium: ≤2 agents and/or tacrolimus plus sirolimus trough between 5 and 8 ng/mL, and/or steroids <0.5 mg/kg per dose	39 (14)
High[a]: ≥3 agents and/or tacrolimus plus sirolimus trough >8 ng/mL, and/or steroids ≥0.5 mg/kg/d	34 (12)

Abbreviations: MMR, measles-mumps-rubella; VZV, varicella-zoster virus.

[a] Immunosuppressive agents used in addition to tacrolimus, sirolimus, cyclosporine, and steroids include azathioprine (5 participants [2%]) and mycophenolate mofetil (19 participants [7%]).

Klinik Pratikte En Sık Yapılan Hatalar

- “Nakilden sonra bakarız”
- Ev içi temaslıların unutulması
- COVID-19 için tek doz yeter sanılması

Aşılama, nakil hazırlığının **ayrılmaz parçasıdır**

- Aşılar mümkün olduğunca **nakil öncesi tamamlanmalı**
- Canlı aşılar için neredeyse **son fırsat**
  - Nakil sonrası canlı aşı = istisnai, yeni veriler geliyor
  - 1 yıl post-transplant
  - Rejeksiyon yoksa → seçilmiş olgularda mümkün

- Ev içi temaslıların aşılanması
- COVID-19 → çok doz + ek stratejiler

En iyi aşı, nakilden önce yapılan aşıdır

Teşekkürler..