Vaccinations du patient en attente de greffe : mise à jour 2026

FMC transplantation – 24 septembre 2026

Olivier Epaulard

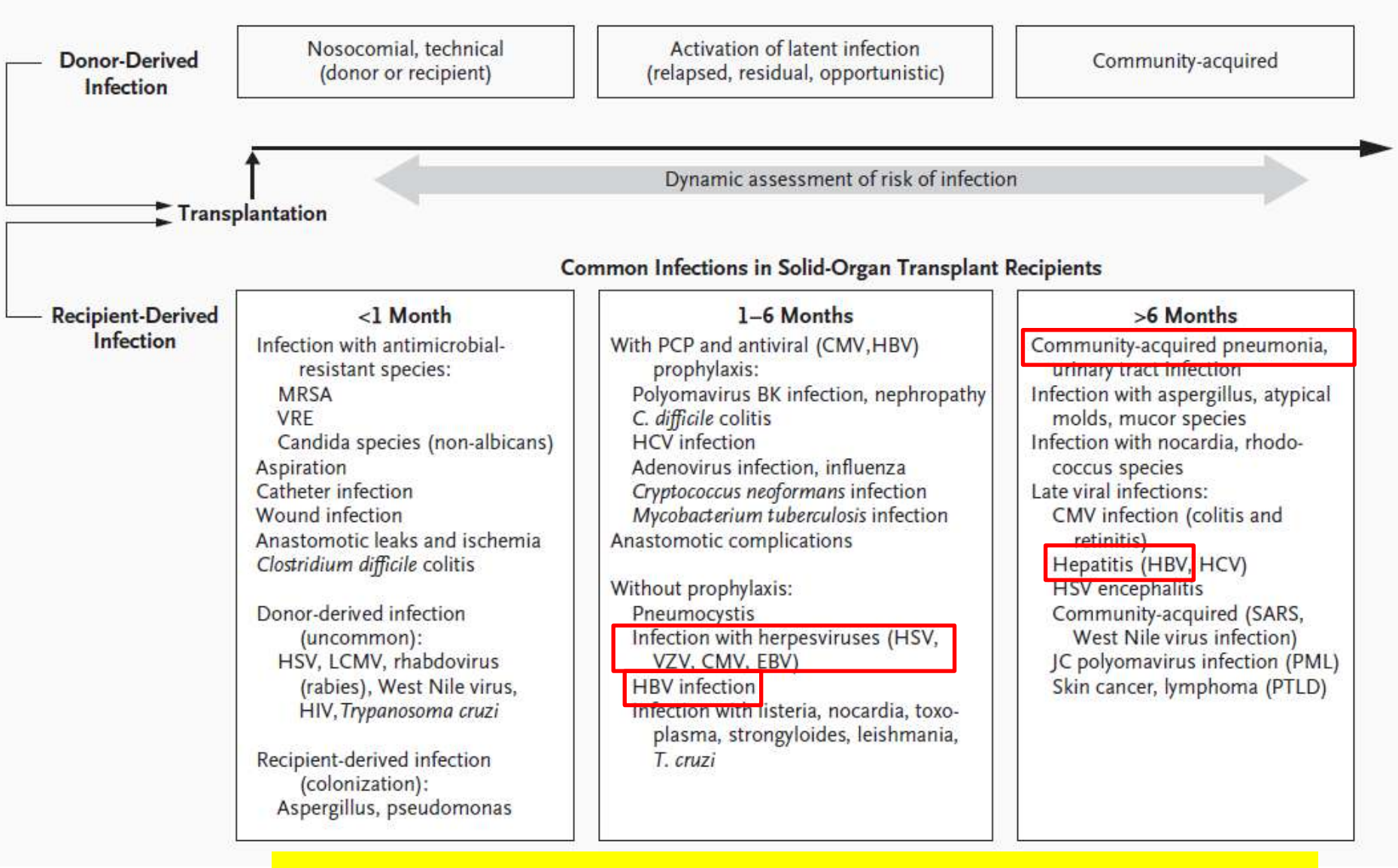
Service des Maladies Infectieuses

CHU Grenoble Alpes

Populations et vaccins

- Population générale
- Populations à risque comportemental
  - Soignants
  - Employés de laboratoire d'analyse / de recherche
  - Partenaires sexuels multiples
  - Voyageurs
  - Divers … spéléologues … UDIV …
- Populations avec des comorbidités
  - Respiratoires, cardiaques, rénales, neurologiques, âge …
- Populations à risque immunitaire

Transplantation d'organe solide



Fishman 2017

Covid-19

Les greffés d'organes

- Les vacciner pour 2 raisons
  - Greffe = immunosuppression = risque infectieux
  - Infection = facteur de risque pour le rejet

- Avant la greffe
  - Vérifier la séropositivité rougeole et varicelle
  - Mise à jour du calendrier vaccinal
    - Dont HPV
  - Réaliser les vaccins des infections opportunistes
    - Pneumocoque ; grippe ; zona ; Covid-19
  - Nécessite parfois d'augmenter les doses
    - Hépatopathes, néphropathes, et vaccin HBV
  - Réaliser les vaccins « de loisir » : fièvre jaune …

- Après la greffe
  - Attendre 6 mois avant un vaccin
    - Risque de rejet : très théorique … presque aucune donnée alarmante
    - Phase d'immunodépression la plus intense : réponse très altérée
  - Repartir sur un calendrier vaccinal plus serré que la population générale

Haut Conseil de la Santé Publique

2014

Actualisation en cours

Vaccination des personnes immunodéprimées ou aspléniques

Recommandations

Collection
Avis et Rapports

Quelques problèmes …

- Peu de données d'efficacité
  - Essentiellement des données d'immunogénicité
- Intéressantes données de tolérance

- D'où essentiellement des recommandations d'experts
  - Et des déductions d'autres situations d'immunodépression

- Hétérogénéité des patients
  - Enfants / adultes /adultes âgés
  - Protocole d'immunosuppression

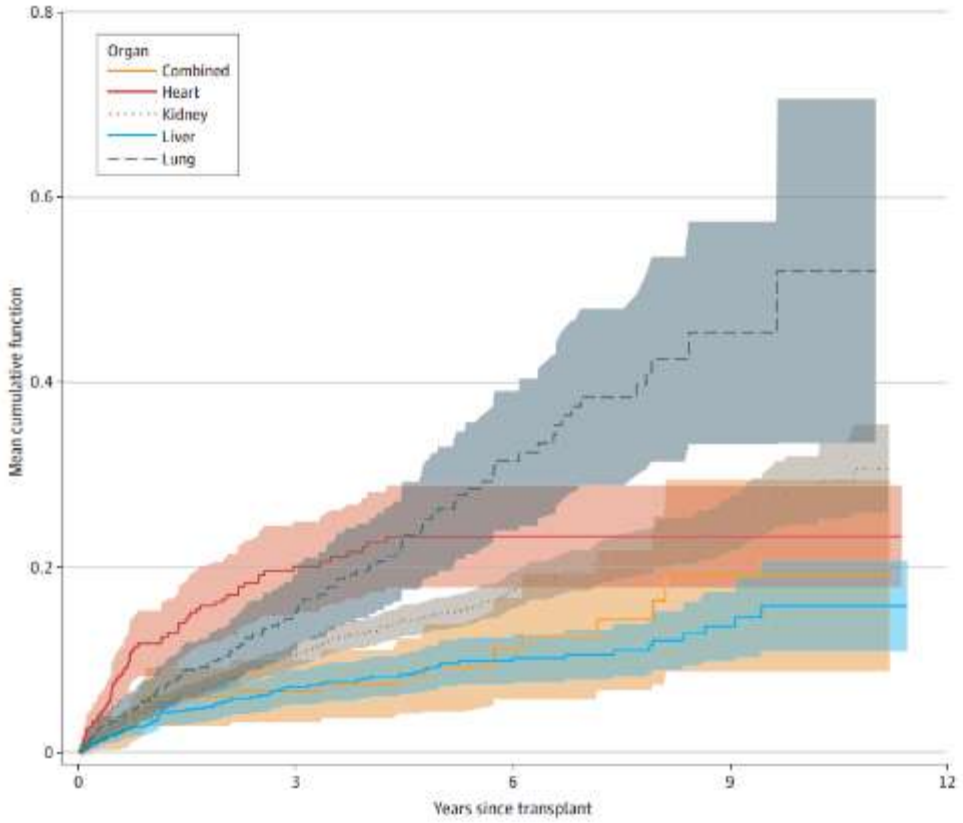
JAMA Network Open

Original Investigation | Infectious Diseases

Vaccine-Preventable Infections Among Solid Organ Transplant Recipients in Switzerland

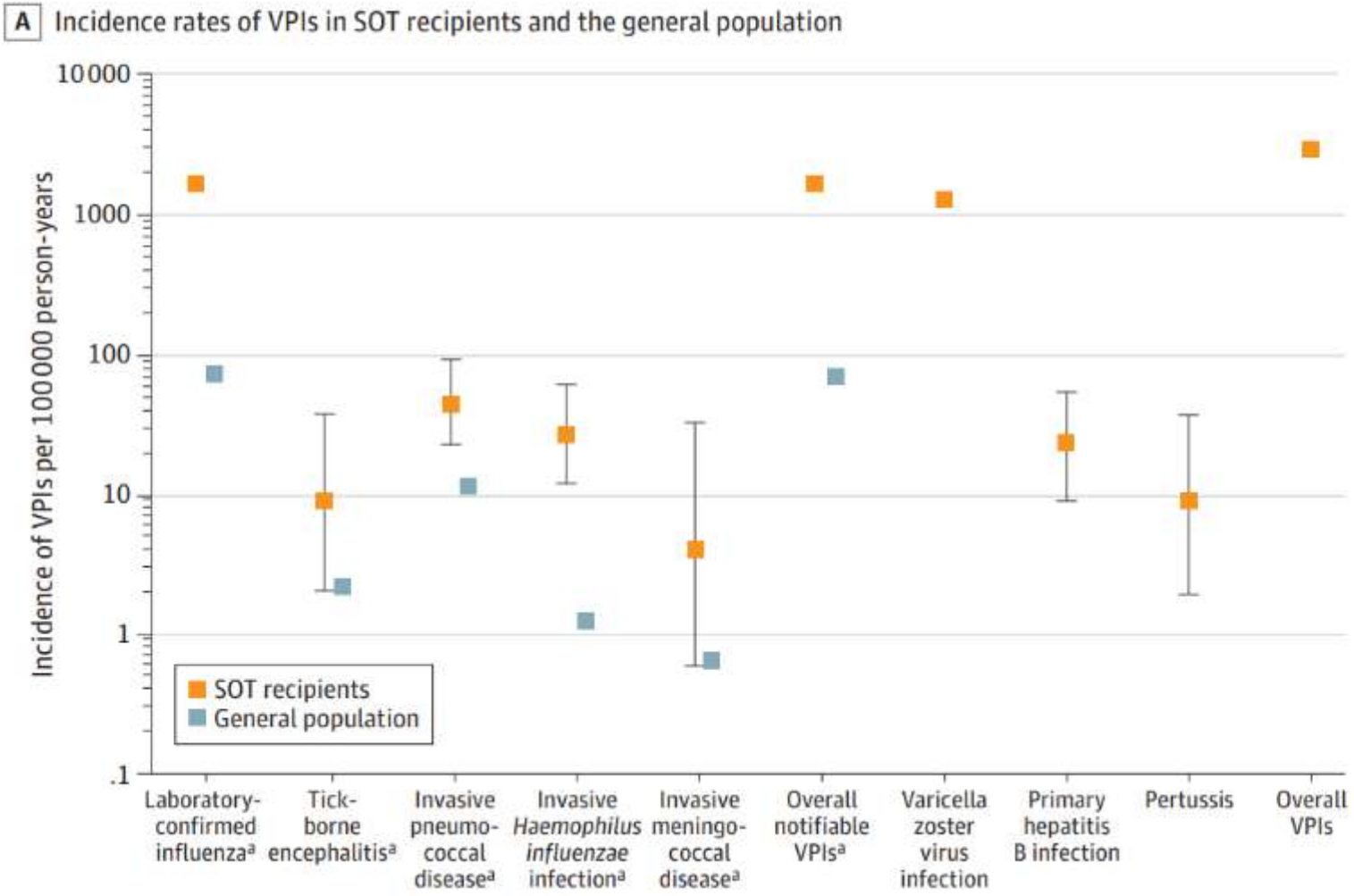
Laura N. Walti, MD; Catrina Mugglin, MD, PhD; Matteo Mombelli, MD; Oriol Manuel, MD; Hans H. Hirsch, MD, MSc; Nina Khanna, MD; Nicolas J. Mueller, MD; Christoph Berger, MD; Katia Boggian, MD; Christian Garzoni, MD; Dionysios Neofytos, MD; Christian van Delden, MD; Mirjam Mäusezahl, MSc, MPH; Cédric Hirzel, MD; for the Swiss Transplant Cohort Study

Figure 1. Mean Cumulative Vaccine-Preventable Infection Episodes per Solid Organ Transplant Recipient Stratified by Type of Transplanted Organs



Mean cumulative function is equivalent to the mean cumulative number of vaccine-preventable infections per solid organ transplant recipient. Shading indicates 95% CIs.

Figure 2. Vaccine-Preventable Infections (VPIs) in Solid Organ Transplant (SOT) Recipients and the General Population

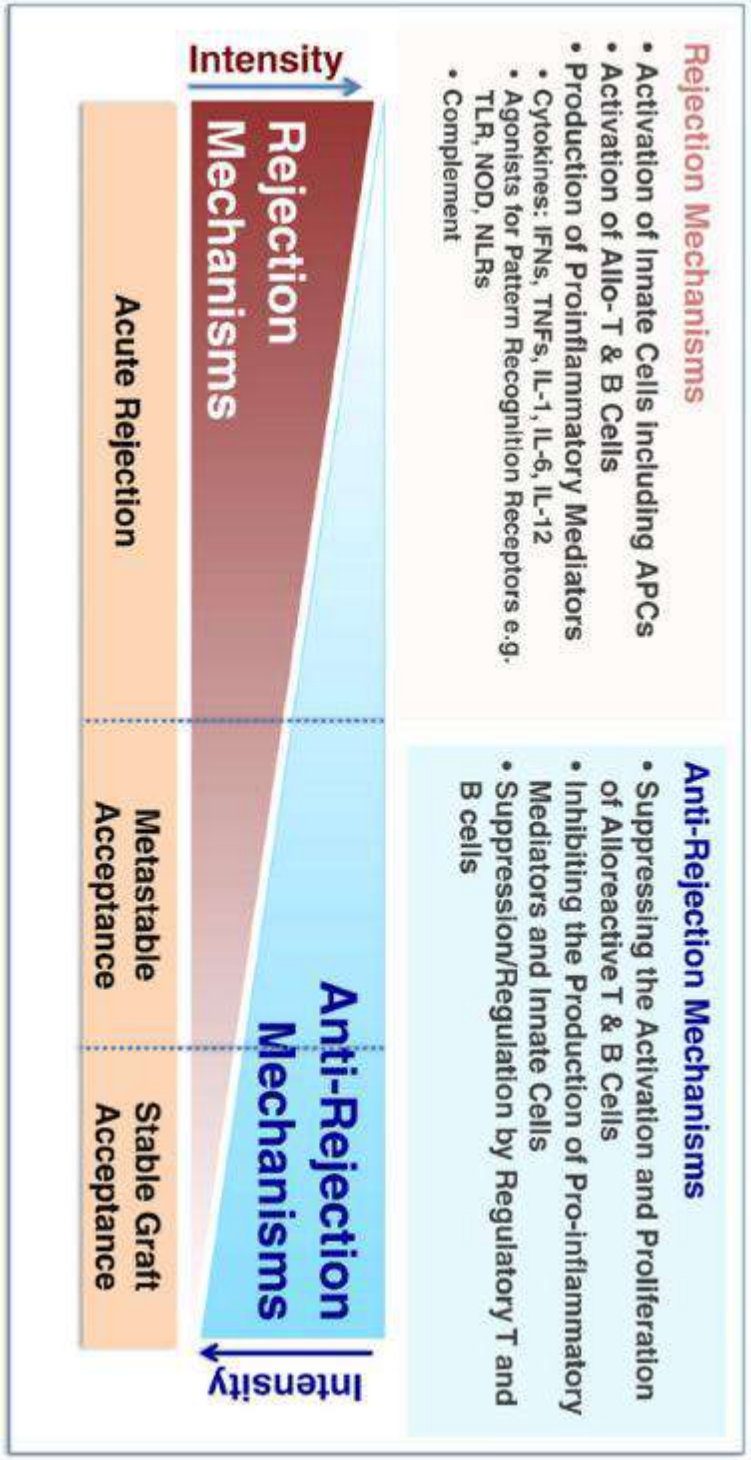


Available online at www.sciencedirect.com
ScienceDirect
Transplantation Reviews 25 (2011) 27–35
TRANSPLANTATION Reviews
www.elsevier.com/locate/trre

Bacterial infections, alloimmunity, and transplantation tolerance

Emily B. Ahmed[a], Melvin Daniels[a], Maria-Luisa Alegre[b], Anita S. Chong[a,*]





Grippe

Clinical Infectious Diseases

MAJOR ARTICLE

IDSA Infectious Diseases Society of America

hivma hiv medicine association

OXFORD

A 5-Year Prospective Multicenter Evaluation of Influenza Infection in Transplant Recipients

Deepali Kumar,[1] Victor H. Ferreira,[1] Emily Blumberg,[2] Fernanda Silveira,[3] Elisa Cordero,[4] Pilar Perez-Romero,[4] Teresa Aydillo,[4] Lara Danziger-Isakov,[5] Ajit P. Limaye,[6] Jordi Carratala,[7] Patricia Munoz,[8] Miguel Montejo,[9] Francisco Lopez-Medrano,[10] Maria Carmen Farinas,[11] Joan Gavalda,[12] Asuncion Moreno,[13] Marilyn Levi,[14] Jesus Fortun,[15] Julian Torre-Cisneros,[16] Janet A. Englund,[17] Yoichiro Natori,[1] Shahid Husain,[1] Gail Reid,[18] Tanvi S. Sharma,[19] and Atul Humar[1]

616 patients with confirmed influenza (477 SOT; 139 HSCT)

- Pneumonia at presentation: 134 of 606 (22.1%) patients
- 66.5% hospitalized; 11.0% required intensive care unit care

- **Death: 2.8%**

- Early antiviral treatment (within 48 hours) was associated with improved outcomes

American Journal of Transplantation 2002; 2: 287–291
Blackwell Munksgaard

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ISSN 1600-6135

Influenza Virus Infection in Adult Solid Organ Transplant Recipients

Regis A. Vilchez[a,c], Kenneth McCurry[b], James Dauber[a], Aldo Iacono[a], Bartley Griffith[b], John Fung[b,c] and Shimon Kusne[a,b,c,*]

Received 11 June 2001, revised and accepted for publication 8 November 2001

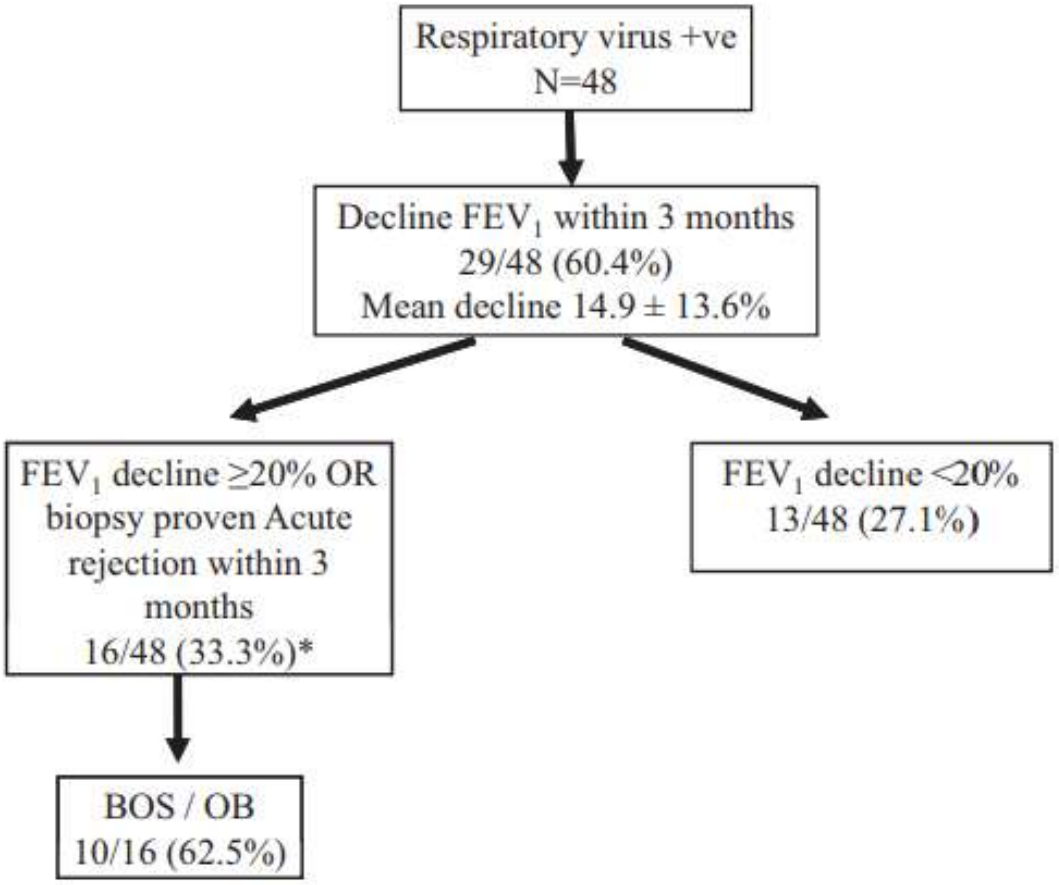
- *Biopsy of the transplanted organ was performed in 21 SOT recipients (18 lung, 1 liver and 2 kidney) at the time of influenza viral infection.*
- *Overall, 62% (13/21) showed variable degrees of acute allograft rejection*
  - *11/18 of lung transplant recipients*
  - *2/2 of kidney transplant recipients*

2010

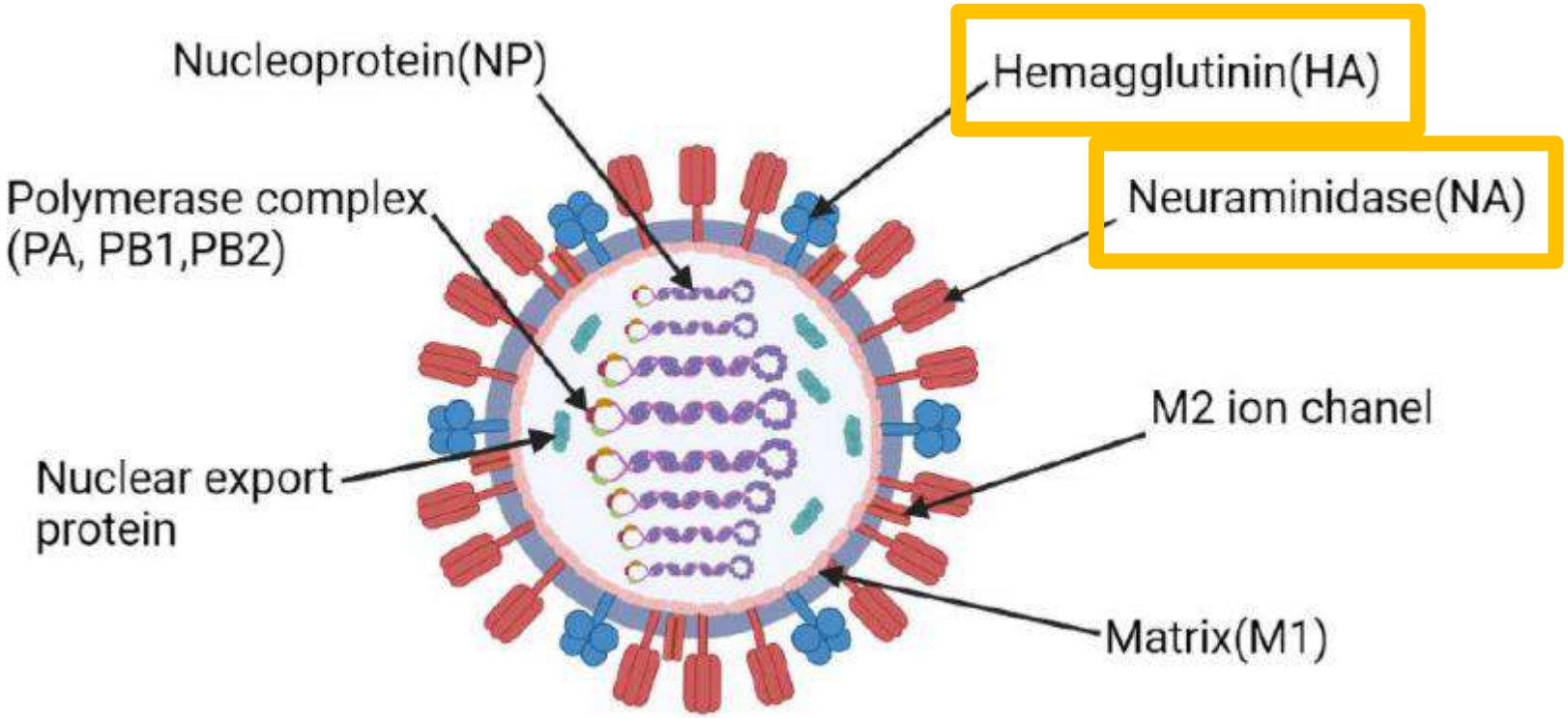
A Prospective Molecular Surveillance Study Evaluating the Clinical Impact of Community-Acquired Respiratory Viruses in Lung Transplant Recipients

Deepali Kumar,[1,8] Shahid Husain,[2,8] Maggie Hong Chen,[3] George Moussa,[4] David Himsworth,[5] Oriol Manuel,[6] Sean Studer,[7] Diana Pakstis,[7] Kenneth McCurry,[7] Karen Doucette,[1] Joseph Pilewski,[7] Richard Janeczko,[5] and Atul Humar[1]

2010



- 16 of 48 (33.3%) patients:
  - Biopsy-proven acute rejection [grade 2]
  - or a decline in FEV1 20% within 3 months of a RVI
- Incidence in patients without a respiratory viral infection : 3 of 45 (6.5%) in the comparable 3-month period (p=0.001)

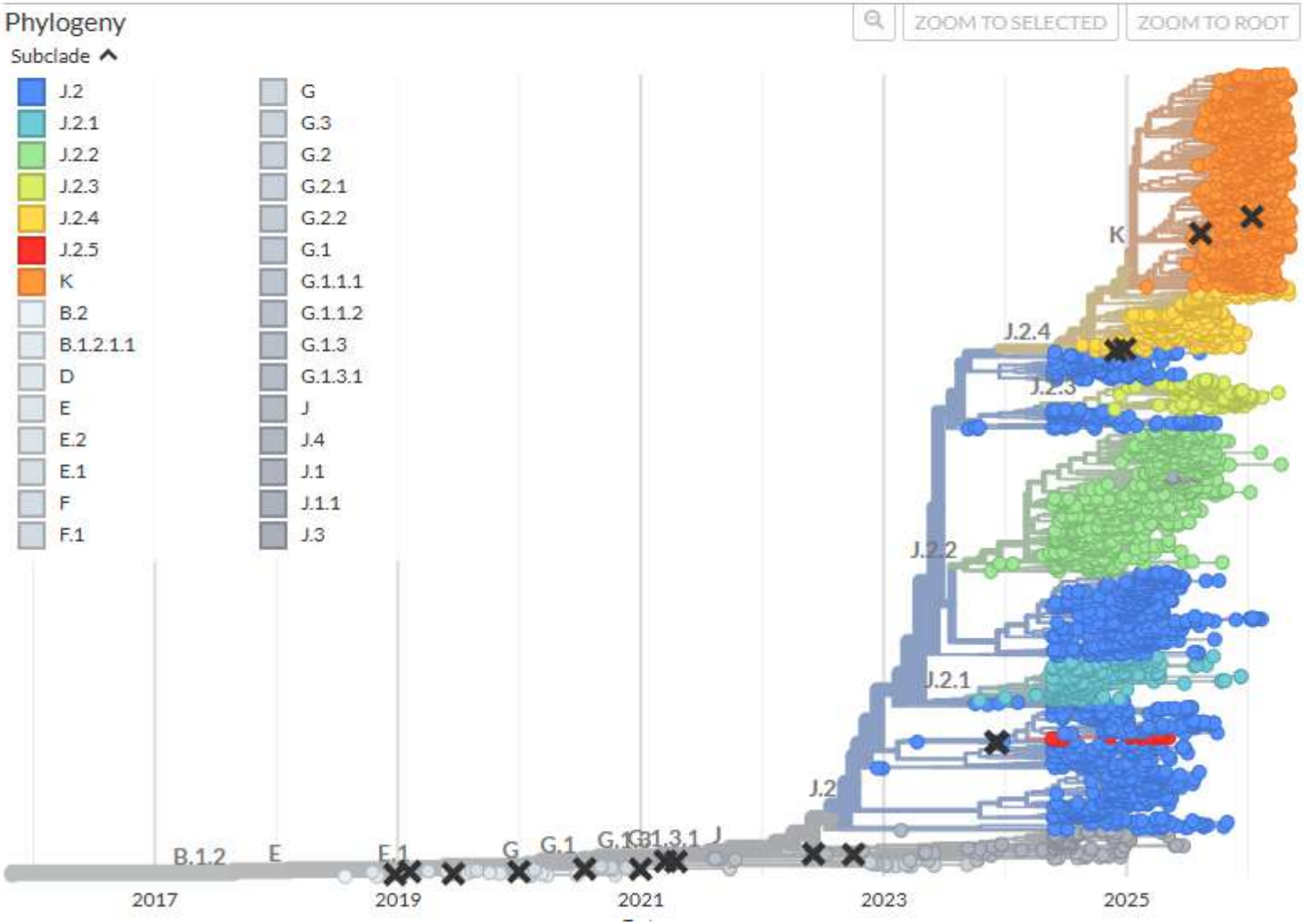


Circulation actuelle chez l'humain : H1N1; H2N2 ; H3N2

Real-time tracking of influenza A/H3N2 evolution

nextstrain.org

Showing 3097 of 3097 genomes sampled between Jul 2018 and May 2026.



2012

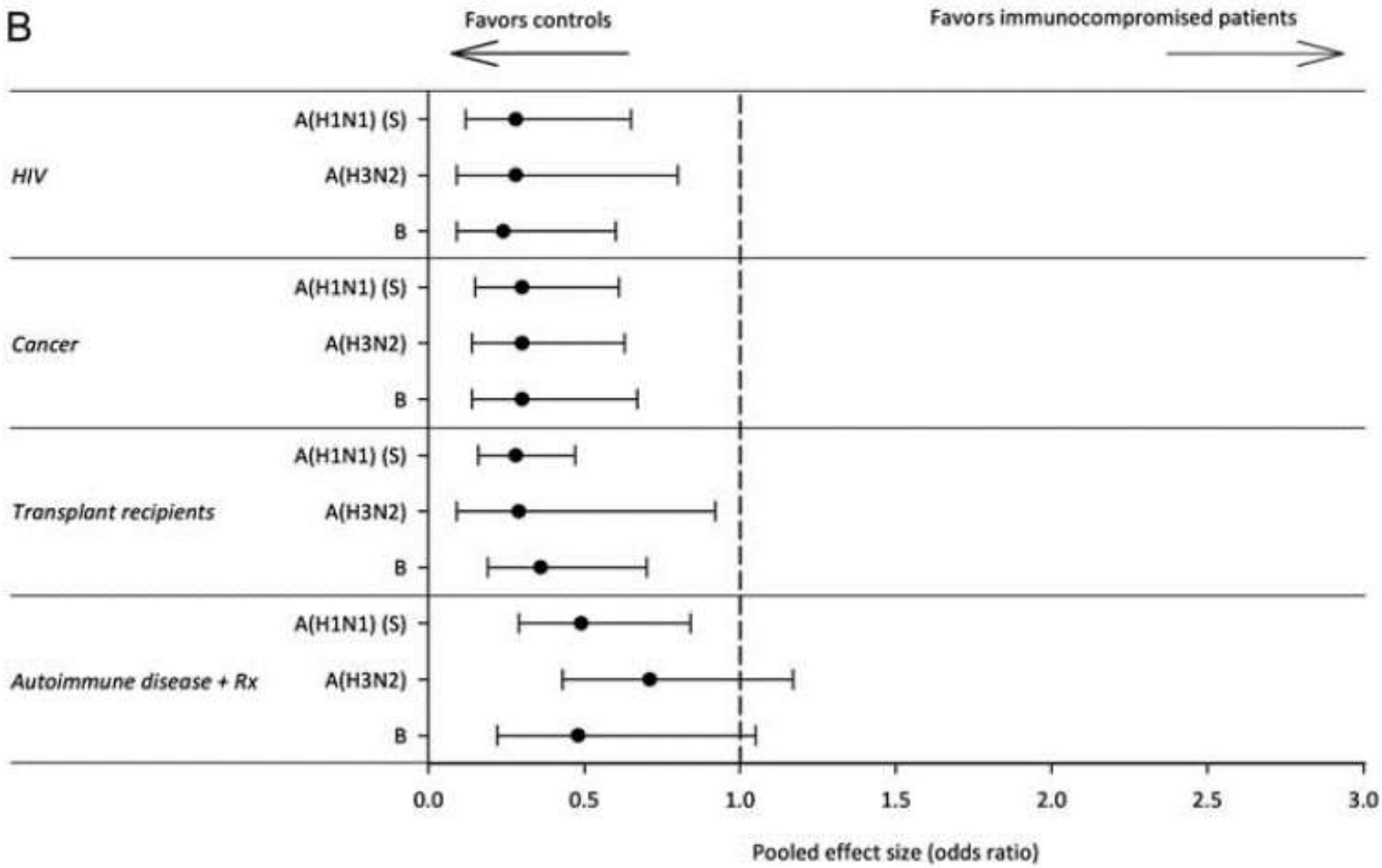
MAJOR ARTICLE

Influenza Vaccination for Immunocompromised Patients: Systematic Review and Meta-analysis by Etiology

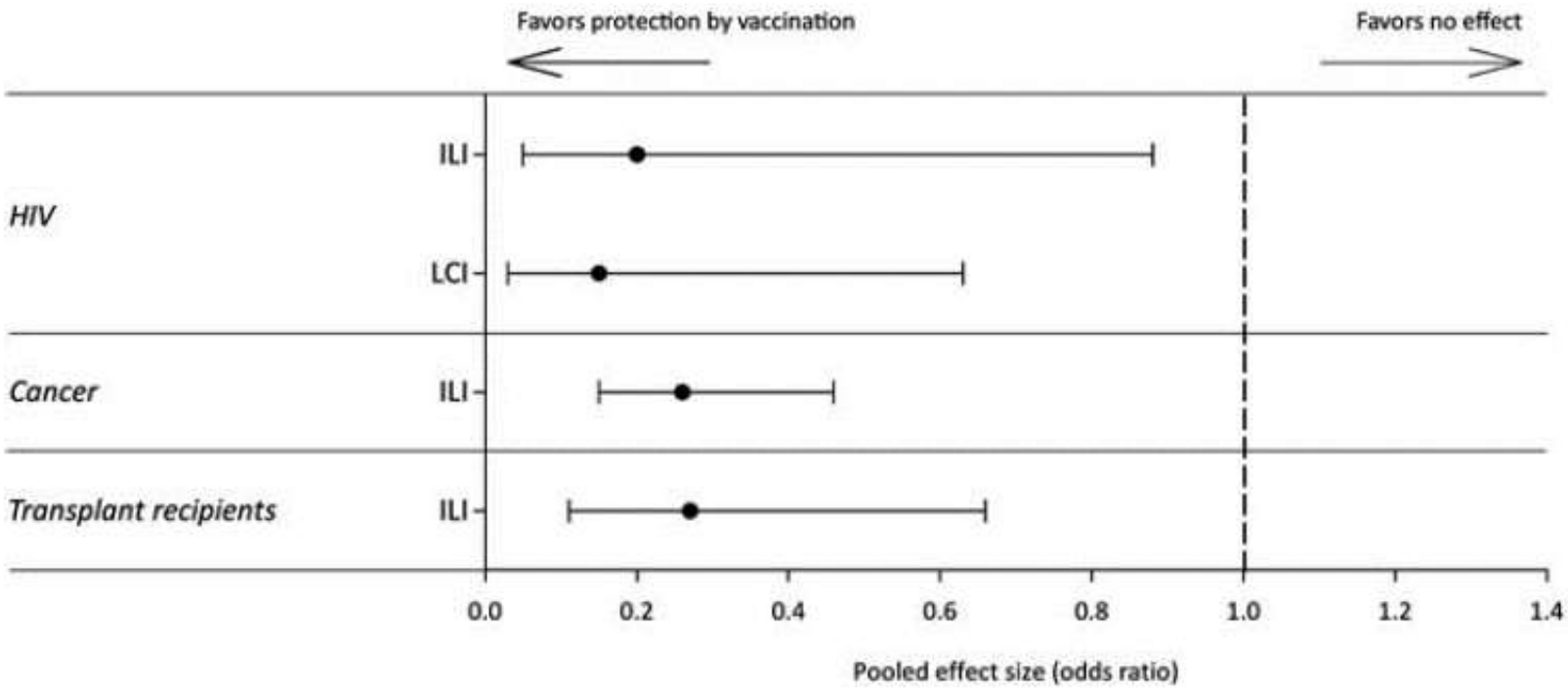
Charles R. Beck,[1] Bruce C. McKenzie,[1] Ahmed B. Hashim,[1] Rebecca C. Harris,[2] University of Nottingham Influenza and the ImmunoCompromised (UNIIC) Study Group,[a] and Jonathan S. Nguyen-Van-Tam[1]

[1]Division of Epidemiology and Public Health, University of Nottingham, United Kingdom; and [2]Global Influenza Programme, World Health Organization, Geneva, Switzerland

Taux de **séroprotection**
(comparé à une population contrôle)



Efficacité sur la prévention des infections d'allure grippale (*influenza-like illness*)



Dose d'antigène des vaccins anti-grippaux

- Vaccins inactivés
- Dose standard d'antigène : 15 µg pour chacune des 4 souches
- Haute dose (vaccin efluelda®) : 60 µg pour chacune des 4 souches
- Vaccin adjuvanté au MF59C.1 (fluad®)

2026

Immunity & Ageing

https://doi.org/10.1186/s12979-026-00571-x

Article in Press

High-dose quadrivalent influenza vaccine in older adults with or without cardiovascular risk: a meta-analysis of randomized trials on 511,890 participants

Received: 22 March 2026

Accepted: 5 May 2026

Published online: 09 May 2026

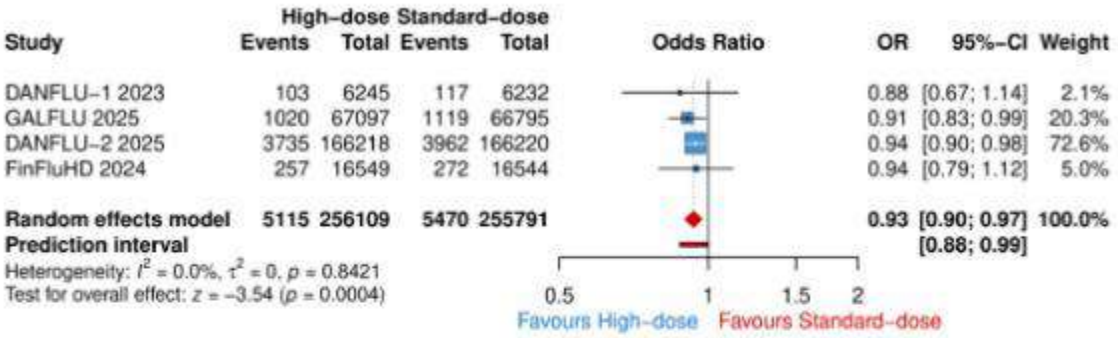
Cite this article as: Elgendy M.S., Shubietah A., Awashra A. *et al.* High-dose quadrivalent influenza vaccine in older adults with or without cardiovascular risk: a meta-analysis of randomized trials on 511,890 participants. *Immun Ageing* (2026). https://doi.org/10.1186/s12979-026-00571-x

Mohamed S. Elgendy, Abdalhakim Shubietah, Ameer Awashra, Mohamed Rifai, Mohanad Qwaider, Mohamed A. Faheem, Momin A. Abuwatfa, Mahmoud Ismayl & Mohammad Alqadi

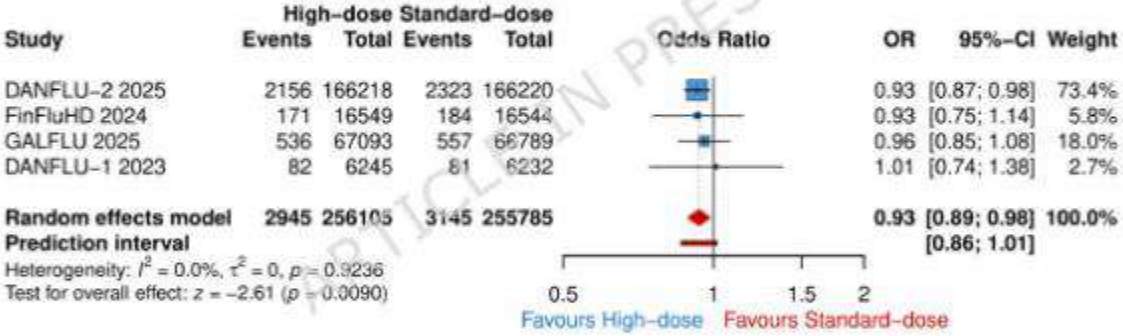
We are providing an unedited version of this manuscript to give early access to its findings. Before final publication, the manuscript will undergo further editing. Please note there may be errors present which affect the content, and all legal disclaimers apply.

If this paper is publishing under a Transparent Peer Review model then Peer Review reports will publish with the final article.

(a) Cardio-Respiratory Hospitalization

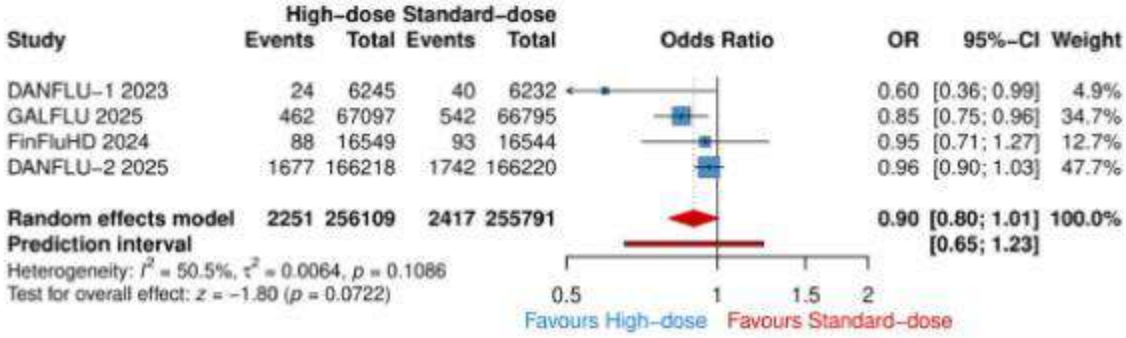


(b) Cardiovascular Hospitalization



ARTICLE IN PRESS

(c) Respiratory Hospitalization



Original Clinical Science—General

An Open-label Randomized Controlled Parallel-group Pilot Study Comparing the Immunogenicity of a Standard-, Double-, and Booster-dose Regimens of the 2014 Seasonal Trivalent Inactivated Influenza Vaccine in Kidney Transplant Recipients

Fatuma Catherine Atieno Odongo, PhD,[1] Patrícia Emília Braga, PhD,[2] Ricardo Palacios, PhD,[2] João Luiz Miraglia, MSc,[2] Ana Marli Christovam Sartori, PhD,[1] Karim Yaqub Ibrahim, PhD,[1] Marta Heloisa Lopes, PhD,[1] Helio Hehl Caiaffa-Filho, PhD,[3] Maria do Carmo Sampaio Tavares Timenetsky, PhD,[4] Fabiana Agena, PhD,[5] Luiz Sergio Fonseca de Azevedo,[5] Elias David-Neto,[5] Alexander Roberto Precioso, PhD,[2] and Lígia Camera Pierrotti, PhD[1]

SPR: vaccinated participants with postvaccination titers ≥1:40
GMR: Geometric mean ratio

Vaccine antigen	SDTIIV[a]		DDTIIV[a]		BDTIIV[b]	
	Prevaccination antibody titers <1:40					
	n	(95% CI)	N	(95% CI)	N	(95% CI)
A/H1N1		$n_T = 20$		$n_T = 18$		$n_T = 20$
SPR	5/20	25.0% (8.7-49.1)	14/18	77.8% (52.4-93.6)	13/20	65.0% (40.8-84.6)
SCR	2/20	10.0% (1.2-31.7)	10/18	55.6% (30.8-78.5)	12/20	60.0% (36.1-80.9)
GMR		1.7 (1.1-2.5)		3.4 (2.1-5.5)		4.3 (2.5-7.2)
A/H3N2		$n_T = 24$		$n_T = 25$		$n_T = 18$
SPR	9/24	37.5% (18.8-59.4)	14/25	56.0% (34.9-75.6)	14/18	77.8% (52.4-93.6)
SCR	7/24	29.2% (12.6-51.1)	11/25	44.0% (24.4–65.1)	12/18	66.7% (41.0–86.7)
GMR		2.4 (1.5-3.7)		3.7 (2.3-6.0)		6.6 (3.5-12.3)

Immunogenicity of High-Dose Versus MF59-Adjuvanted Versus Standard Influenza Vaccine in Solid Organ Transplant Recipients: The Swiss/Spanish Trial in Solid Organ Transplantation on Prevention of Influenza (STOP-FLU Trial)

2024

Matteo Mombelli,[1,2,a] Dionysios Neofytos,[3,a] Uyen Huynh-Do,[4] Javier Sánchez-Céspedes,[5,6,7] Susanne Stampf,[8] Dela Golshayan,[1] Suzan Dahdal,[4] Guido Stirnimann,[9] Aurelia Schnyder,[10] Christian Garzoni,[11] Reto M. Venzin,[12] Lorenzo Magenta,[13] Melanie Schönenberger,[8] Laura Walti,[14] Cédric Hirzel,[14] Aline Munting,[2] Michael Dickenmann,[8] Michael Koller,[8] John-David Aubert,[1,15] Jürg Steiger,[8] Manuel Pascual,[1] Thomas F. Mueller,[16] Macé Schuurmans,[17] Christoph Berger,[18] Isabelle Binet,[10] Jean Villard,[19] Nicolas J. Mueller,[20] Adrian Egli,[21,22,23] Elisa Cordero,[5,6,7] Christian van Delden,[3] and Oriol Manuel;[1,2] and the Swiss Transplant Cohort Study

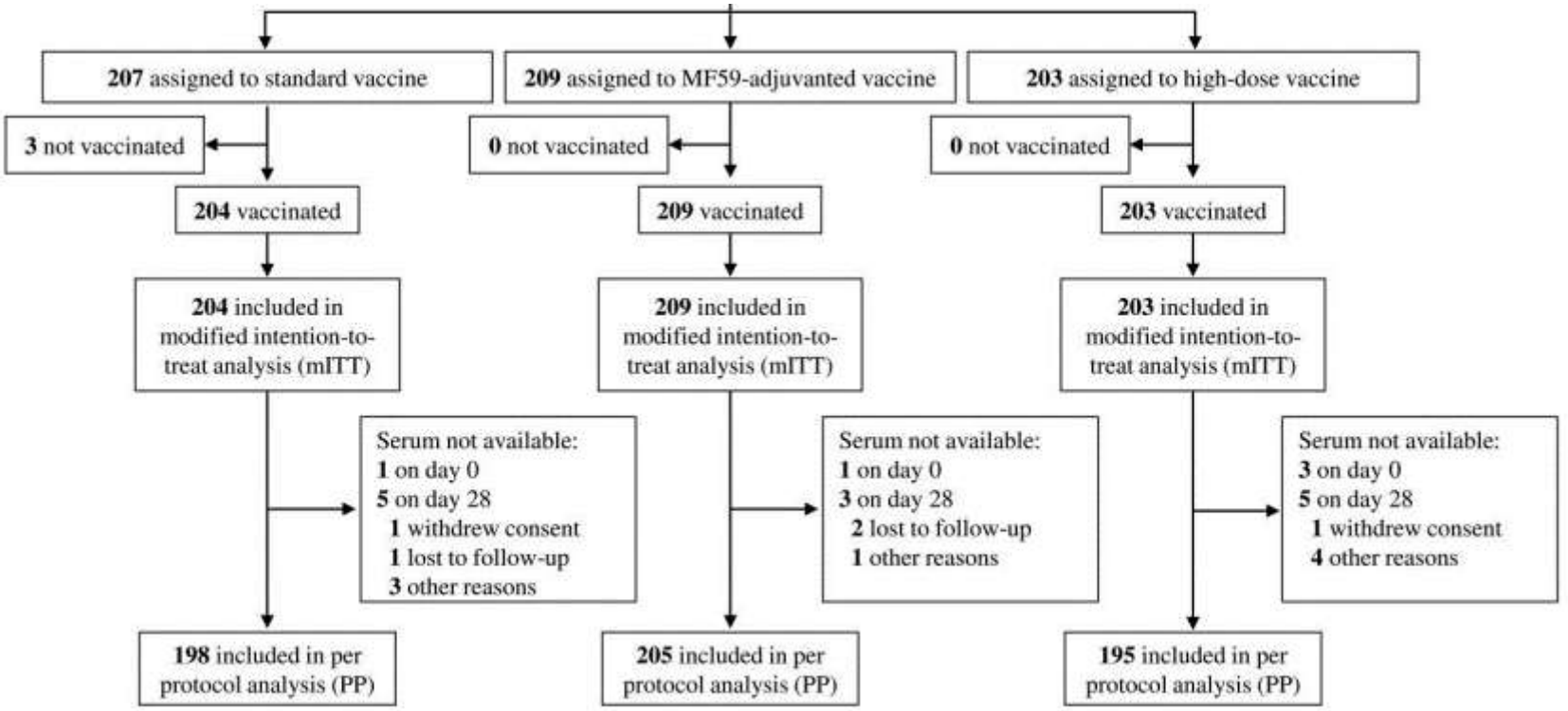


Table 2. Primary Outcome for Patients Receiving the High-Dose, MF59-Adjuvanted and Standard Influenza Vaccines in the Per-Protocol Population

	Vaccine Response Rate	Risk Difference	*P* Value
High-dose and MF59-adjuvanted versus standard vaccine[a]	63% (251/400) versus 42% (84/198)	0.20 (97.5% CI, .12–1)	<.001
High-dose versus standard vaccine[a]	66% (129/195) versus 42% (84/198)	0.24 (95% CI, .16–1)	<.001
MF59-adjuvanted versus standard vaccine[b]	60% (122/205) versus 42% (84/198)	0.17 (97.5% CI, .08–1)	<.001
High-dose versus MF59-adjuvanted vaccine[b]	66% (129/195) versus 60% (122/205)	0.07 (95% CI, −.01 to 1)	.085

Abbreviation: CI, confidence interval.

[a]First-level hypothesis.

[b]Second-level hypothesis. A 2-level hierarchical test procedure for differences in response rates to the vaccine at day 28 postvaccination was applied. The tests for the hypotheses at the first level served as "gatekeepers." The second-level hypotheses were only tested if 2 or more gatekeeper null hypotheses were rejected.

Journal of Infection 91 (2025) 106538

Contents lists available at ScienceDirect

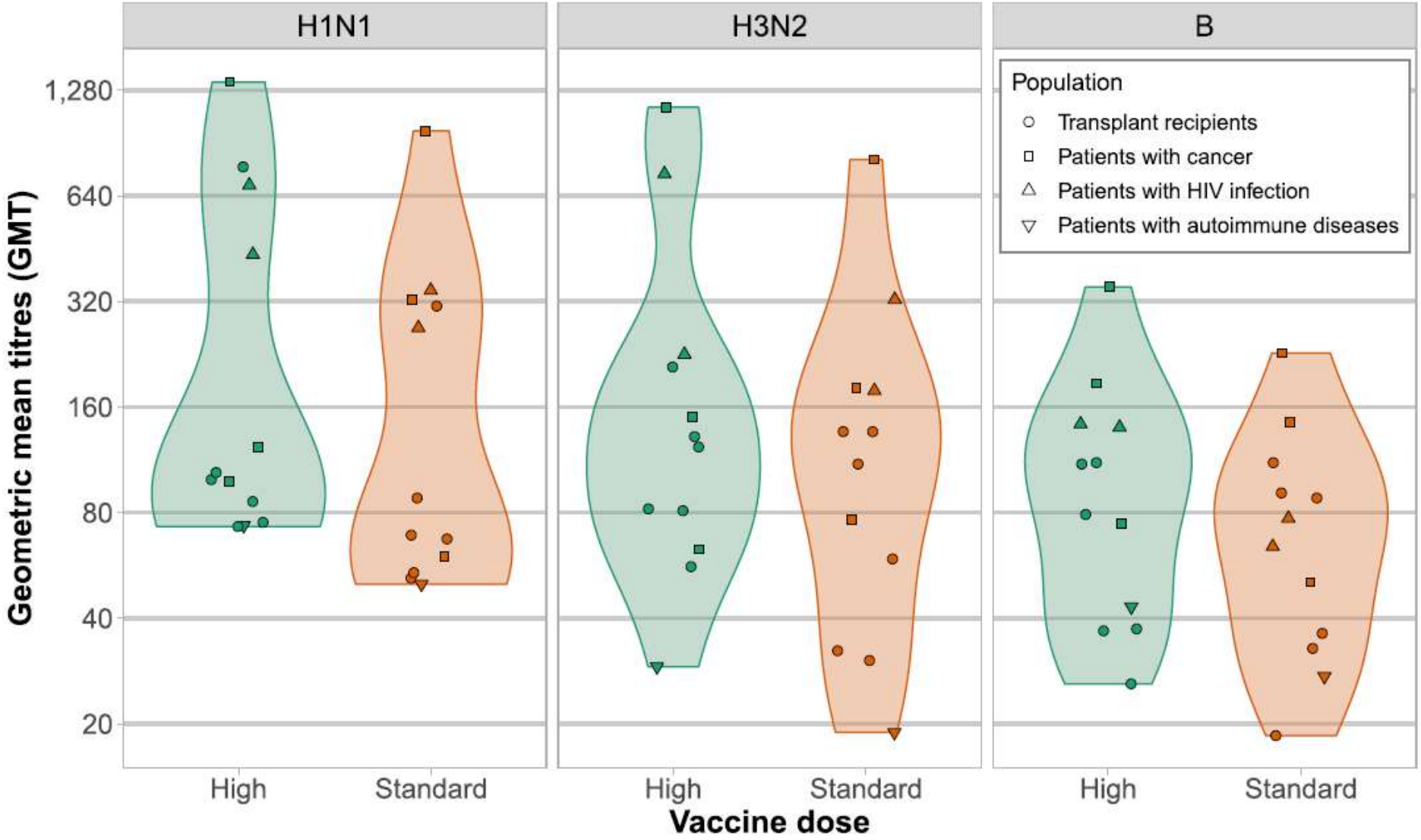
Journal of Infection

journal homepage: www.elsevier.com/locate/jinf

Viruses and Viral Diseases

High-dose versus standard-dose influenza vaccine for immunocompromised patients: A systematic review and meta-analysis of randomised clinical trials

Mario Rivera-Izquierdo [a,b,c], Alejandro Verdejo-Iáñez [a], Arturo Morales-Portillo [d,e], Manuel González-Alcaide [a,*], Antonio Jesús Láinez-Ramos-Bossini [b,f,g], Virginia Martínez-Ruiz [a,b,c], Nicolás Francisco Fernández-Martínez [b,c,h], Luis Miguel Martín-delosReyes [b,c,h], Eladio Jiménez-Mejías [a,b,c], Inmaculada Guerrero-Fernández de Alba [b,i], María del Carmen Valero-Ubierna [b,i], Pablo Lardelli-Claret [a,b,c], Joan Antoni Schoenenberger-Arnaiz [d,e], José Juan Jiménez-Moleón [a,b,c]


H1N1
H3N2
B
Population
Transplant recipients
Patients with cancer
Patients with HIV infection
Patients with autoimmune diseases
Geometric mean titres (GMT)
1,280
640
320
160
80
40
20
High
Standard
Vaccine dose

Vaccine 34 (2016) 3598–3606

Contents lists available at ScienceDirect

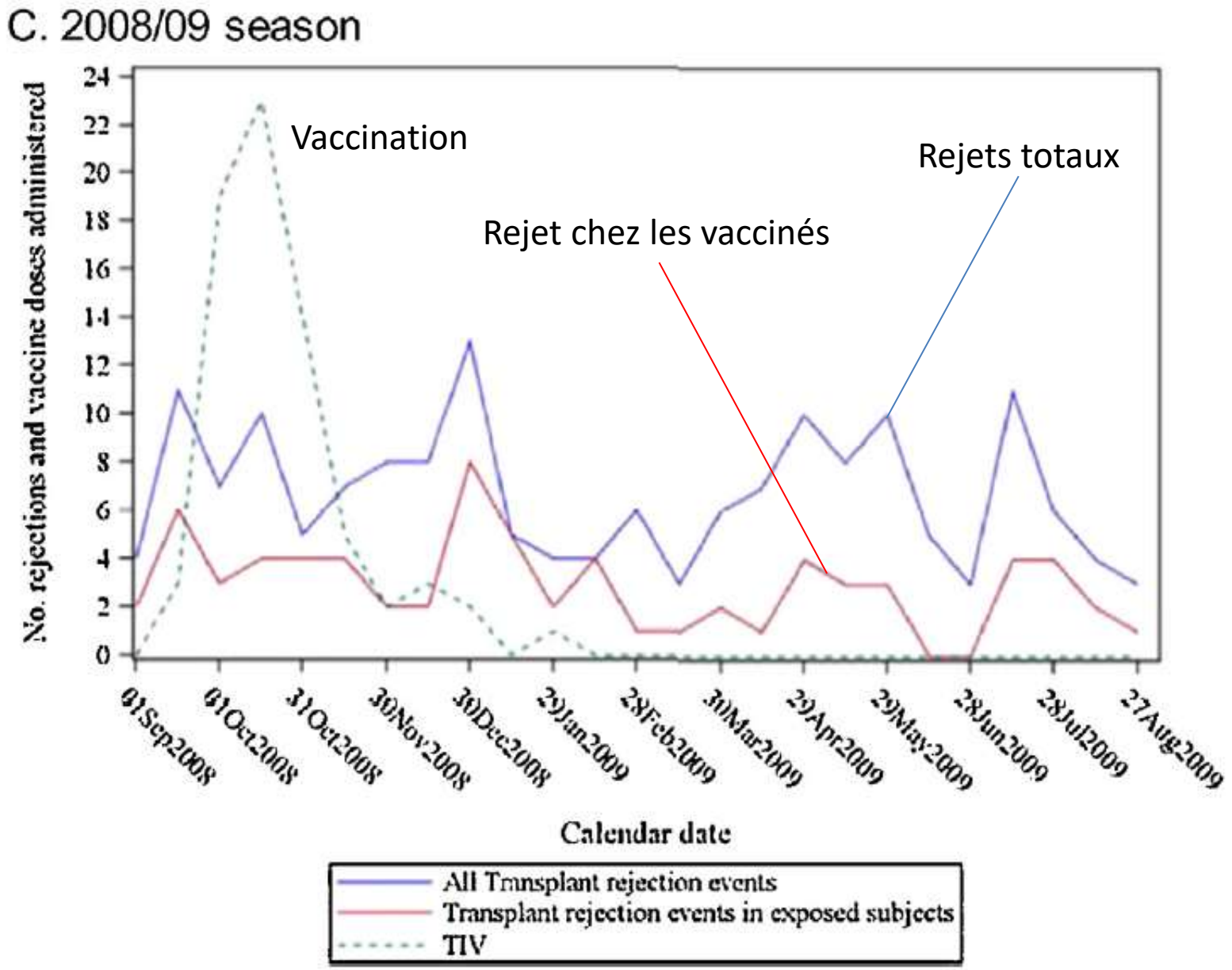
Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Risk of solid organ transplant rejection following vaccination with seasonal trivalent inactivated influenza vaccines in England: A self-controlled case-series

Gaël Dos Santos[a,*,1], François Haguinet[b,1], Catherine Cohet[b], Dave Webb[c], John Logie[c], Germano L.C. Ferreira[b,2], Dominique Rosillon[b], Vivek Shinde[b,3]

[a] Business & Decision Life Sciences (C/O GSK Vaccines), Rue Saint Lambert 141, B-1200 Brussels, Belgium
[b] GSK Vaccines, Avenue Fleming 20, B-1300 Wavre, Belgium
[c] GSK R&D, Stockley Park West, Uxbridge, Middlesex UB11 1BT, United Kingdom


C. 2008/09 season
No. rejections and vaccine doses administered
0
2
4
6
8
10
12
14
16
18
20
22
24
Vaccination
Rejets totaux
Rejet chez les vaccinés
01Sep2008
01Oct2008
31Oct2008
30Nov2008
30Dec2008
29Jan2009
28Feb2009
30Mar2009
29Apr2009
29May2009
28Jun2009
28Jul2009
27Aug2009
Calendar date
All Transplant rejection events
Transplant rejection events in exposed subjects
TIV

ELSEVIER

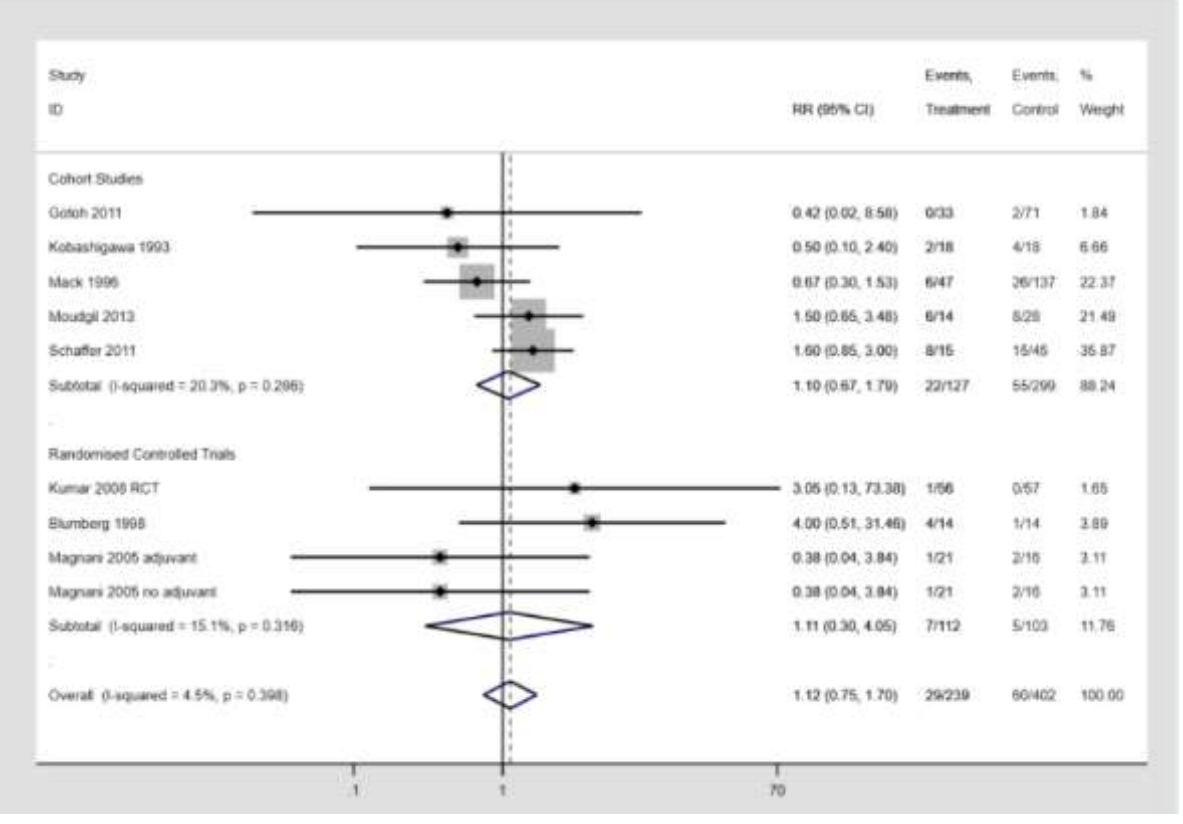
The Journal of Heart and Lung Transplantation
http://www.jhltonline.org

2018

Does vaccination in solid-organ transplant recipients result in adverse immunologic sequelae? A systematic review and meta-analysis

William R. Mulley, BMed, PhD,[a,b] Claire Dendle, MBBS,[b,c] Jonathan E.H. Ling, MBChB,[a,b] and Simon R. Knight, MChir, MA[d,e]

estimate of rejection risk post-vaccination



Grippe : recommandations

- Vaccination annuelle en octobre-novembre
  - Privilégier le vaccin haute dose ou adjuvanté
- Avant la greffe
- Et dès 3 (ou 1…) mois après la greffe
  - *Mais pas de consensus sur le fait de faire 2 doses à 1 mois d'intervalle*
  - *Sauf ? si primo-vaccination chez un enfant <9 ans*

- Cocooning

Pneumocoque

American Journal of Transplantation 2007; 7: 1209–1214
Blackwell Munksgaard

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Journal compilation © 2007 The American Society of Transplantation and the American Society of Transplant Surgeons

doi: 10.1111/j.1600-6143.2006.01705.x

Invasive Pneumococcal Disease in Solid Organ Transplant Recipients—10-Year Prospective Population Surveillance

D. Kumar[a,*], A. Humar[a], A. Plevneshi[b], K. Green[b], G.V. R. Prasad[c], D. Siegal[d], the Toronto Invasive Bacterial Diseases Network[e] and A. McGeer[b]

- Incidence of IPD in the transplant population:
  146 per 100,000 persons / year
- General population incidence:
  11.5 per 100,000 persons / year

Table 2: Clinical presentations of pneumococcal disease

Outcome	Cases (n = 21)
Clinical presentation	
Bacteremia	19 (90.5%)
Pneumonia	12 (57.1%)
Bacteremia without focus	7 (33.3%)
Peritonitis	1 (4.8%)
Parotitis	1 (4.8%)
Site of positive culture	
Blood	19 (90.5%)
Ascitic fluid	1 (4.8%)
Parotid gland	1 (4.8%)
Hospitalization	19 (90.5%)
Mean time in hospital (days)	16.2 ± 16.9
Range (days)	1–67
In-hospital mortality	6 (28.6%)

Table 1
Incidence of invasive pneumococcal disease in adult SOT recipients.

Population	First author and year of publication	Incidence of invasive pneumococcal disease
General population	Shigayeva 2016 [8]	4.8 per 100,000 person/years
	Kumar 2007 [7]	11.5 per 100,000 person/years
SOT recipients overall	Shigayeva 2016 [8]	195 per 100,000 person/years[a]
	Kumar 2007 [7]	146 per 100,000 transplanted patients/year
Kidney transplant recipients	Kumar 2007 [7]	104 per 100,000 transplanted patients/year
Lung transplant recipients	Kumar 2007 [7]	239 per 100,000 transplanted patients/year
Heart transplant recipients	Kumar 2007 [7]	0 per 100,000 transplanted patients/year
	Amber 1990 [11]	3600 per 100,000 person/years[b]
Liver transplant recipients	Kumar 2007 [7]	354 per 100,000 transplanted patients/year
Pancreas transplant recipients	Kumar 2007 [7]	0 per 100,000 transplanted patients/year

[a] Includes solid organ and bone marrow transplant recipients.
[b] All pneumococcal infections, not just invasive pneumococcal disease.

Dendle 2018

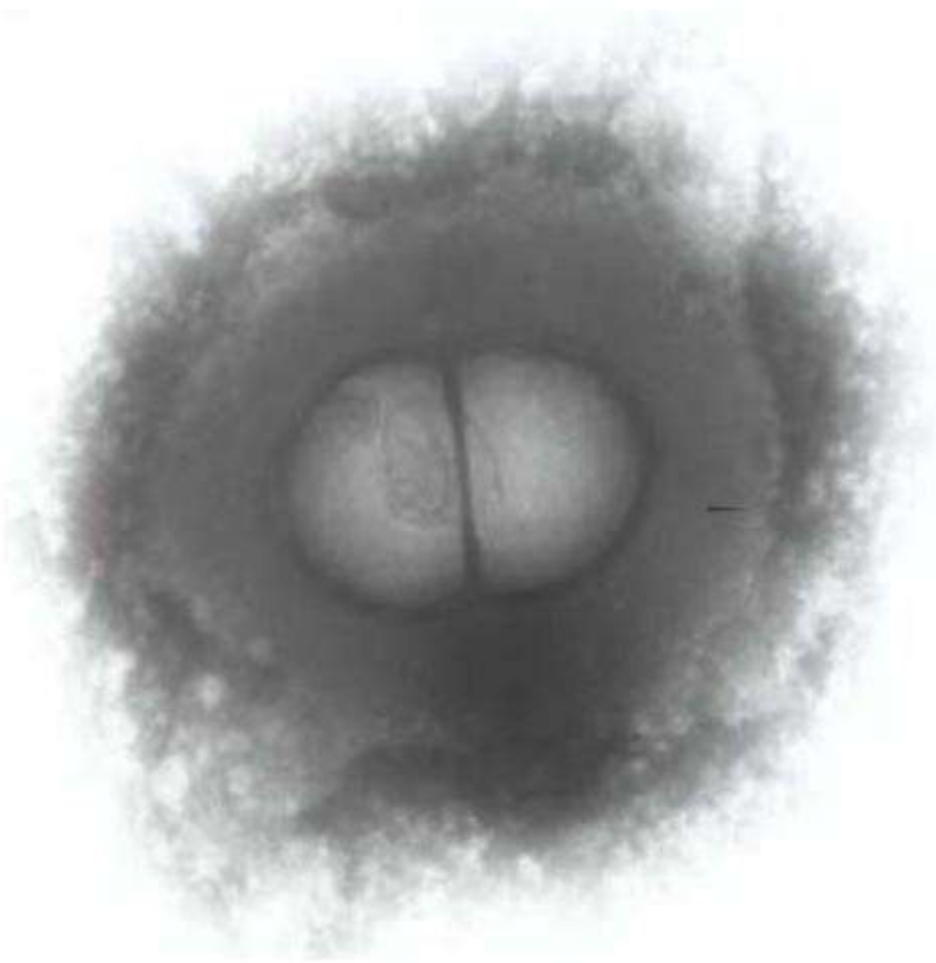
Capsule et sérotype

- Capsule : protection contre l'opsonisation
  - Par le complément
  - Par les anticorps

- 90 sérotypes capsulaires
- Hétérogénéité de leur invasivité
  - Ratio portage/invasion : variation de 2 log

- 20-30 sérotypes font 90% des cas d'IIP

- Cible d'anticorps efficaces



3

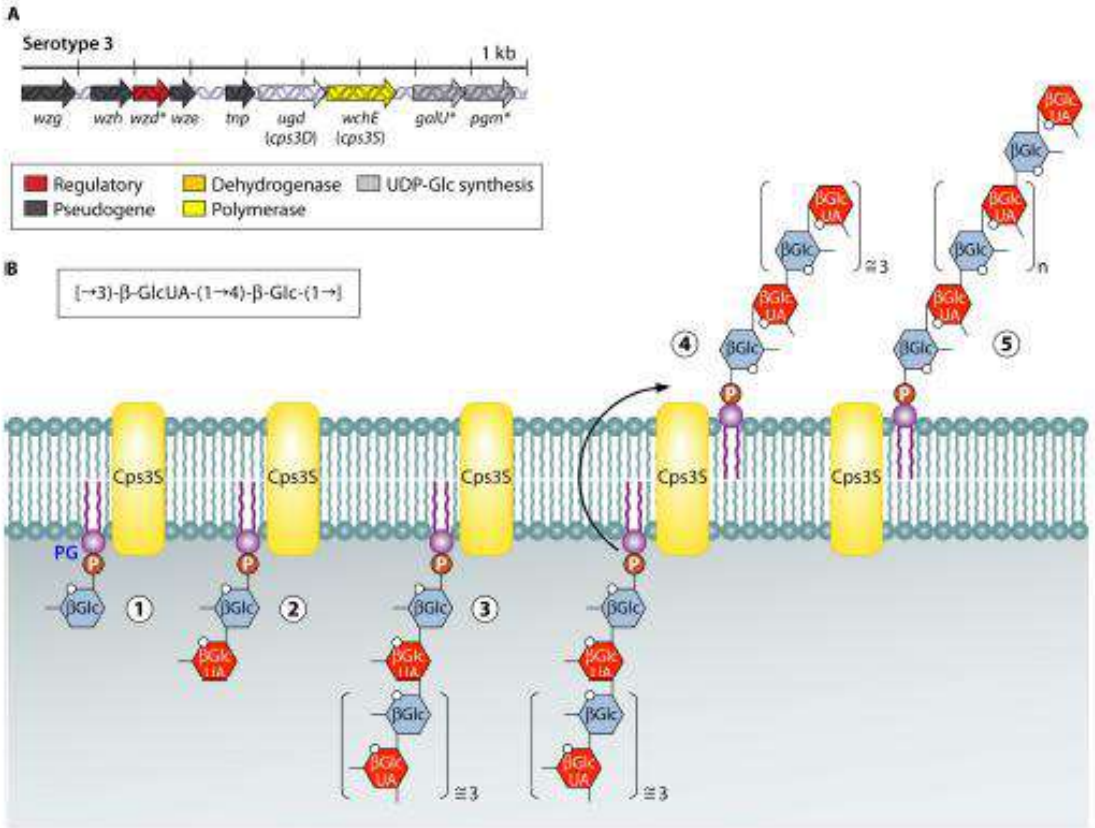
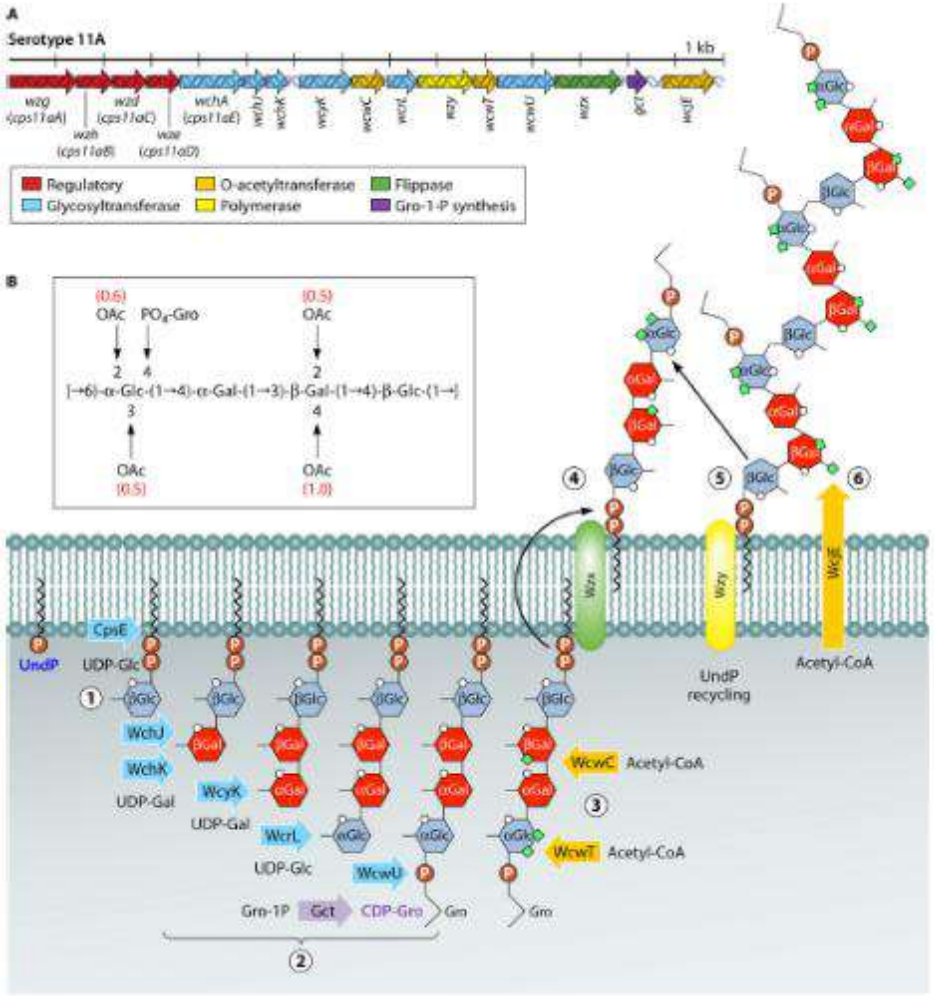


FIG 2 Serotype 3 has a divergent *cps* locus and utilizes synthase-dependent assembly. (A) The serotype 3 *cps* locus (based on GenBank accession no. CR931634.2). The *cps* locus occurs between *dexB* and *aliA* on the chromosome. Note that *ugd* (*cps3D*) and *wchE* (*cps3S*) are necessary for capsular synthesis, and *wzd*, *galU*, and *pgm* (*) are dispensable (66, 73, 74, 275, 276). (B) The Cps3S synthase synthesizes serotype 3 PS (structure shown in the inset). Cps3S initiates synthesis by transfer of glucose (Glc) from UDP-glucose to a phosphatidyl glycerol (PG) acceptor (1), transfers glucuronic acid (GlcUA) from UDP-GlcUA to the PG-linked Glc (2), and extends the capsule to approximately an octosaccharide (3). Under favorable conditions (i.e., relatively high [GlcUA]), Cps3S translocates the PS chain to the external face of the membrane (4) and increases chain length by a processive capsular synthesis mechanism (5). PS is thought to be released when [GlcUA] becomes insufficient to fill the second-sugar binding site of Cps3S before the PS chain advances without a new sugar to bind in the first binding site.

11A



A
Serotype 11A
1 kb
Regulatory
Glycosyltransferase
O-acetyltransferase
Polymerase
Flippase
Gro-1-P synthesis
B
OAc
PO4-Gro
OAc
OAc
OAc
UndP
CpsE
UDP-Glc
WchJ
WchK
UDP-Gal
WcyK
UDP-Gal
WcrL
UDP-Glc
WcwU
Gro-1P
Gct
CDP-Gro
Gro
WcwC
Acetyl-CoA
WcwT
Acetyl-CoA
UndP
recycling
Acetyl-CoA

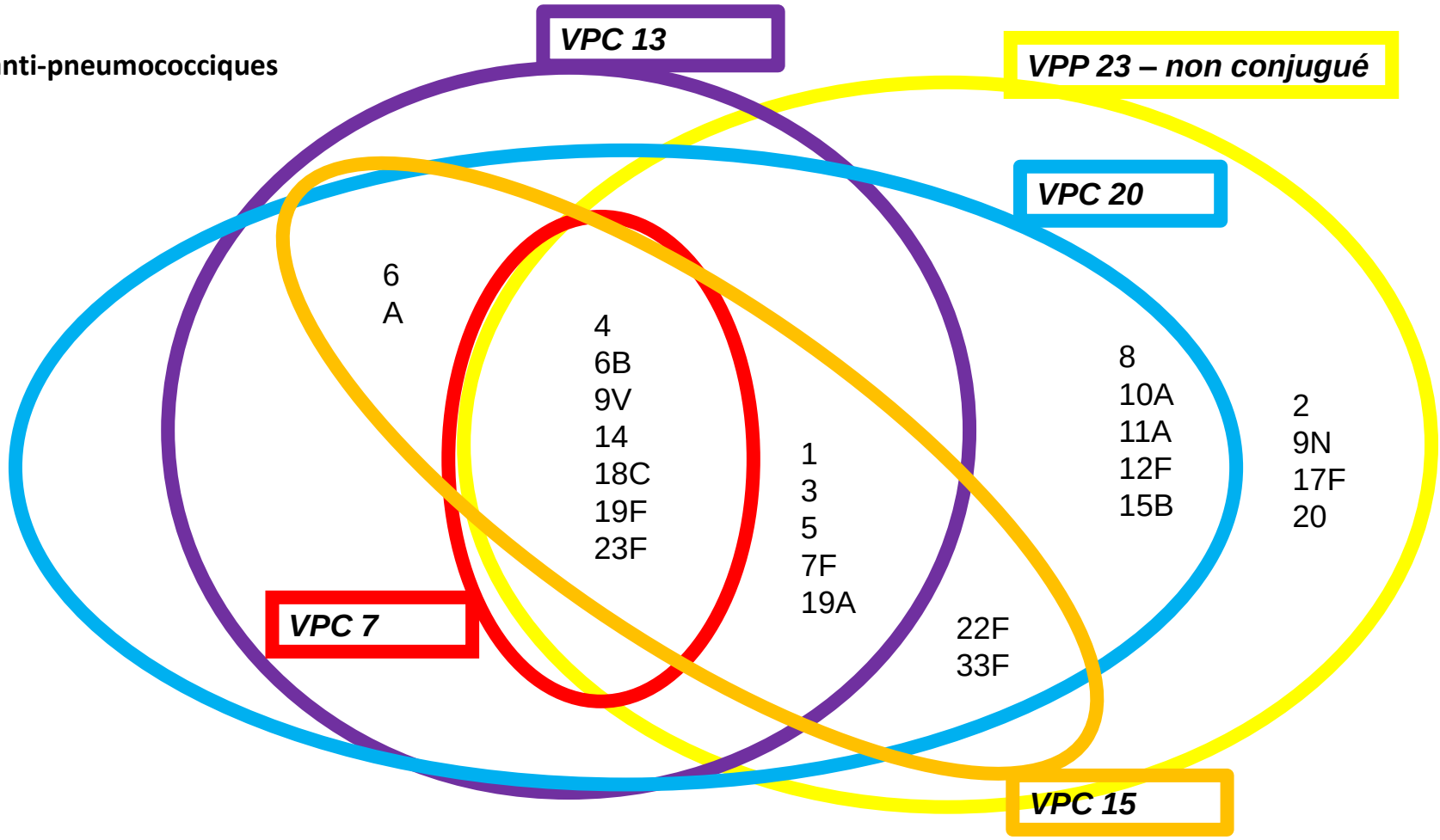
Vaccins anti-pneumococciques

- Vaccins polysaccharidiques (capsule)
  - Pneumovax®, pneumo23®
  - 23 sérotypes
  - Mauvaise réponse chez le nourrisson
  - AMM après 5 ans
  - Peu ou pas d'induction de mémoire immunologique
  - Risque d'hyporéactivité si revaccination par vaccin conjugué ou pas

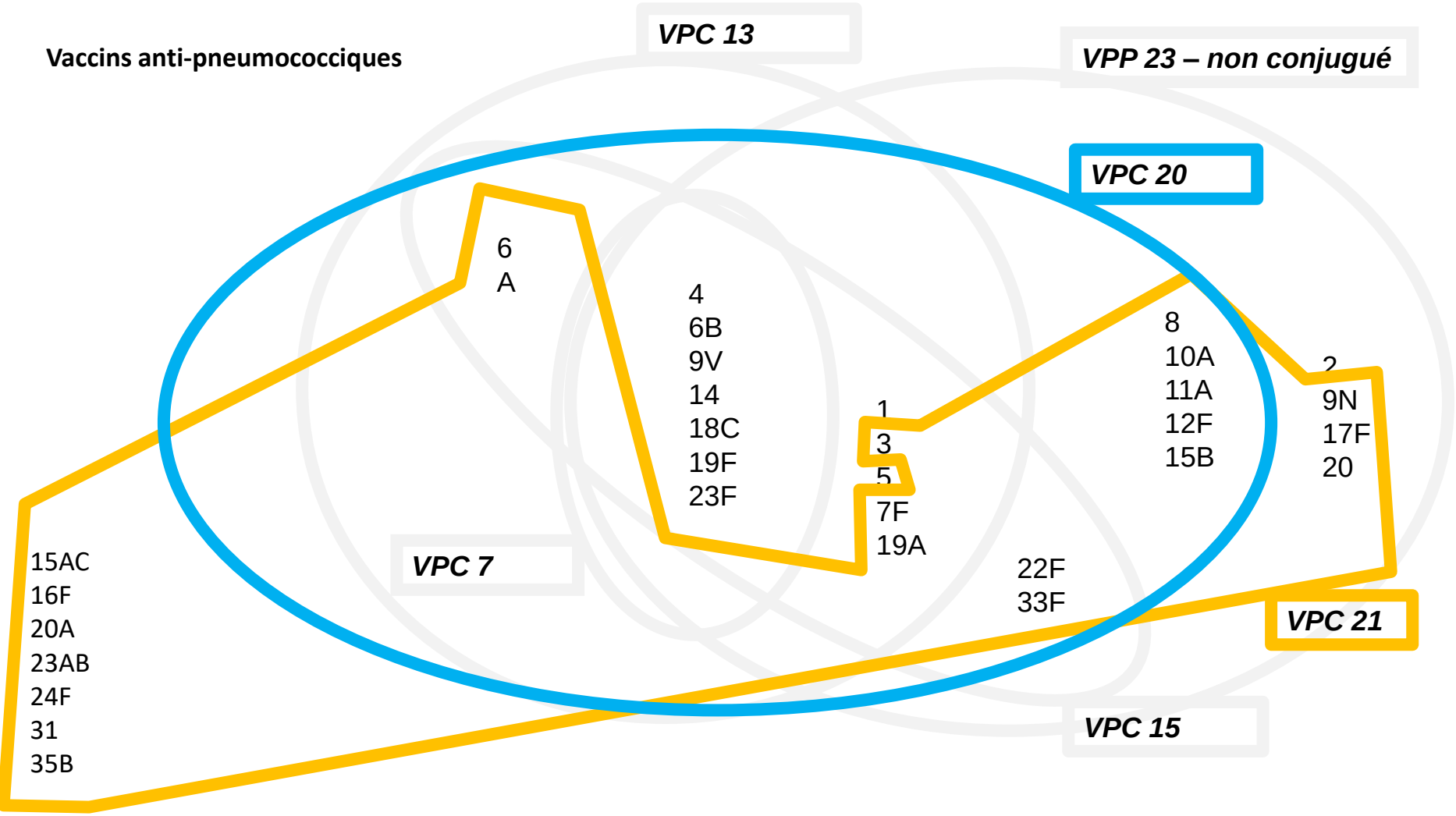
Abandon actuellement

- Vaccins polysaccharidiques conjugués
  - Prévenar7® puis prévenar13®, vaxneuvance (15), prévenar20®, capvaxive 21
  - Conjugaison à un dérivé de la toxine diphtérique
  - Meilleure réponse chez le nourrisson
  - Induction d'une mémoire immunologique
  - Efficacité sur le portage

Vaccins anti-pneumococciques



Vaccins anti-pneumococciques



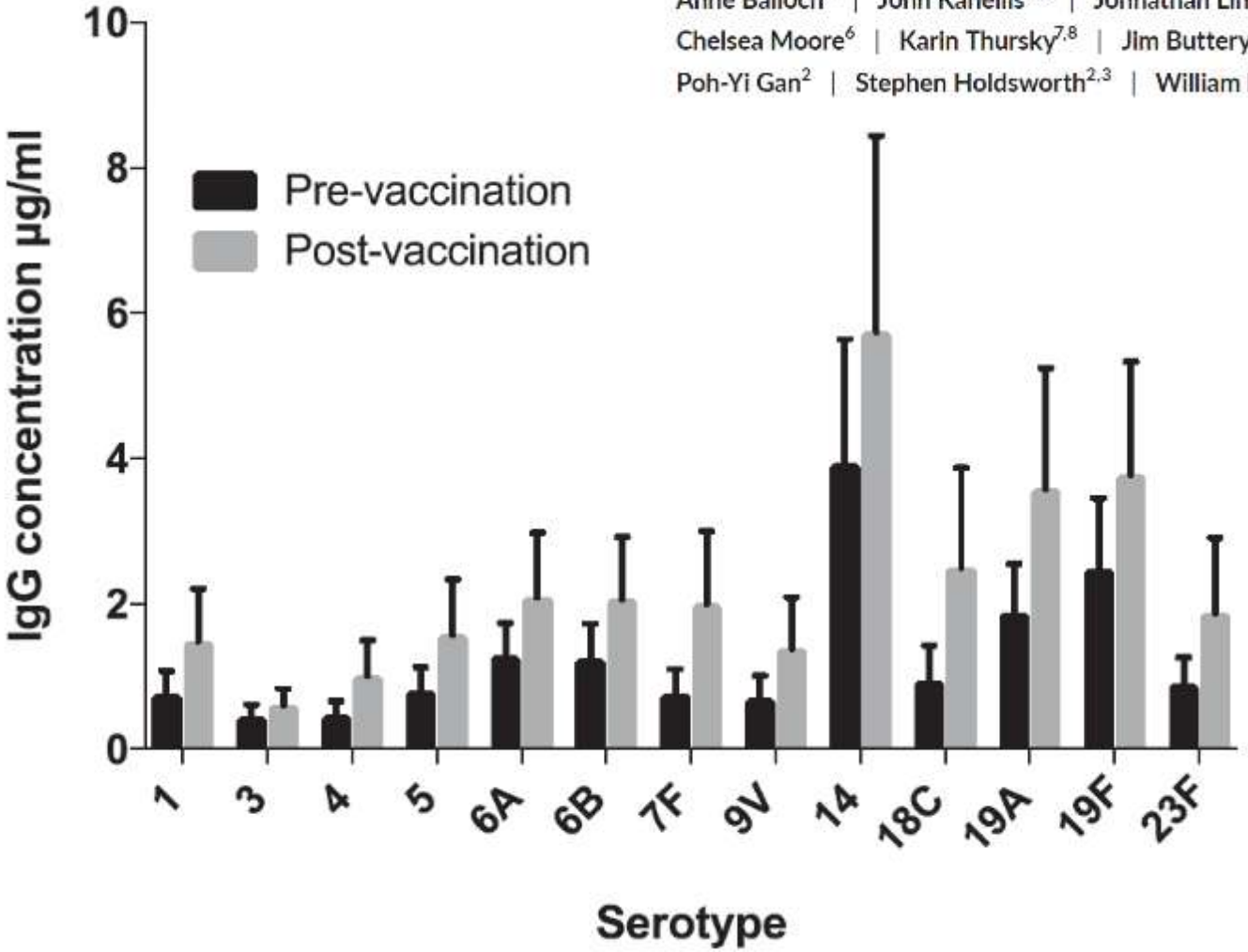
Received: 25 October 2017 | Revised: 6 November 2017 | Accepted: 7 November 2017
DOI: 10.1111/tid.12866

ORIGINAL ARTICLE

WILEY

Seroresponses and safety of 13-valent pneumococcal conjugate vaccination in kidney transplant recipients

Claire Dendle[1] | Rhonda L. Stuart[1] | Kevan R. Polkinghorne[2,3,4] | Anne Balloch[5] | John Kanellis[2,3] | Johnathan Ling[3] | Megan Kummrow[6] | Chelsea Moore[6] | Karin Thursky[7,8] | Jim Buttery[4,9] | Kim Mulholland[5] | Poh-Yi Gan[2] | Stephen Holdsworth[2,3] | William R. Mulley[2,3]



Age médian : 57 ans

Contents lists available at ScienceDirect

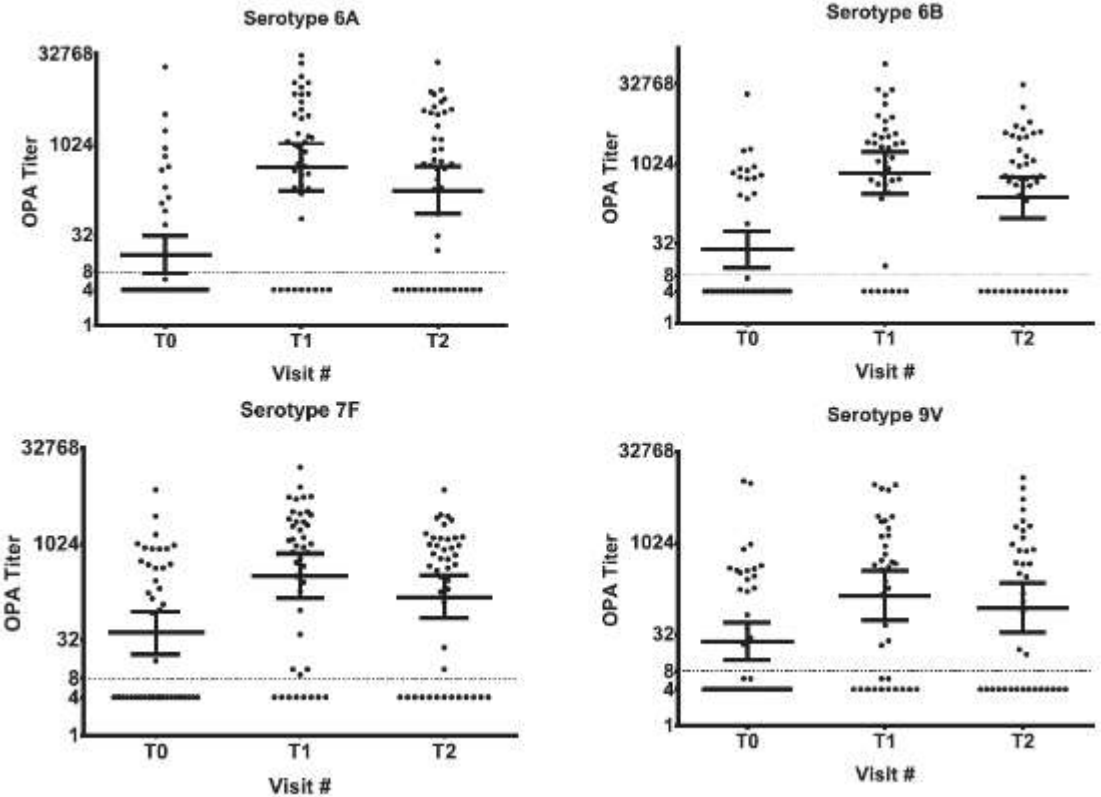
Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Humoral response to a 13-valent pneumococcal conjugate vaccine in kidney transplant recipients

Simon Oesterreich [a,b,c], Monika Lindemann [c,*], David Goldblatt [d,e], Peter A. Horn [c], Benjamin Wilde [b], Oliver Witzke [a]

[a] Department of Infectious Diseases, University Hospital Essen, University Duisburg-Essen, Essen, Germany
[b] Department of Nephrology, University Hospital Essen, University Duisburg-Essen, Essen, Germany
[c] Institute for Transfusion Medicine, University Hospital Essen, University Duisburg-Essen, Essen, Germany
[d] University College London, Institute of Child Health, London, United Kingdom
[e] World Health Organisation, Pneumococcal Serology Reference Laboratory, London, United Kingdom



Pneumocoque : recommandations

- Prévenar20® ou capvaxive21®
  - Reco été 2026: préférer le 21

- Vacciner en pré-transplantation d'organe solide
  - 1 dose
  - On arrête la double vaccination par prévenar13® - pneumovax ®/pneumo23®

- En post-transplantation d'organe solide :
  - 1 dose à 6 mois si pas de vaccination pré-greffe
  - À 5 ans post-greffe si vaccination pré-greffe ?

Diphtérie-Tétanos-Poliomyélite

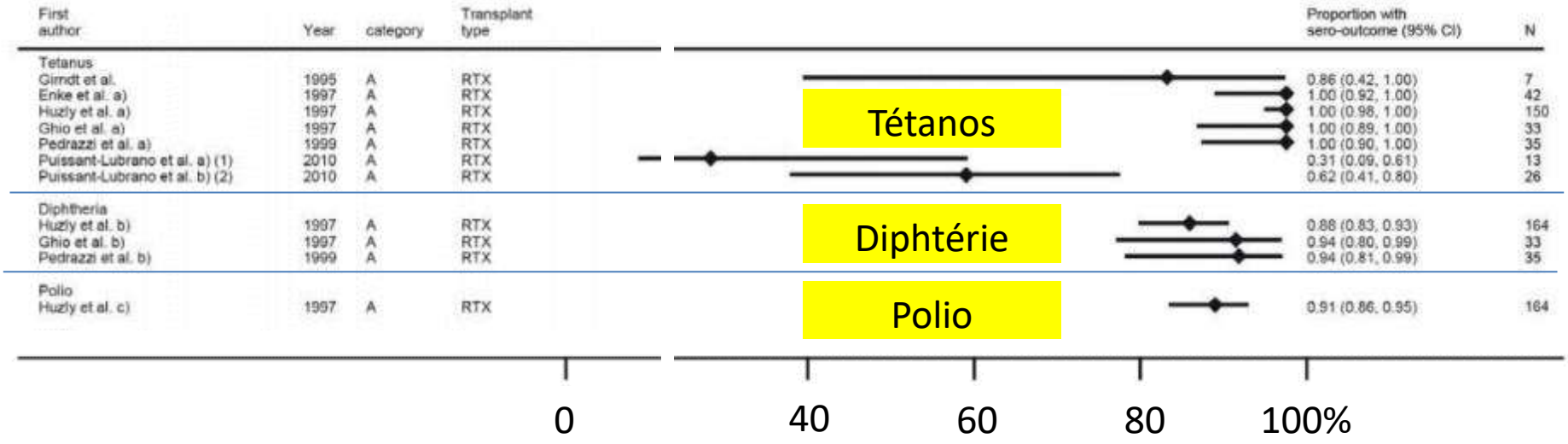
OPEN ACCESS Freely available online

PLOS ONE

Serologic Vaccination Response after Solid Organ Transplantation: A Systematic Review

Isabella Eckerle[1,2]*, Kerstin Daniela Rosenberger[1], Marcel Zwahlen[3], Thomas Junghanss[1]

1 Section of Clinical Tropical Medicine, Department of Infectious Diseases, University Hospital Heidelberg, Heidelberg, Germany, **2** Institute of Virology, University of Bonn Medical Centre, Bonn, Germany, **3** Institute of Social and Preventive Medicine, University Bern, Bern, Switzerland



Proportion de personnes protégées

Recommandations DTP

- Rappel avant la greffe (si précédente dose >10 ans)

- Rappel après la greffe
  - À 6 mois de la greffe s'il n'y a pas eu de rappel pré-greffe
  - Et tous les 10 ans

- Indication potentielle de sérologie en cas de voyage en zone d'endémie de diphtérie
  - Et rappel plus tôt que prévu si anticorps bas

HBV

Rationnel

- 0,3% de la population française avait une infection chronique en 2016 (réduction de moitié en 10 ans)
- Risque plus élevé d'infection chronique en cas de primo-infection chez l'ID
- Risque majoré chez le transplanté hépatique
- Risque synergique avec la toxicité médicamenteuse
- Exposition (très théorique …) au risque nosocomial

Les problèmes

- Moindre réponse chez le transplanté
- Moindre réponse chez le cirrhotique
- Moindre réponse chez l'insuffisant rénal

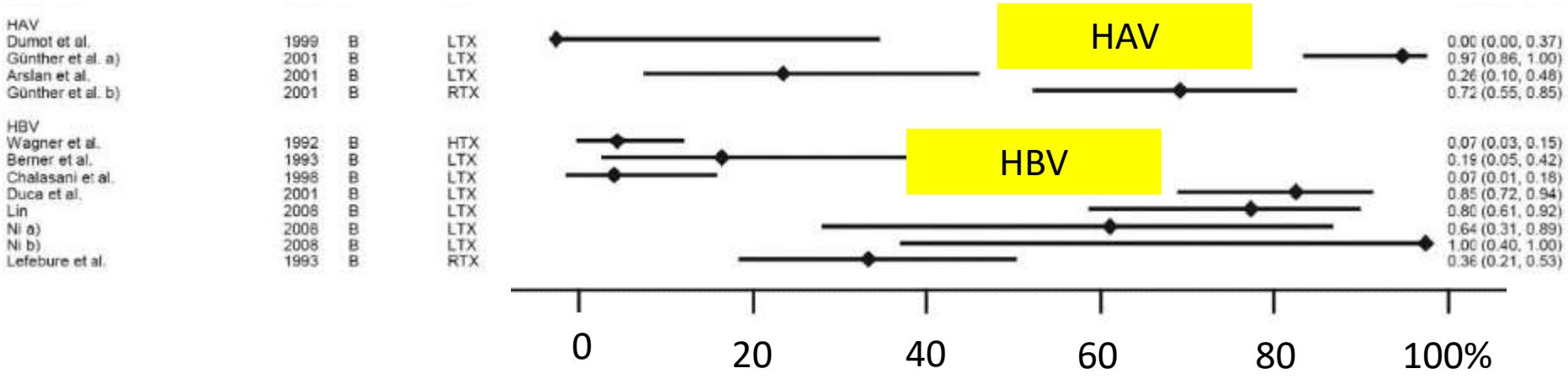
OPEN ACCESS Freely available online

PLOS | ONE

Serologic Vaccination Response after Solid Organ Transplantation: A Systematic Review

Isabella Eckerle[1,2]*, Kerstin Daniela Rosenberger[1], Marcel Zwahlen[3], Thomas Junghanss[1]

1 Section of Clinical Tropical Medicine, Department of Infectious Diseases, University Hospital Heidelberg, Heidelberg, Germany, **2** Institute of Virology, University of Bonn Medical Centre, Bonn, Germany, **3** Institute of Social and Preventive Medicine, University Bern, Bern, Switzerland



ELSEVIER

Efficacy of a Hepatitis B Vaccination Schedule With Two Cycles of Four Double Doses of Conventional Vaccine and Four Doses of Adjuvanted Vaccine in Chronic Kidney Disease Patients Evaluated for Renal Transplantation

R. García-Agudo, S. Aoufi Rabih, P. Araque Torres, M. Dolores Fraga Fuentes, J. Carlos Valenzuela Gámez, J. Mancha Ramos, and J. María Tenías Burillo

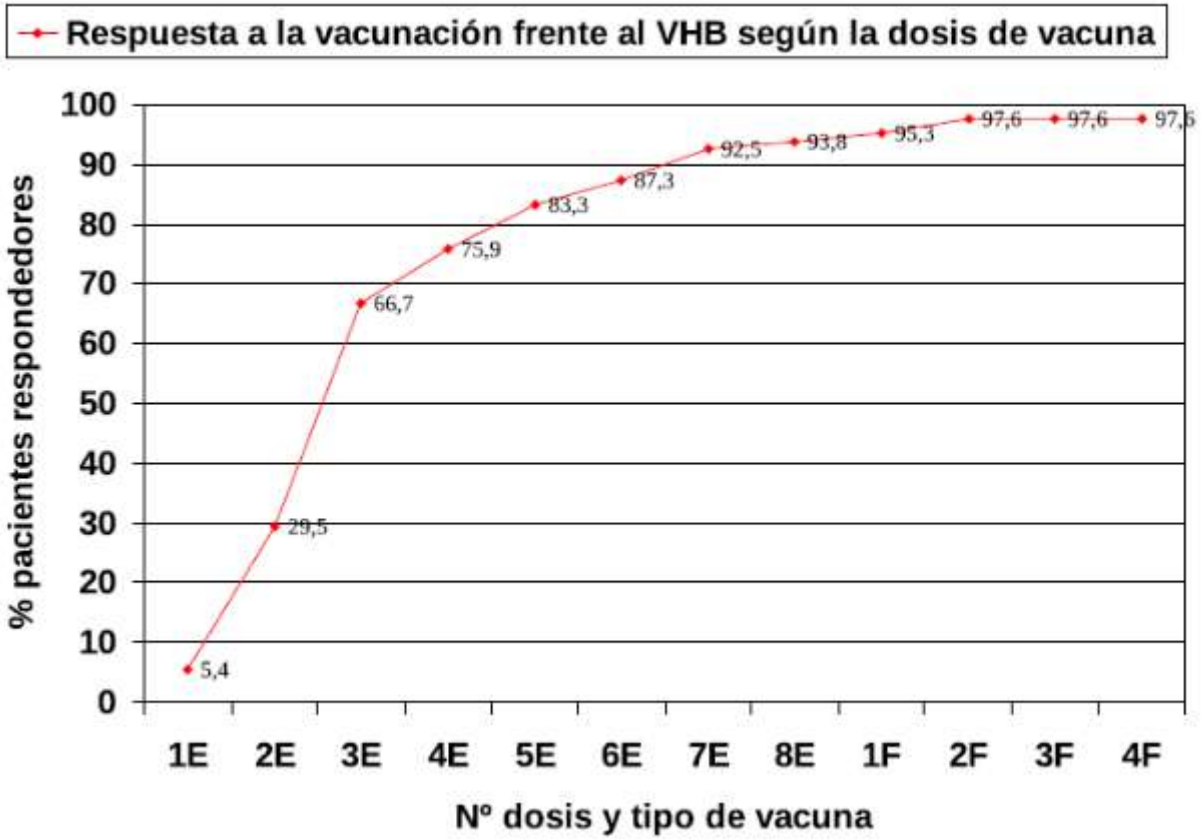


Fig 1. Response to hepatitis B vaccination and revaccination. (E = Engerix®, F = Fendrix®).



ELSEVIER

2012

Response to Vaccination Against Hepatitis B Virus with a Schedule of Four 40-μg Doses in Cirrhotic Patients Evaluated for Liver Transplantation: Factors Associated with a Response

I. Gutierrez Domingo, J.M. Pascasio Acevedo, A. Alcalde Vargas, A. Ramos Cuadra, M.T. Ferrer Ríos, J.M. Sousa Martin, M. Sayago Mota, A. Giráldez Gallego, and G. Suárez Artacho

Table 1. Variables Associated With Vaccination Response: Multivariate Analysis*

Variable	OR	95% CI	*P* Value
MELD	0.922	0.851–0.999	.046
Diabetes	0.359	0.168–0.765	.008
Anti-HBc-positive	5.826	1.140–29.765	.034

Abbreviations: OR, odds ratio; CI, confidence interval; MELD, Model for End-stage Liver Disease.

*Child-Pugh Class (A, B, C) and Age (> 45 vs 45–55 vs >55 years) included in the multivariate logistic regression analysis were not statistically significant.

Taux de réponse :

- Diabète O vs N : 20,8% vs 43,6% ;
- Isolated anti-HBc positive O vs N : 80% vs 37,7%

Liver International ISSN 1478-3223

2007

CLINICAL STUDIES

Hepatitis B vaccination after living donor liver transplantation

Yuji Soejima, Toru Ikegami, Akinobu Taketomi, Tomoharu Yoshizumi, Hideaki Uchiyama, Noboru Harada, Yoichi Yamashita and Yoshihiko Maehara

Department of Surgery and Science, Graduate School of Medical Sciences, Kyushu University, Fukuoka, Japan

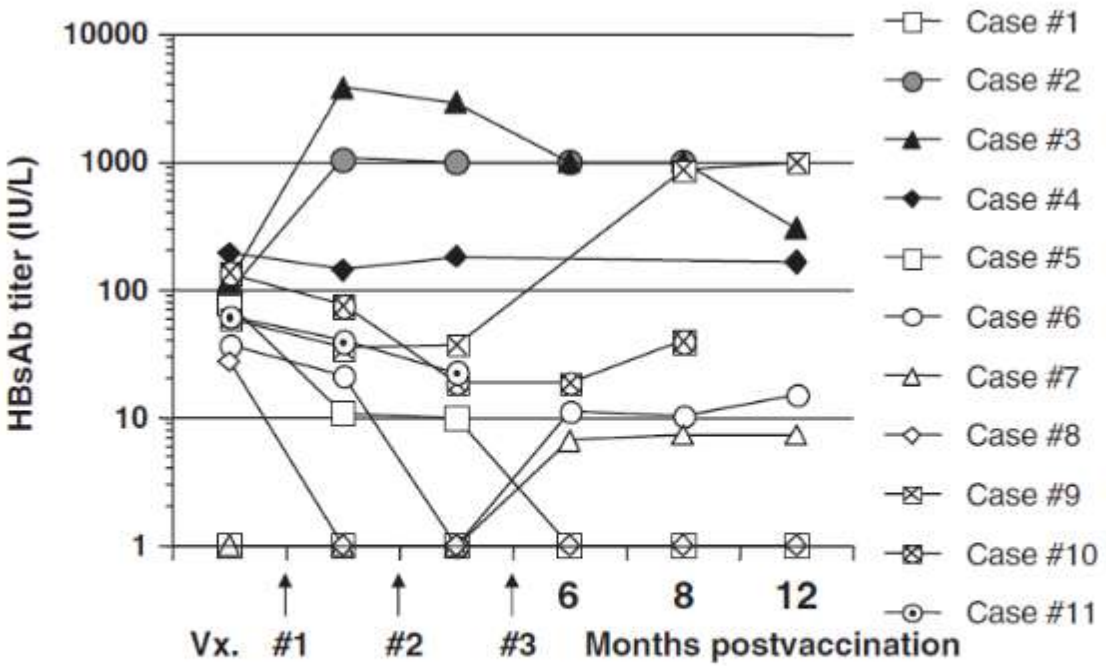


Fig. 1. Time course of anti-HBs titres during and after the first, second, and third cycle of vaccination in 11 patients. Vx, vaccination.

UNIVERSITÉ GRENOBLE ALPES

UFR DE MÉDECINE DE GRENOBLE

Année : 2020

ÉVOLUTION DES TAUX D'ANTICORPS ANTI-HBS ET IDENTIFICATION DES FACTEURS DE RISQUE DE PERTE DE LA SÉROPROTECTION CHEZ LES TRANSPLANTÉS D'ORGANES SOLIDES PRÉALABLEMENT VACCINÉS CONTRE L'HÉPATITE B

THÈSE

PRÉSENTÉE POUR L'OBTENTION DU TITRE DE DOCTEUR EN MÉDECINE

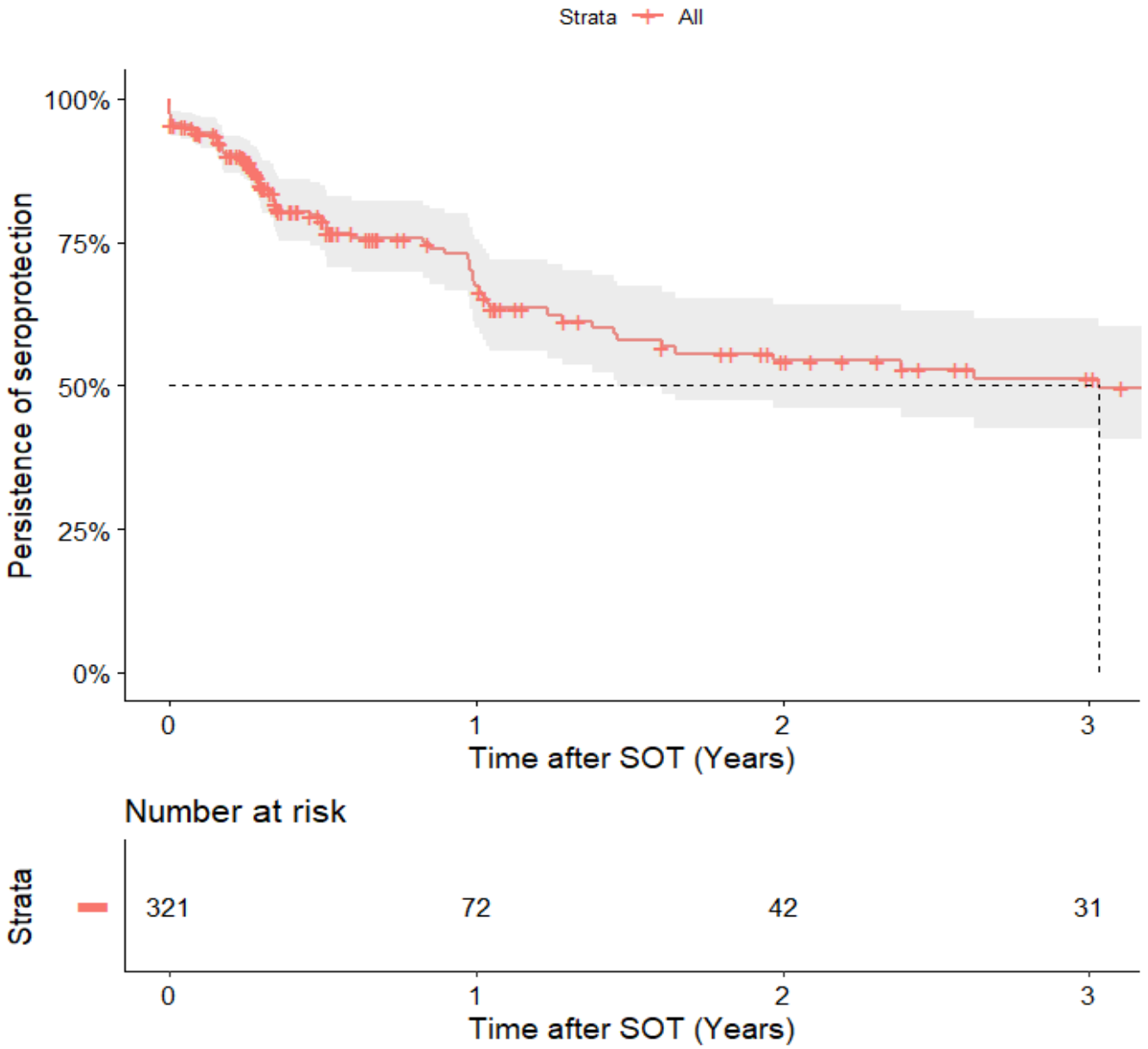
DIPLÔME D'ÉTAT

Sophie LEJEUNE

THÈSE SOUTENUE PUBLIQUEMENT À LA FACULTÉ DE MÉDECINE DE GRENOBLE

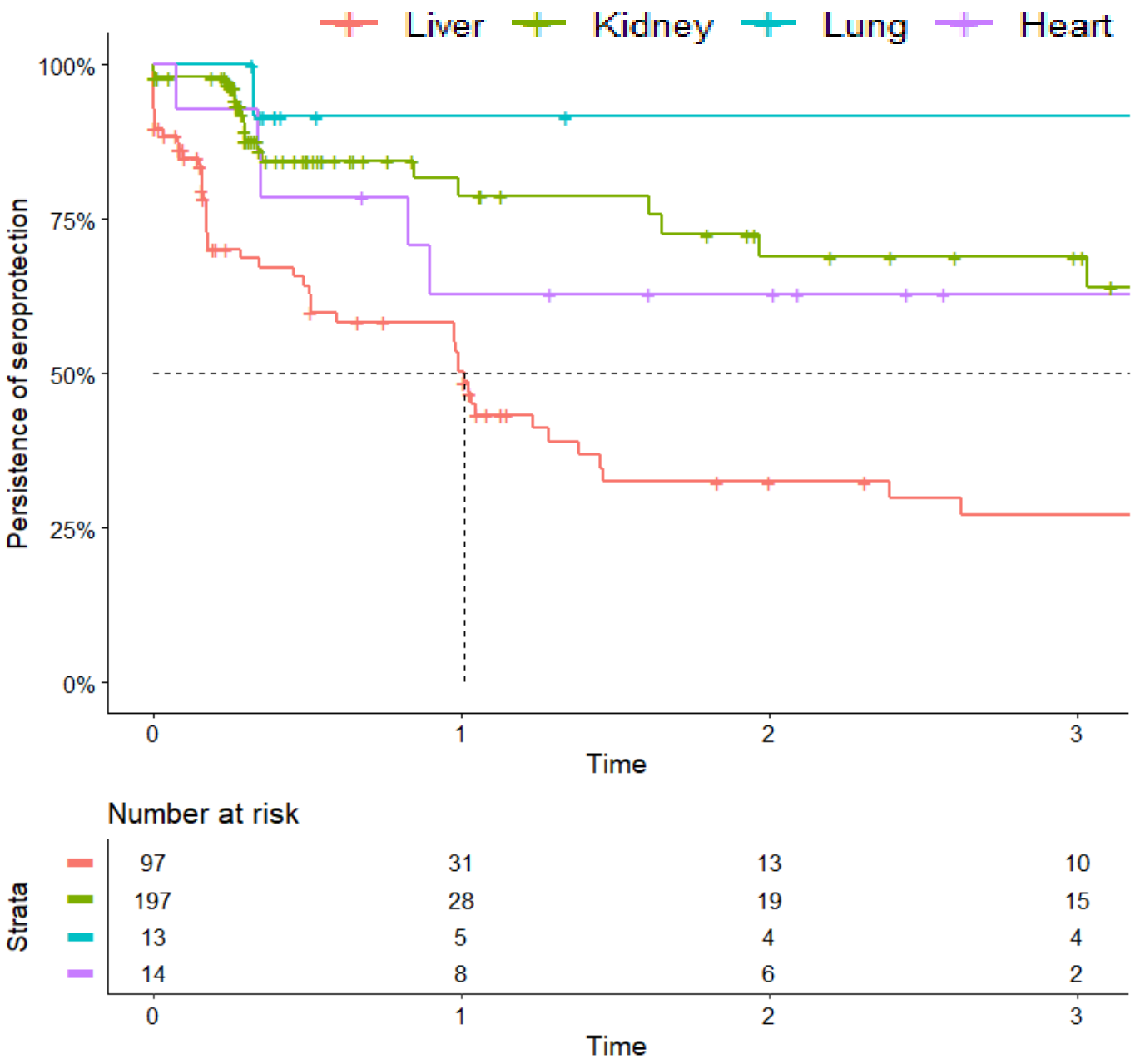
Le 04/12/2020

Passage sous le taux protecteur de 10 UI/L



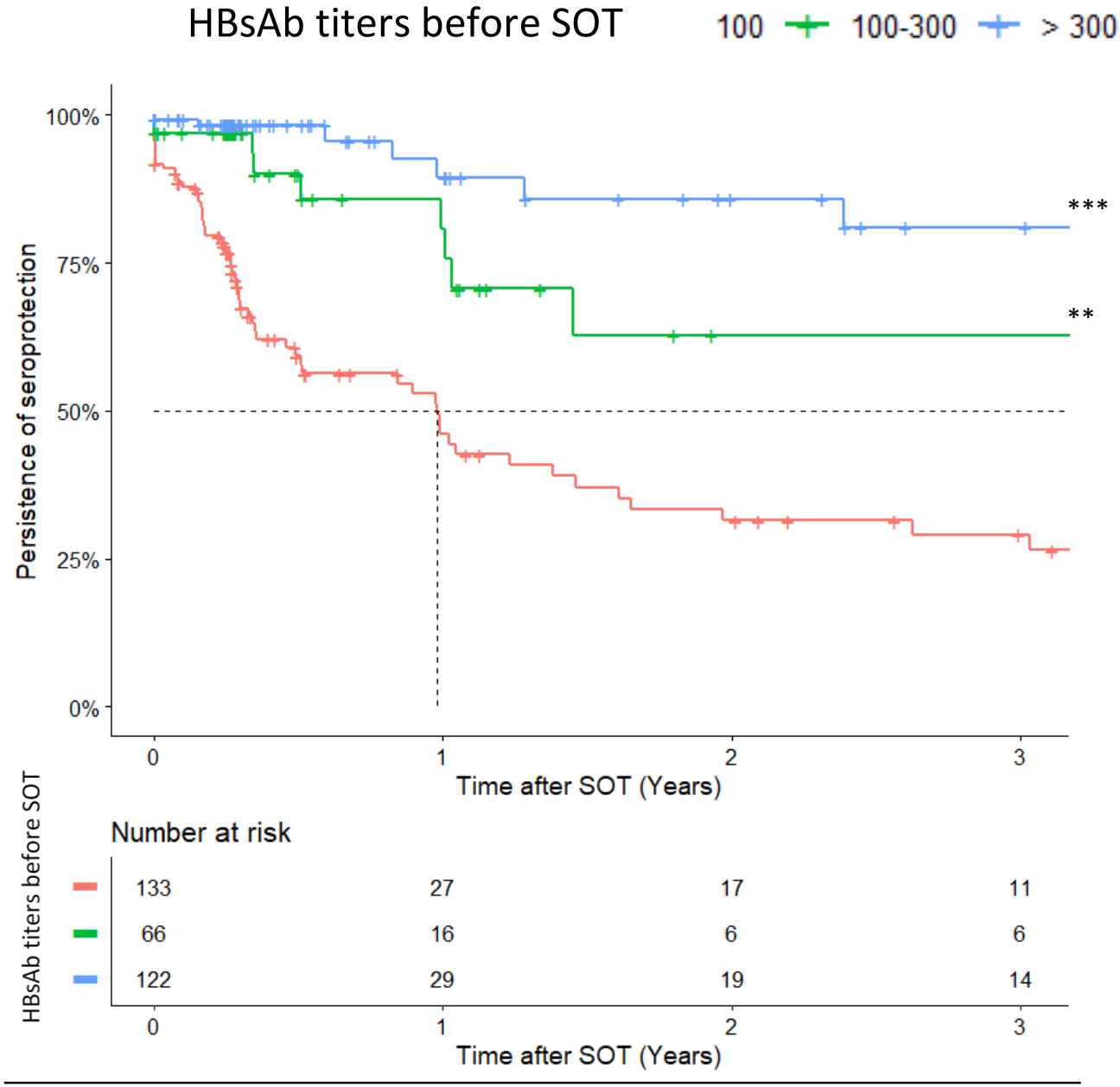
Passage sous le taux protecteur de 10 UI/L

Selon l'organe transplanté



Passage sous le taux protecteur de 10 UI/L

Selon le taux initial



HBV : recommandations

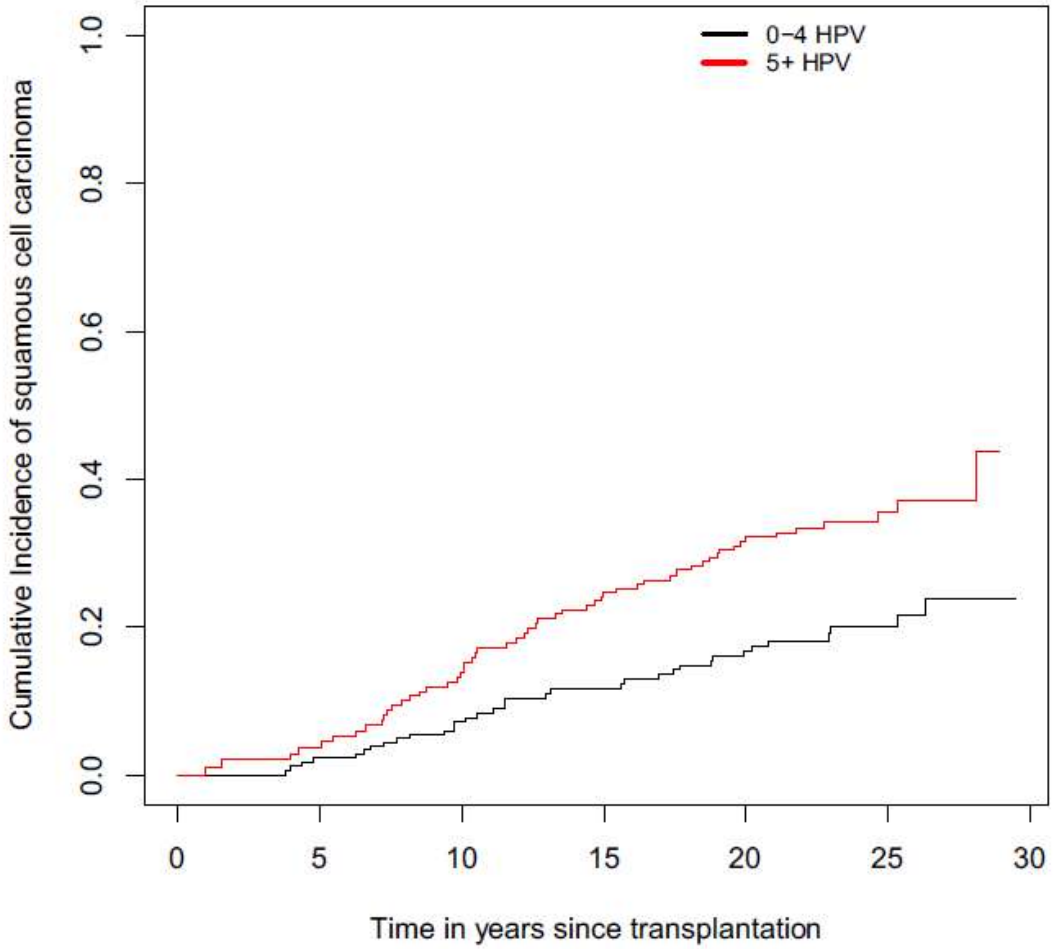
- Vaccination pré-transplantation
  - Cirrhotique, dialysé : 40µg M0-M1-M2-M6 (adultes)
  - Autres situations : 20 µg M0-M1-M6
- Sinon, post-transplantation après 6 mois
  - Même schéma : 40µg, 4 injections (adultes)
- Suivi post-transplantation du taux d'anticorps
  - Et revaccination si inférieur à 10 mUI/ml

HPV

Human papillomavirus and posttransplantation cutaneous squamous cell carcinoma: A multicenter, prospective cohort study

Incidence des carcinomes cutanés selon le nombre de β-HPV détectés dans a peau

Jan N. Bouwes Bavinck[1] | Mariet C. W. Feltkamp[2] | Adele C. Green[3] | Marta Fiocco[4,5] | Sylvie Euvrard[6] | Catherine A. Harwood[7] | Shaalra Nasir[7] | Jason Thomson[7] | Charlotte M. Proby[8] | Luigi Naldi[9] | Janouk C. D. Diphoorn[9] | Anna Venturuzzo[9] | Gianpaolo Tessari[10] | Ingo Nindl[11] | Francesca Sampogna[12] | Damiano Abeni[12] | Rachel E. Neale[3] | Jelle J. Goeman[4] | Koen D. Quint[1] | Anne B. Halk[1] | Carmen Sneek[1] | Roel F. Genders[1] | Maurits N. C. de Koning[13] | Wim G. V. Quint[13] | Ulrike Wieland[14] | Sönke Weissenborn[14] | Tim Waterboer[15] | Michael Pawlita[15] | Herbert Pfister[14] | on behalf of the EPI-HPV-UV-CA group



PLOS ONE

2022

RESEARCH ARTICLE

Human Papillomavirus (HPV) seroprevalence, cervical HPV prevalence, genotype distribution and cytological lesions in solid organ transplant recipients and immunocompetent women in Sao Paulo, Brazil

Karina Takesaki Miyaji[1,2,3]*, Vanessa Infante[1,2], Camila de Melo Picone[2], José Eduardo Levi[4], Ana Carolina Soares de Oliveira[4], Amanda Nazareth Lara[2,3], Maricy Tacla[5], Joakim Dillner[6], Hanna Kann[6], Carina Eklund[6], Cristina Paula Castanheira[5], Philippe Mayaud[7], Ana Marli Christovam Sartori[1,2,3], the Study group on HPV vaccine in immunosuppressed persons[¶]

Check for updates

Table 4. Results of liquid-based cytology, by study population.

Cytology*	Solid organ transplanted women (N = 113) n (%)	Immunocompetent women (N = 127) n (%)	*P-value*
Normal cytology / Benign cellular changes	82 (72.6)	107 (85.6)	
ASC-US	11 (9.7)	7 (5.6)	
ASC-H	1 (0.9)	8 (6.4)	
LSIL	11 (9.7)	2 (1.6)	0.001*
HSIL	6 (5.3)	1 (0.8)	
Unknown	2 (1.8)	2 (1.6)	

Note: Cervical samples collected only for women who had initiated sexual activity.

*ASC-US = atypical squamous cells of undetermined significance; ASC-H = atypical squamous cells, cannot exclude high-grade squamous intraepithelial lesion; LSIL = low-grade squamous intraepithelial lesion; HSIL = high-grade squamous intraepithelial lesion.

*Statistical analysis compared LSIL+HSIL vs. Normal cytology / Benign cellular changes.

Received: 18 November 2019 | Revised: 30 March 2020 | Accepted: 10 April 2020
DOI: 10.1111/ajt.15942

ORIGINAL ARTICLE

Burden of anal squamous cell carcinoma, squamous intraepithelial lesions and HPV16 infection in solid organ transplant recipients: A systematic review and meta-analysis

Andreia Albuquerque[1,2] | Oliver Stirrup[3] | Mayura Nathan[4] | Gary M. Clifford[5]

Sur-risque par rapport à la population générale

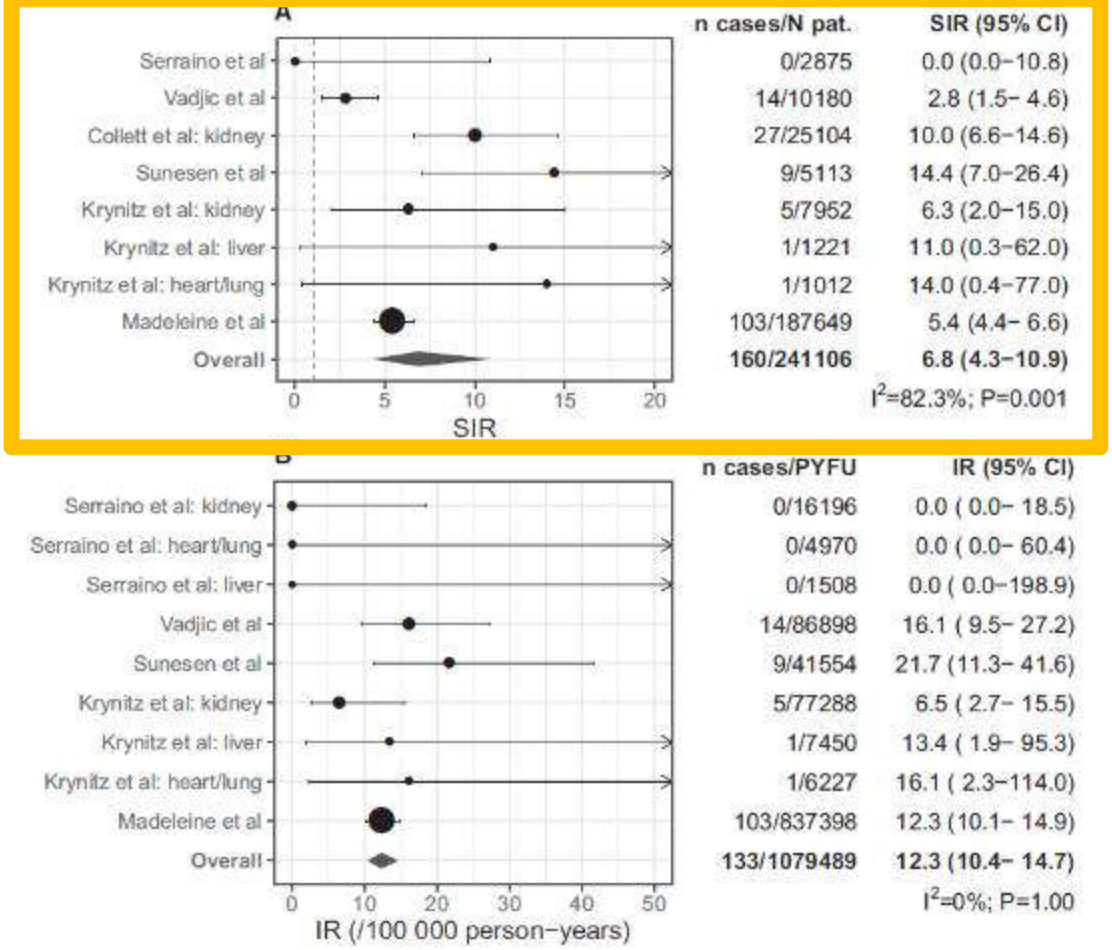


FIGURE 2 Forest plots of (A) the standardized incidence ratio (SIR) and (B) the incidence rate (IR) for anal squamous cell carcinoma in solid organ transplant recipients in individual studies (●) with summary estimates from our meta-analysis (◆). Plots of individual study estimates are scaled in relation to the number of patients in (A) and person-years of follow-up (PYFU) in (B), and error bars show 95% confidence intervals (CIs) (as reported in study). The dashed vertical line in (A) shows an SIR of 1

Vaccin anti-α-papillomavirus

- Élaboré pour faire face aux maladies du col utérin
  - Condylomes et cancer

- En fait actif aussi sur les α-HPV responsables
  - De condylomes génitaux des 2 sexes
  - De cancers anaux et pharyngés

- Vaccin actuel : gardasil9®
  - 2 génotypes d'HPV responsables de condylomes
  - 7 génotypes d'HPV responsables de carcinomes

- Recommandations hétérogènes :
  - France : filles ; et garçons si ID ou si relations homosexuelles …
    jusqu'en 2019 : enfin une reco non genrée !
  - USA, UK, Australie, Suisse … : tous les enfants/ados

HPV : recommandation

- Vaccination des 2 sexes
- Transplantés et candidats à la transplantation
- À partir de 9 ans, jusqu'à 26 ans
  - Rattrapage sans doute possible encore plus tard …

ROR

France, 2008-2011 : 24000 cas de rougeole …
10 décès … dont un ID (VIH+)
(et 21 morts de 2008 à 2019, dont un greffé de CSHP)

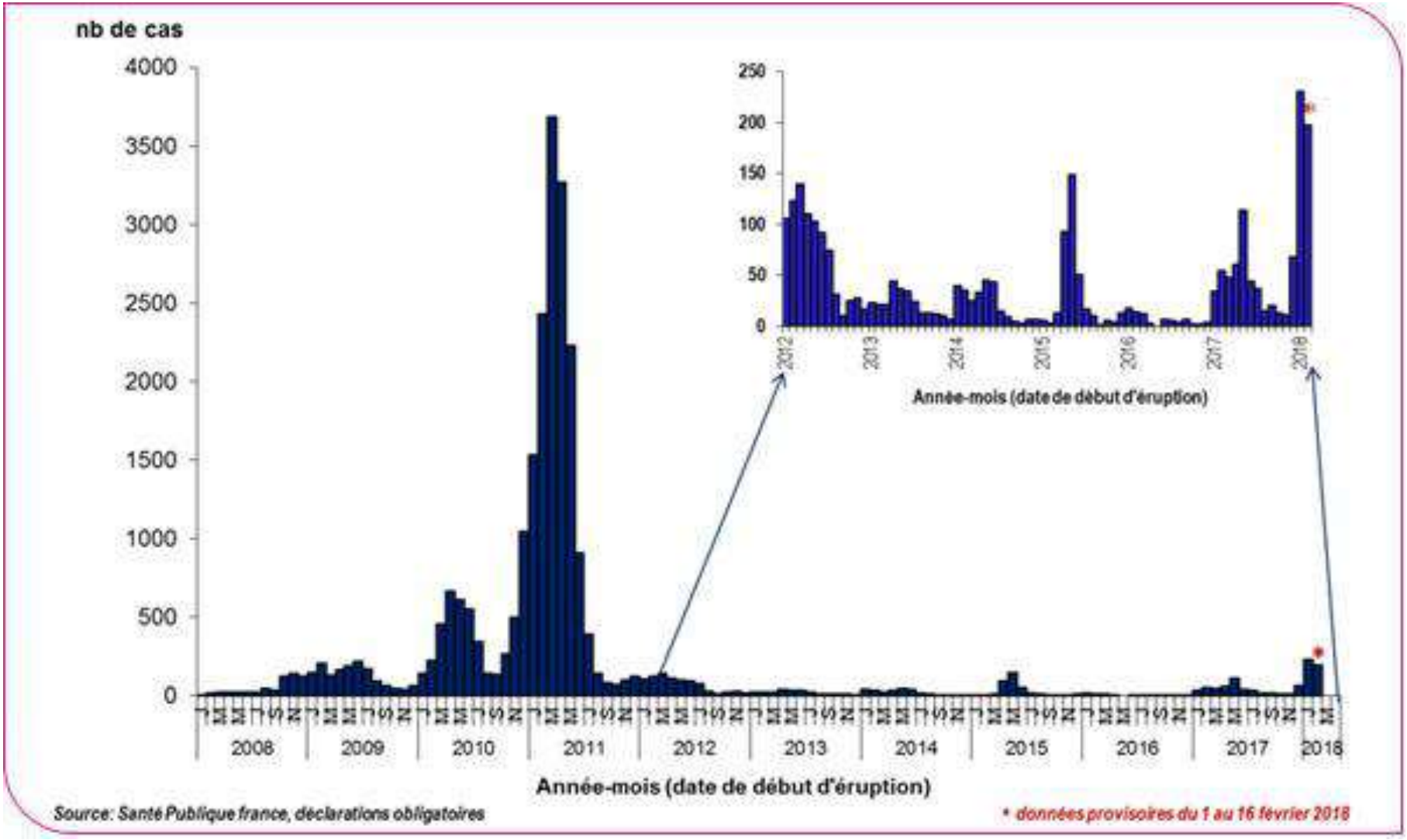
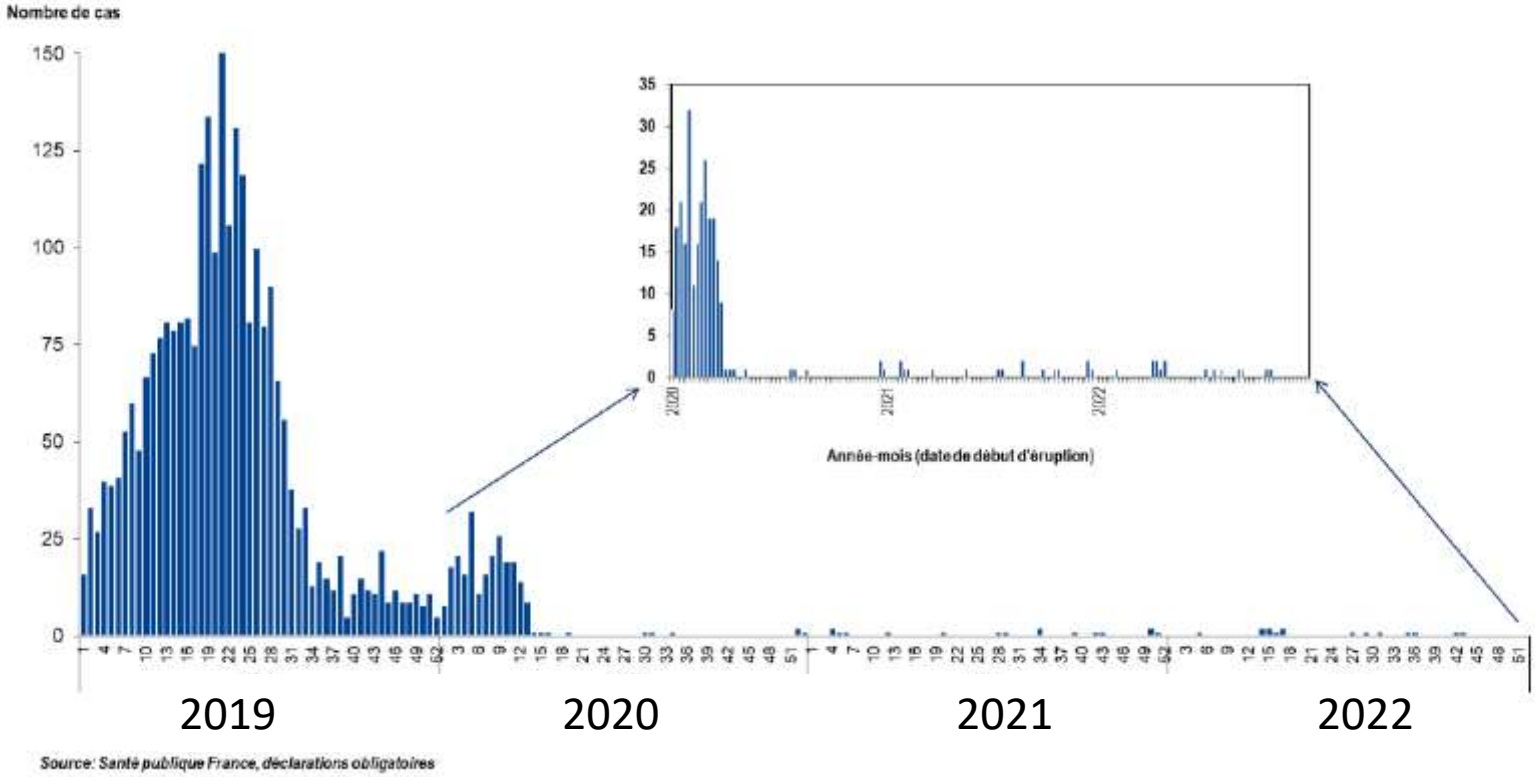


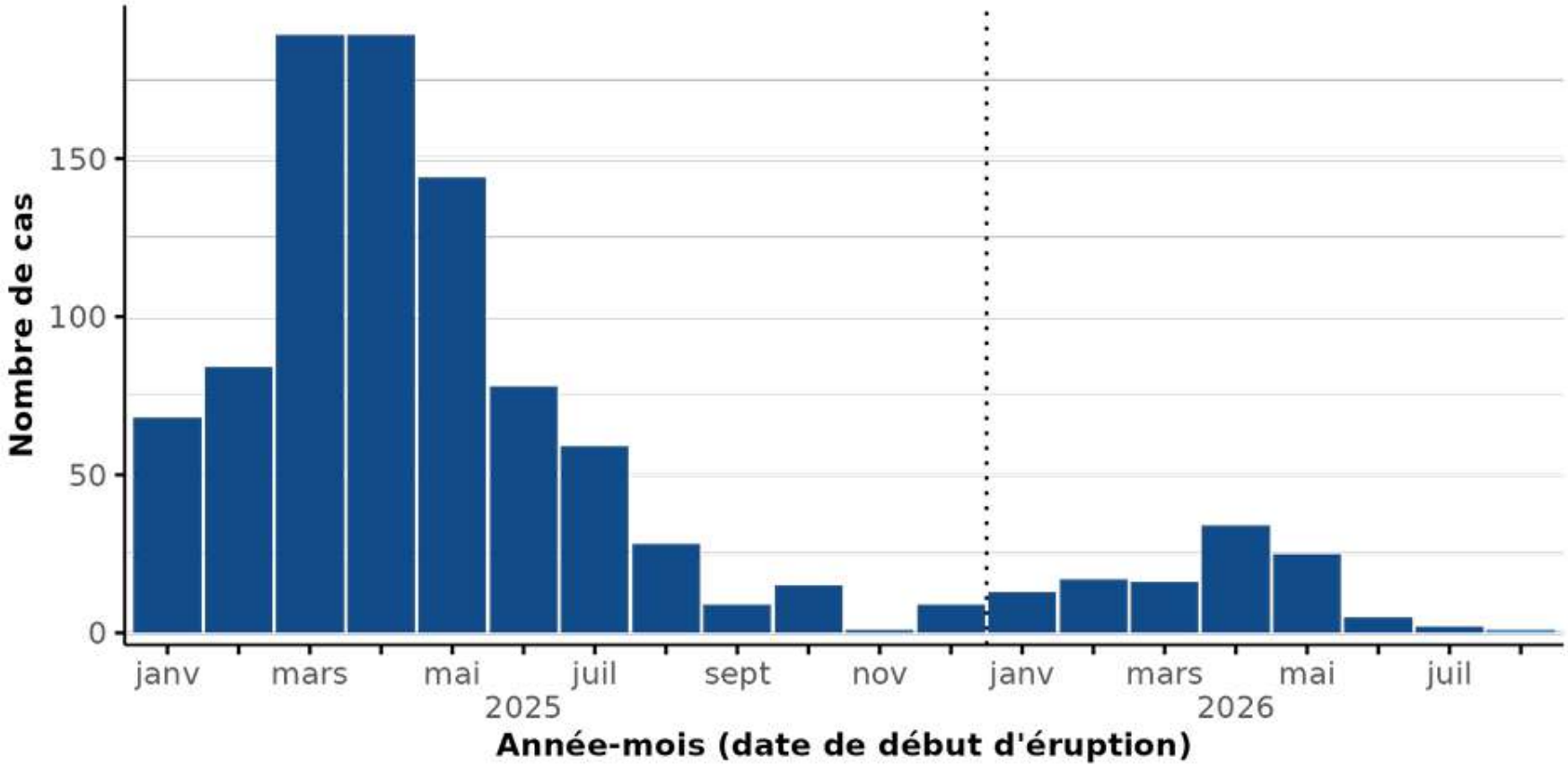
Figure 2: Evolution du nombre de cas de rougeole confirmés déclarés par semaine de survenue (date d'éruption), semaines S01-2019 à S52-2022, France entière



Source: Santé publique France, déclarations obligatoires

2025-26

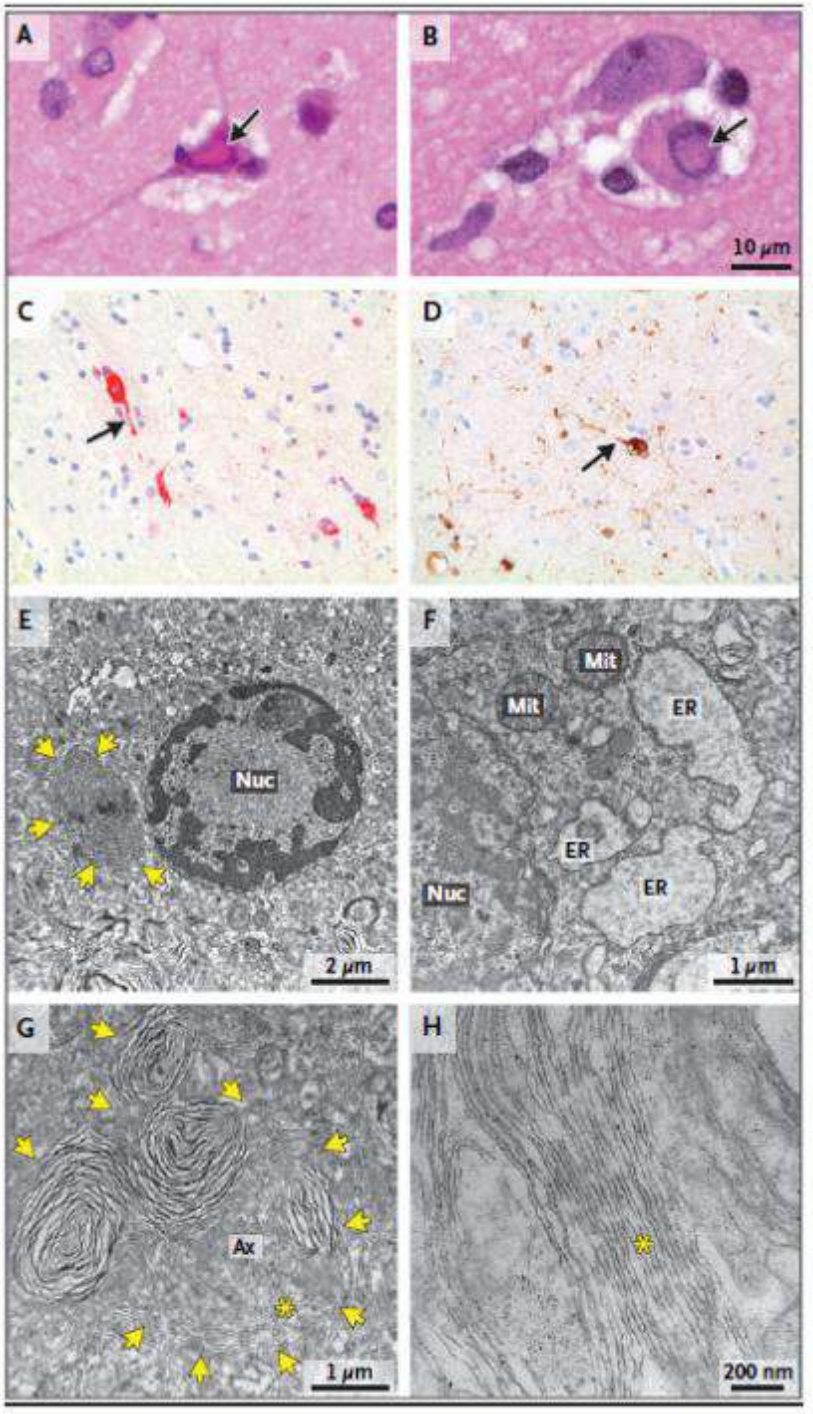
Figure 2. Nombre de cas de rougeole déclarés, par mois de début d'éruption, du 01/01/2025 au 31/08/2026, France entière (N=113 en 2026)



Source des données : Signalements obligatoires, Données provisoires non consolidées pour 2026

Measles Inclusion-Body Encephalitis after Allogeneic Stem-Cell Transplantation

Benjamin Nemoz, M.D., Ph.D.,[1] Meriadeg Ar Gouilh, Ph.D.,[2] Karin Pernet-Gallay, Ph.D.,[3] Anais Dartevel, M.D.,[1] Jean Boutonnat, M.D., Ph.D.,[1] Cyrille Mathieu, Ph.D.,[4] Sylvie Berthier, Dipl.Ing.,[1] Denis Gerlier, M.D., Ph.D.,[4] Bryce Leterrier, M.D.,[2] Anne Thiébaut, M.D.,[1] Patrice Morand, M.D., Ph.D.,[1] Julien Lupo, Pharm.D., Ph.D.,[1] and Olivier Epaulard, M.D., Ph.D.[1]



RESEARCH ARTICLE

Diminished measles immunity after paediatric liver transplantation—A retrospective, single-centre, cross-sectional analysis

Tobias Laue[1]*, Norman Junge[1], Christoph Leiskau[2], Frauke Mutschler[1], Johanna Ohlendorf[1], Ulrich Baumann[1]

1 Division for Paediatric Gastroenterology and Hepatology, Department of Paediatric Kidney, Liver, and Metabolic Diseases, Hannover Medical School, Hannover, Germany, **2** Paediatric Gastroenterology, Department of Paediatrics and Adolescent Medicine, University Medical Centre Goettingen, Georg August University Goettingen, Goettingen, Germany

2024

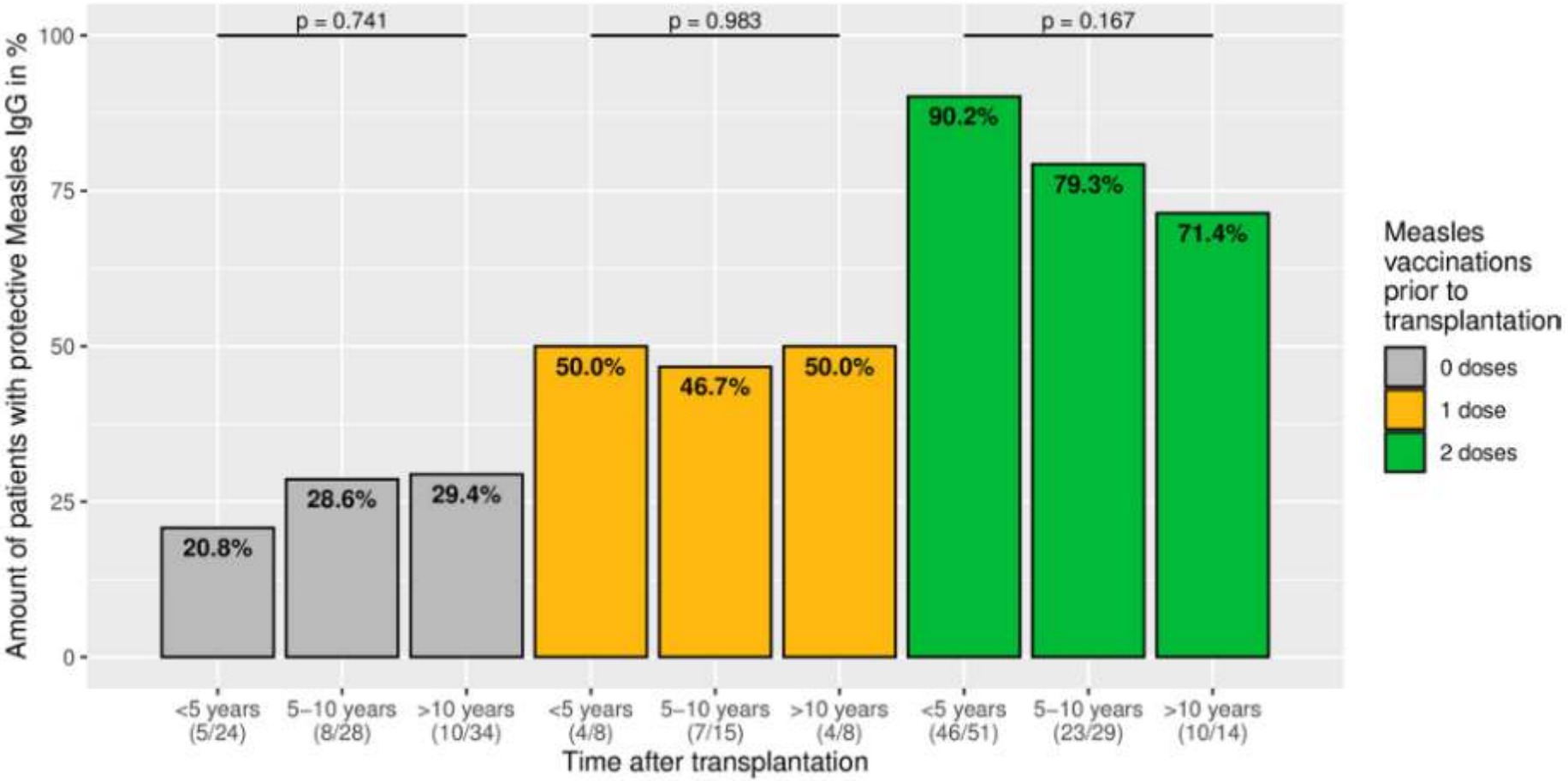


Fig 2. Measles immunity in relation to the years from transplantation to testing. The bar plots show the proportion of patients with a positive measles IgG after transplantation; according to the number of measles vaccinations administered prior to transplantation and in relation to time from transplantation. No significant trend was detectable.

Étude sur la vaccination ROR post-greffe

- Kano 2002 : 13 post-SOT (all already vaccinated before SOT)
  - Pediatric, liver
- Khan 2005: 31 post-SOT
  - Pediatric, liver
- Pittet 2019: 40 post-SOT
  - Pediatric, liver
- Newman 2021: 38 pre- and post-SOT, 59 post-SOT
  - Pediatric, liver
- Feldman 2023: 236 post-SOT
  - Pediatric, mostly liver (some kidney)

Étude sur la vaccination ROR post-greffe

- Strict criteria for live attenuated vaccines in SOTr
  - Consequently, most data are in liver transplant recipients

- Results:
  - Primary vaccination with 2 MMR doses: seroprotection up to 96%
  - Boosting of waning antibodies: seroprotection up to 97%
  - Negative role of MMF (lower response) (*Feldman 2023*)
  - no safety signal, including rejection

TABLE 2 Patient considerations and evaluation prior to consideration of live vaccine administration in the pediatric SOT (liver and kidney) recipients

Group 1: Defer Vaccine	Patients in whom live vaccination post–solid organ transplant should be deferred	• Clinically unwell • Cardiac, lung, and multivisceral TR[a] • High-level immune suppression • Patients with current rejection • Use of novel biologic agents (other han those outlined in the table) • Use of the following agents: ATG <1 y prior Alemtuzumab <2 y prior Rituximab <1 y prior
Group 2: Proceed with Vaccine	Patients in whom live vaccination post-SOT is likely to be safe	Clinically well Do not meet criteria in yellow or red boxes and meet all 3 of the following criteria: 1. Timeline criteria: • 1 y post-transplant AND • 2 mo post–rejection episode *AND* 2. Intensity of Immunosuppression Criteria: • Steroids (prednisone equivalent) <2 mg/kg/d or total cumulative <20 mg/d • Tacrolimus <8 ng/mL for two consecutive readings • Cyclosporine <100 ng/mL for two consecutive readings *AND* 3. Minimum Immune Criteria: • ALC >1500 for children ≤6 y and >1000 cells/μL for children >6 y • CD4 >700 cells/μL for children ≤6 y and >500 cells/μL for children >6 y • Normal total serum IgG for age
Group 3: Vaccinate with Caution	Patient where evidence for safety and efficacy of live vaccination post-SOT is unclear. *Patients who meet these criteria may be eligible for live vaccination after more in-depth evaluation, and provided they meet the minimum timeline, immunosuppression and immunology criteria in Group 1*	• Patients who have received mycophenolate mofetil (MMF)/mycophenolate sodium • Patients who have received the following T cell–depleting agents: ATG—wait 1 y[b] Alemtuzumab—wait 2 y[b] • Use of rituximab—wait 1 y[b] • Patients with persistently elevated EBV viral loads. • Liver transplant recipients who are undergoing immune suppression withdrawal with the goal of cessation or those who are deemed to have "functional tolerance"

Consensus meeting. Suresh, Pediatric Transpl, 2019

Rougeole : recommandations

- Cribler les candidats SOT et vacciner les séronégatifs avant SOT

- Sous des critères stricts, la vaccination primaire contre la rougeole avec le vaccin vivant peut être envisagée dans certains SOTr (principalement le foie ?)

- Le contexte épidémique doit être pris en compte

Zona

ORIGINAL ARTICLE

WILEY

Incidence of herpes zoster in adult solid organ transplant recipients: A meta-analysis and comprehensive review

Da Eun Kwon[1] | Hye Sun Lee[2] | Kyoung Hwa Lee[1] | Yeonju La[1] | Sang Hoon Han[1] | Yong Goo Song[1]

Cumulative incidence post-transplant :
- at 1 year: 1.6%-6.6%
- at 3 years: 5.0%-18.1%
- at 5 years: 8.2%-20.2%

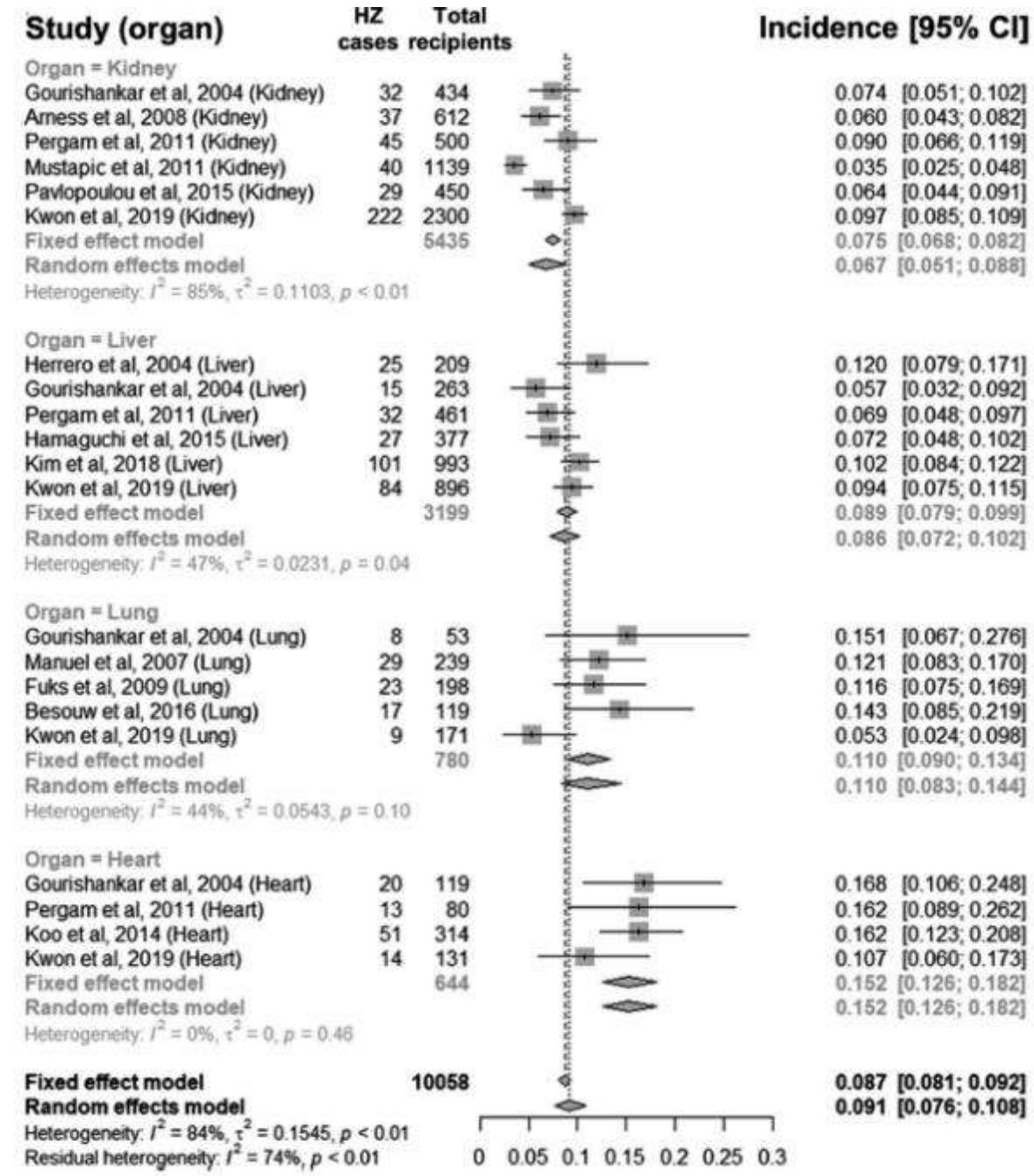


FIGURE 2 (Continued)

Vaccins VZV

- Un vaccin vivant atténué contre la varicelle
- Un vaccin vivant atténué contre le zona
  - En train de disparaître
- Un vaccin protéique contre le zona
  - Disponible dans de nombreux pays depuis 8-9 ans
  - Disponible en France depuis 2024

VZV

- Sérologies pré-transplantation
- Vaccination(s) pré-transplantation si sérologie(s) négative(s)
- Vaccination VZV :
  - Vaccin varicelle, vivant : contre-indiqué en post-transplantation
  - Vaccin zona, subunitaire (shingrix®) : à réaliser systématiquement en pré-transplantation (adulte avec un critère d'âge ?), et à tous les adultes post-transplantation quel que soit l'âge
    - Disponible en France depuis 2024
    - Le vaccin zona vivant (zostavax®) disparait
  - Si exposition chez un séronégatif : immunoglobulines anti-VZV dans les 72 heures
- Cocooning

VRS



American Journal of Transplantation
Volume 24, Issue 6, June 2024, Pages 897-904



Minireview

The respiratory syncytial virus vaccines are here: Implications for solid organ transplantation

Paul Trubin [1 #], Marwan M. Azar [1 2 #], Camille N. Kotton [3]

- 1 vaccin protéique non adjuvanté
- 1 vaccin protéique adjuvanté
- 1 vaccin ARNm
- (et les anticorps monoclonaaux : nirsévimab et clesrovimab)

Contents lists available at ScienceDirect

American Journal of Transplantation

journal homepage: www.amjtransplant.org

Brief Communication

Effectiveness of respiratory syncytial virus vaccination in solid organ transplant recipients in the United States

Lana Hasan [1,*], Deepali Boothankad Sharath [1], Jessica Lum [1], Wayne Tsuang [2], Kaitlyn Rivard [3], Zachary A. Yetmar [1]

[1] Department of Infectious Disease, Cleveland Clinic, Cleveland, Ohio, USA
[2] Department of Pulmonary and Critical Care Medicine, Cleveland Clinic, Cleveland, Ohio, USA
[3] Department of Pharmacy, Cleveland Clinic, Cleveland, Ohio, USA

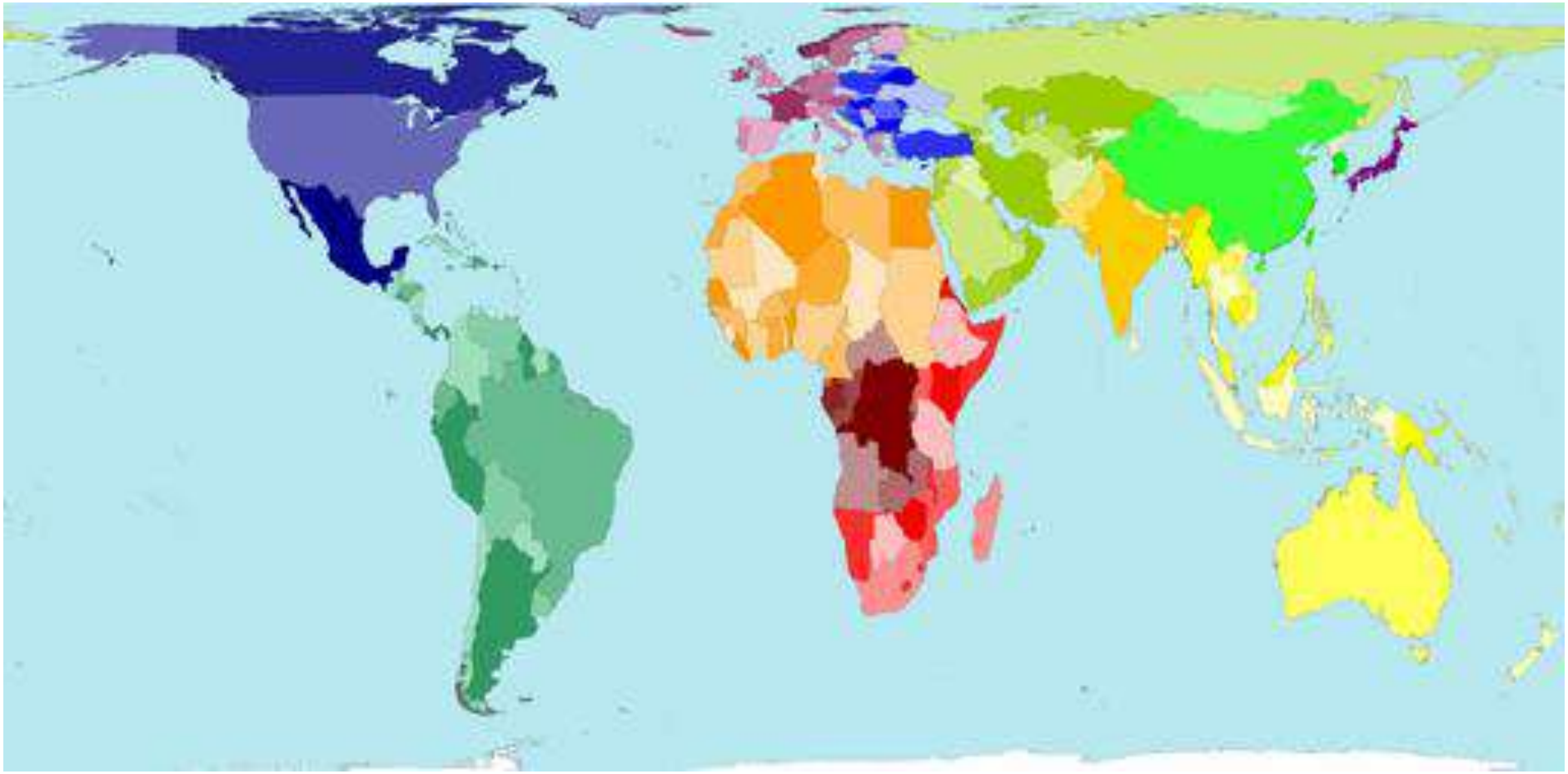
Table 3
Cox regression results of an association between respiratory syncytial virus vaccination and subsequent outcomes within the risk-set matched cohort.

Parameter	Univariable		Multivariable[a]	
	Hazard ratio (95% CI)	*P*	Hazard ratio (95% CI)	*P*
RSV infection	0.69 (0.55-0.86)	.001	0.70 (0.56-0.88)	.002
RSV hospitalization	0.61 (0.43-0.85)	.003	0.61 (0.43-0.86)	.005
RSV ICU admission	0.95 (0.45-2.00)	.888	0.93 (0.44-1.94)	.837
Intubation	1.14 (0.42-3.06)	.796	—	—
All-cause mortality	0.51 (0.46-0.56)	<.001	0.45 (0.41-0.50)	<.001

BMI, body mass index; ICU, intensive care unit; RSV, respiratory syncytial virus.

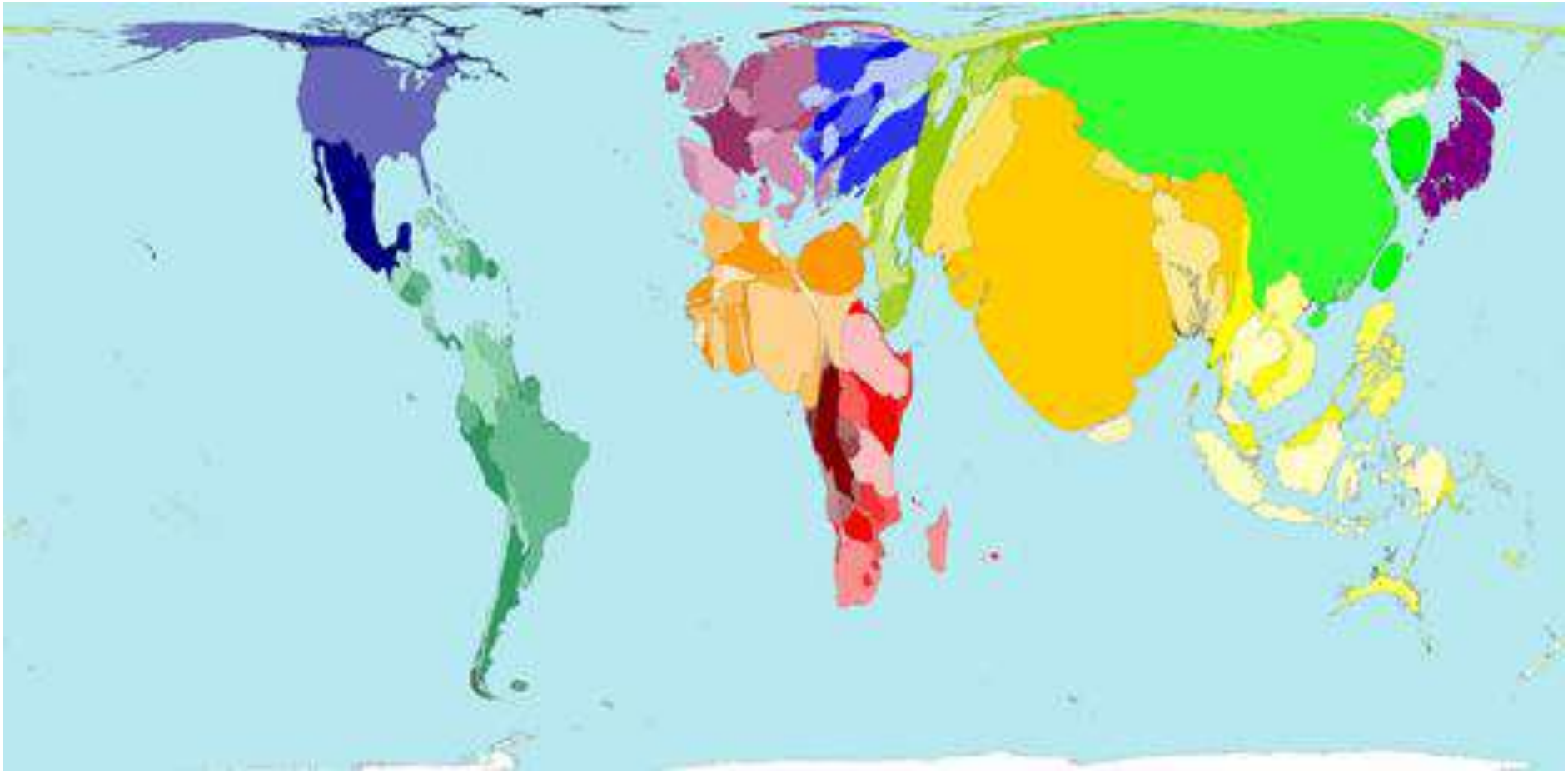
Fièvre jaune

Surface …



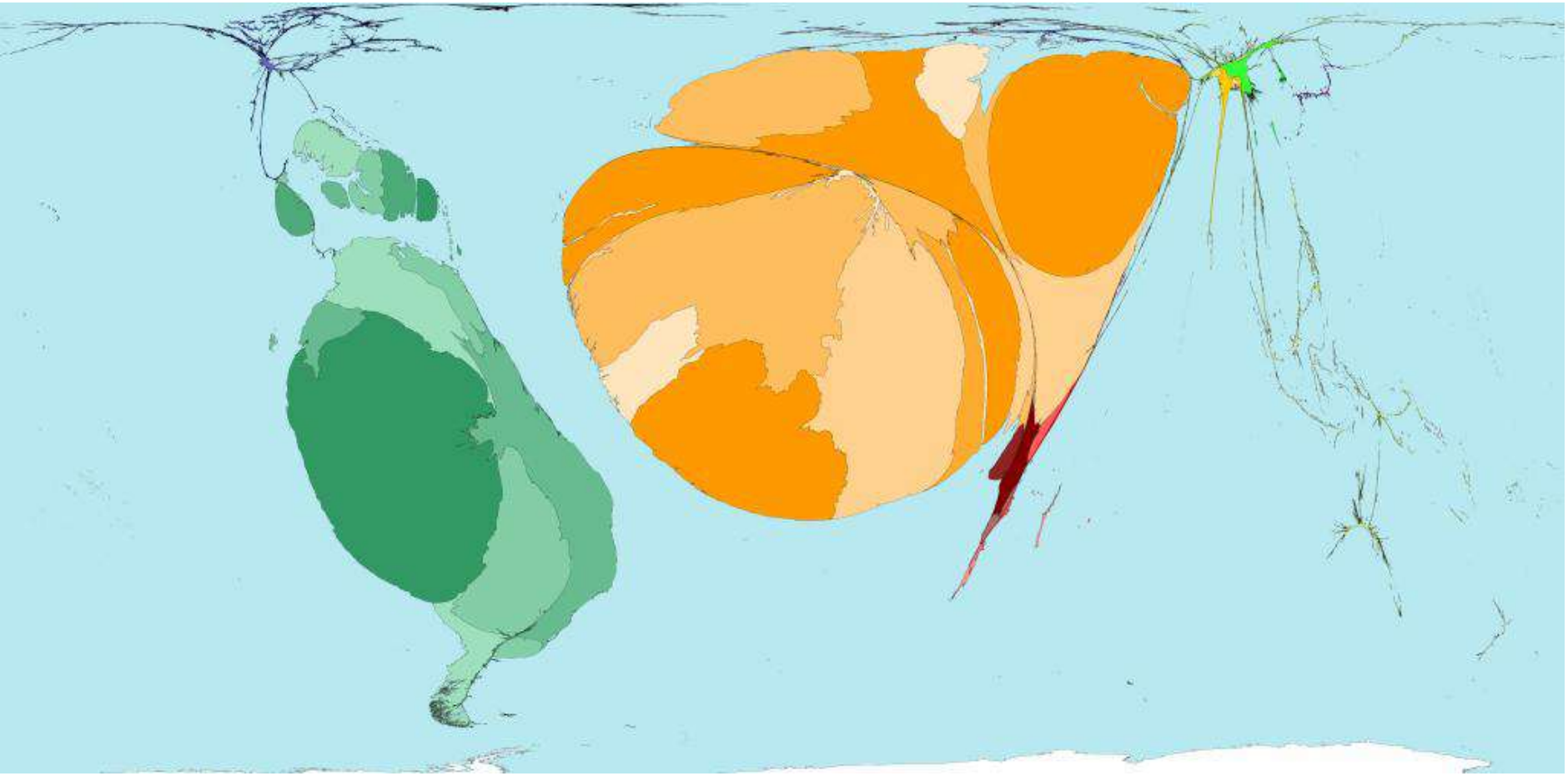
Worldmapper.org

Population …



Worldmapper.org

Décès par fièvre jaune



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American Journal of Transplantation 2013; 13: 2458–2461
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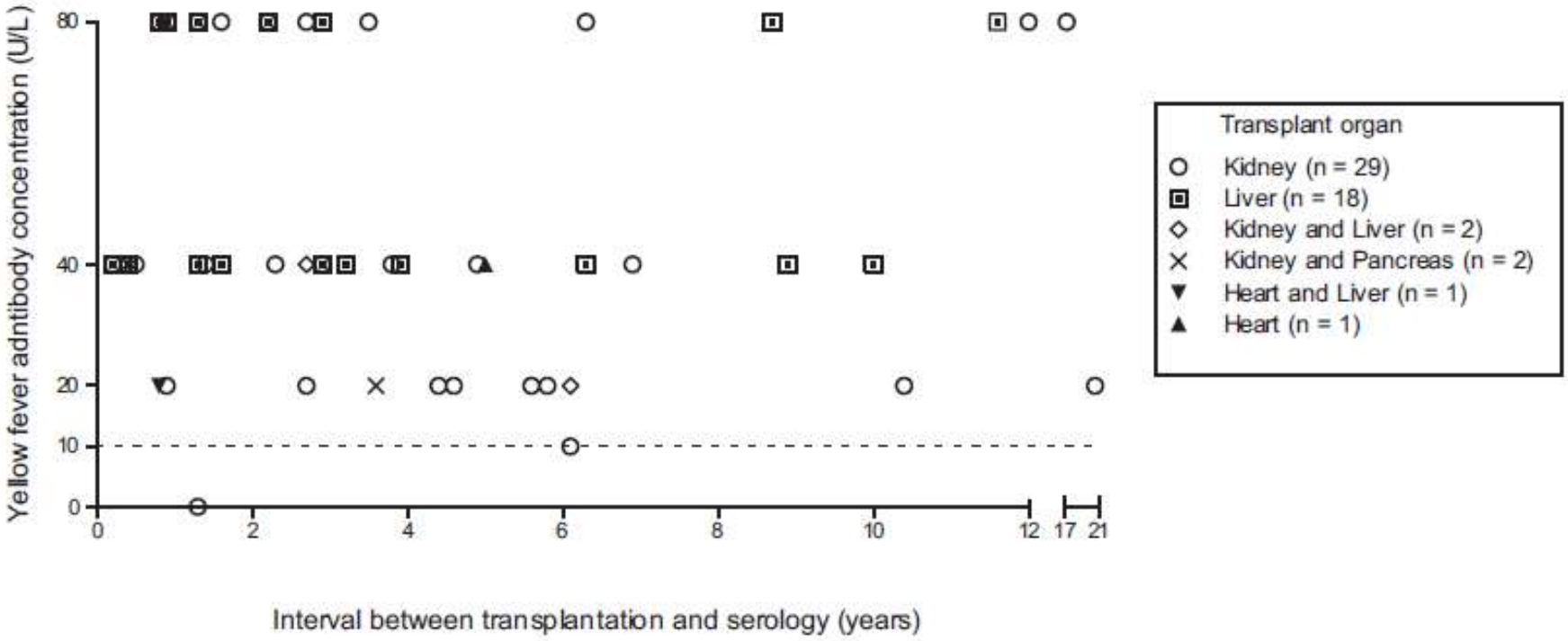
doi: 10.1111/ajt.12338

Brief Communication

Persistence of Yellow Fever Vaccine–Induced Antibodies After Solid Organ Transplantation

B. Wyplosz[1,*,†], C. Burdet[1], H. François[2,3], A. Durrbach[2,3], J. C. Duclos-Vallée[3,4], M.-F. Mamzer-Bruneel[5], P. Poujol[6], O. Launay[7,8], D. Samuel[3,4], D. Vittecoq[1,3] and P. H. Consigny[6] for the GEVACCIM[‡1]

Vaccination pré-transplantation



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Transplant Infectious Disease, ISSN 1398-2273

Yellow fever vaccination in organ transplanted patients: is it safe? A multicenter study

L.S. Azevedo[1], E.P. Lasmar[2], F.L.C.Contieri[3], I. Boin[4], L. Percegona[5], L.T.S. Saber[6], L.S. Selistre[7], M.V.P. Netto[8], M.C.V. Moreira[9], R.M. Carvalho[10], R.M. Bruno[11], T.C.A. Ferreira[12], E. David-Neto[1]

General patient data at the time of yellow fever vaccination (YFV)

	Mean ± SD	Median	Range
Age at the YFV (years)	45.6 ± 13.6	46	11–69
Creatinine (mg/dL)	1.46 ± 0.62	1.25	0.8–3.4
Post-transplant time at YFV (months)	65 ± 83.9	36	3–340
Months from YFV at the time of the survey	45 ± 51	30	3–241

SD, standard deviation.

- 19 cas
- Une réaction locale légère
- Aucune réaction systémique

Recommandations FJ

- Proposer la vaccination en pré-transplantation
  - Au moins 1 mois avant
- Vaccin formellement contre-indiqué après la greffe
- Si voyageur transplanté non vacciné
  - Certificat de CI pour les contraintes administratives
  - Protection anti-vectorielle primordiale
- Sérologie possible
  - Pour l'anxiolyse des médecins

Covid-19

Clinical Microbiology and Infection xxx (xxxx) xxx

Contents lists available at ScienceDirect

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com

Systematic review

Clinical outcome in solid organ transplant recipients affected by COVID-19 compared to general population: a systematic review and meta-analysis

Milo Gatti [1,2], Matteo Rinaldi [1,2], Linda Bussini [1,2], Cecilia Bonazzetti [1,2], Renato Pascale [1,2], Zeno Pasquini [1,2], Francesca Faní [1,2], Mariana Nunes Pinho Guedes [3], Anna Maria Azzini [3], Elena Carrara [3], Zaira R. Palacios-Baena [4,5], Giulia Caponcello [4], Eduardo Reyna-Villasmil [4], Evelina Tacconelli [3], Jesús Rodríguez-Baño [4,5], Pierluigi Viale [1,2], Maddalena Giannella [1,2,*] on behalf of the ORCHESTRA study group

[1] *Infectious Diseases Unit, IRCCS Azienda Ospedaliero-Universitaria di Bologna, Italy*
[2] *Department of Medical and Surgical Sciences, University of Bologna, Italy*
[3] *Division of Infectious Diseases, Department of Diagnostics and Public Health, University of Verona, Verona, Italy*
[4] *Infectious Diseases and Microbiology Unit, Hospital Universitario Virgen Macarena and Department of Medicine, University of Sevilla/Biomedicines Institute of Sevilla, Sevilla, Spain*
[5] *Centro de Investigación Biomédica en Red en Enfermedades Infecciosas, Instituto de Salud Carlos III, Madrid, Spain*

Covid « historique » 2020-2021

Mortality rate of SOTr compared with general population

Covid « historique » 2020-2021

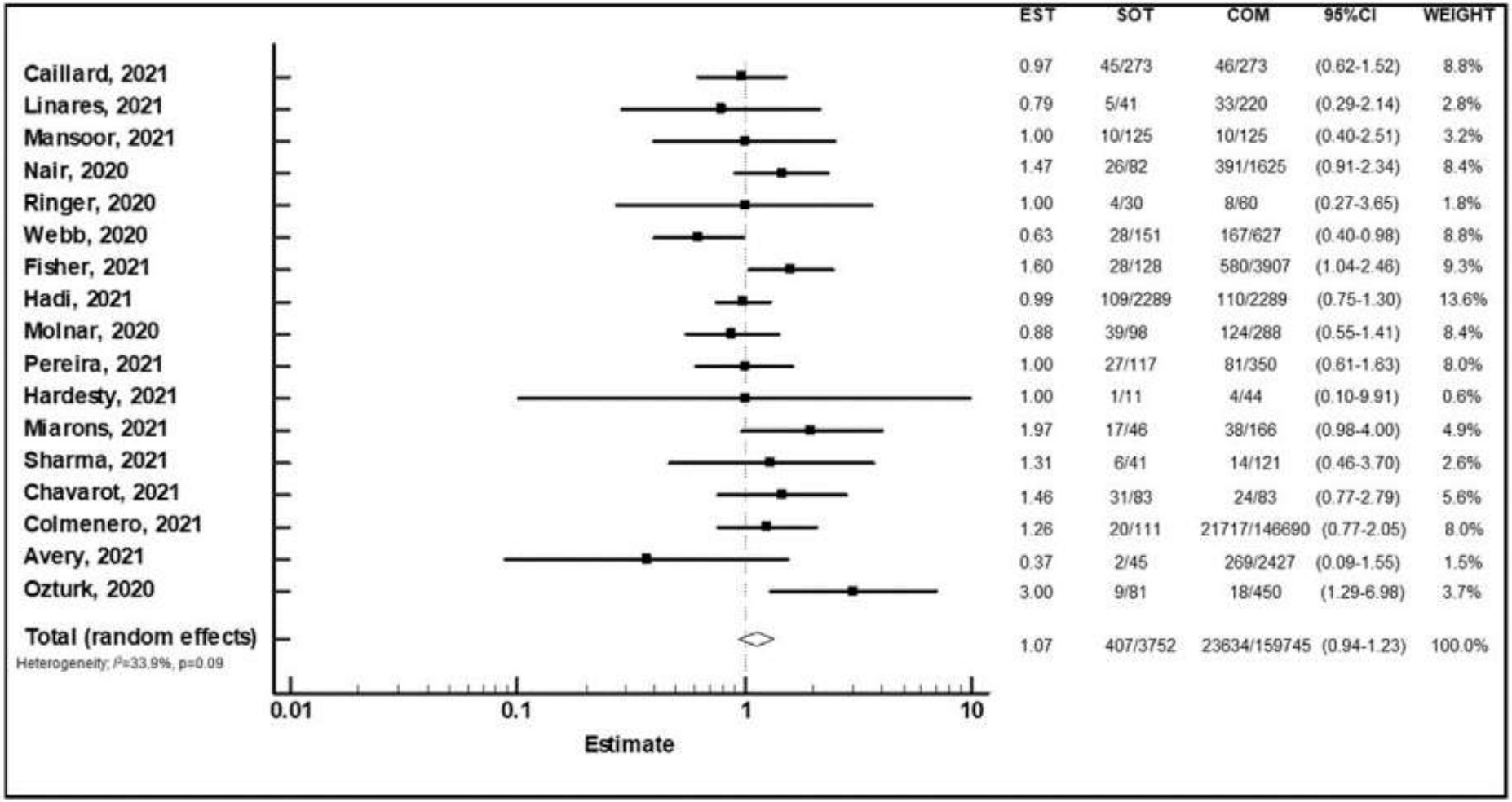

Fig. 2. Forest plot of mortality rate in solid organ transplant recipients compared with the general population for the main analysis, including only studies providing adjusted outcome data.

Received: 21 March 2021 | Revised: 14 April 2021 | Accepted: 14 April 2021

DOI: 10.1111/ajt.16615

ORIGINAL ARTICLE

AJT

Reduced humoral response to mRNA SARS-CoV-2 BNT162b2 vaccine in kidney transplant recipients without prior exposure to the virus

Ayelet Grupper[1,2] | Liane Rabinowich[2,3] | Doron Schwartz[1] | Idit F. Schwartz[1] | Merav Ben-Yehoyada[3] | Moshe Shashar[5,6] | Eugene Katchman[4] | Tami Halperin[4] | Dan Turner[4] | Yaacov Goykhman[2] | Oren Shibolet[2,3] | Sharon Levy[2,3] | Inbal Houri[2,3] | Roni Baruch[1,2] | Helena Katchman[2,3]

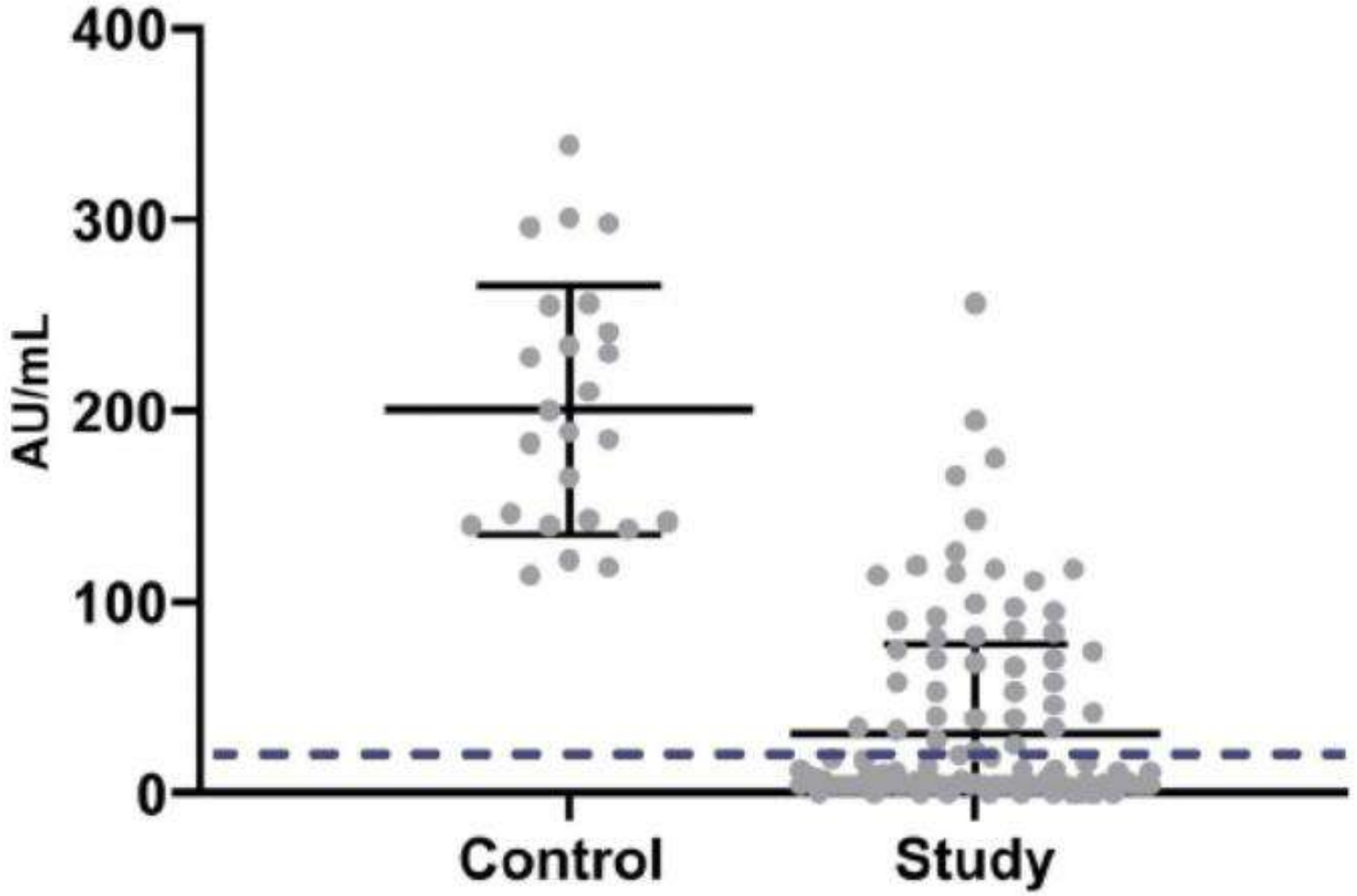

FIGURE 1 Scatterplot of IgG anti S of both groups. Solid lines represent mean and SD. Dashed line represents cutoff of 15 AU/mL (defined as positive serology)

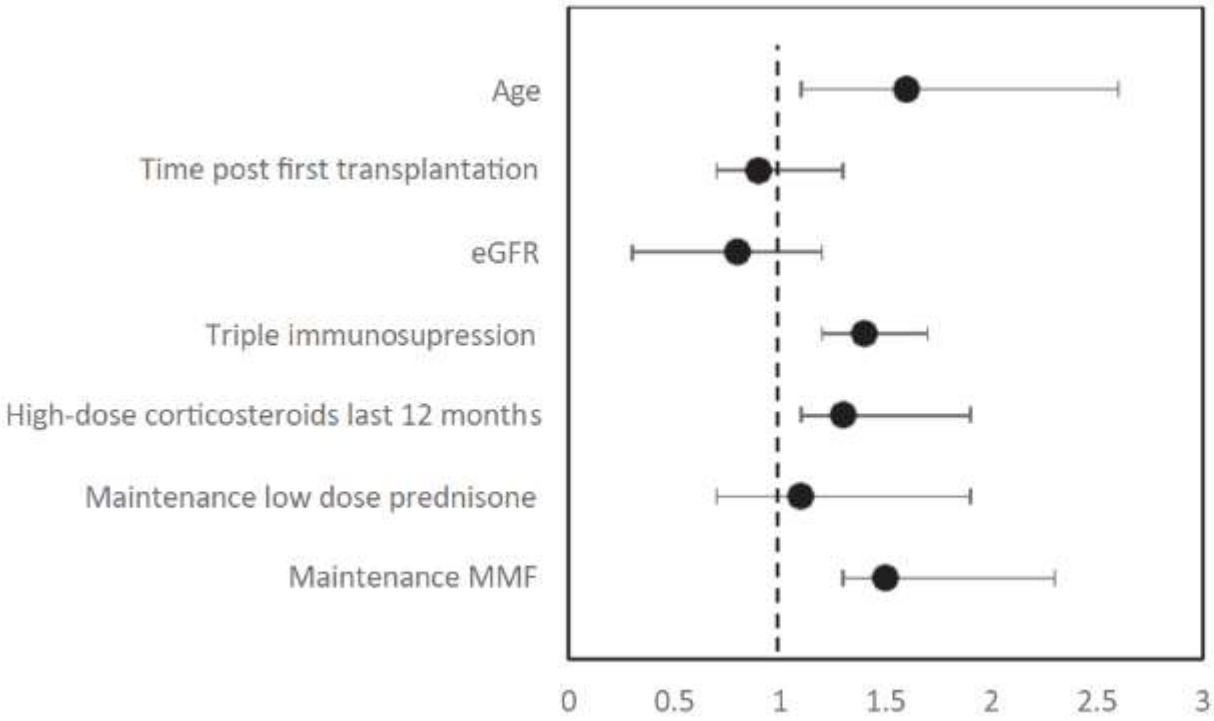

FIGURE 2 Multivariate analysis for the risk of negative serology (odds ratio) in the transplant recipients' group. Note: dashed line represents OR = 1

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Short communication

Timing of rejection events preceded by Covid-19 mRNA vaccination in recipients of solid organ transplants

Quentin Perrier [a], Johan Noble [b], Agnès Bonadona [c], Caroline Augier [d], Thomas Jouve [b], Aude Boignard [d], Loïc Falque [e], Salomé Gallet [f], Pierrick Bedouch [g], Lionel Rostaing [b], Olivier Epaulard [f,*], on behalf of INTEGRAL Study Group

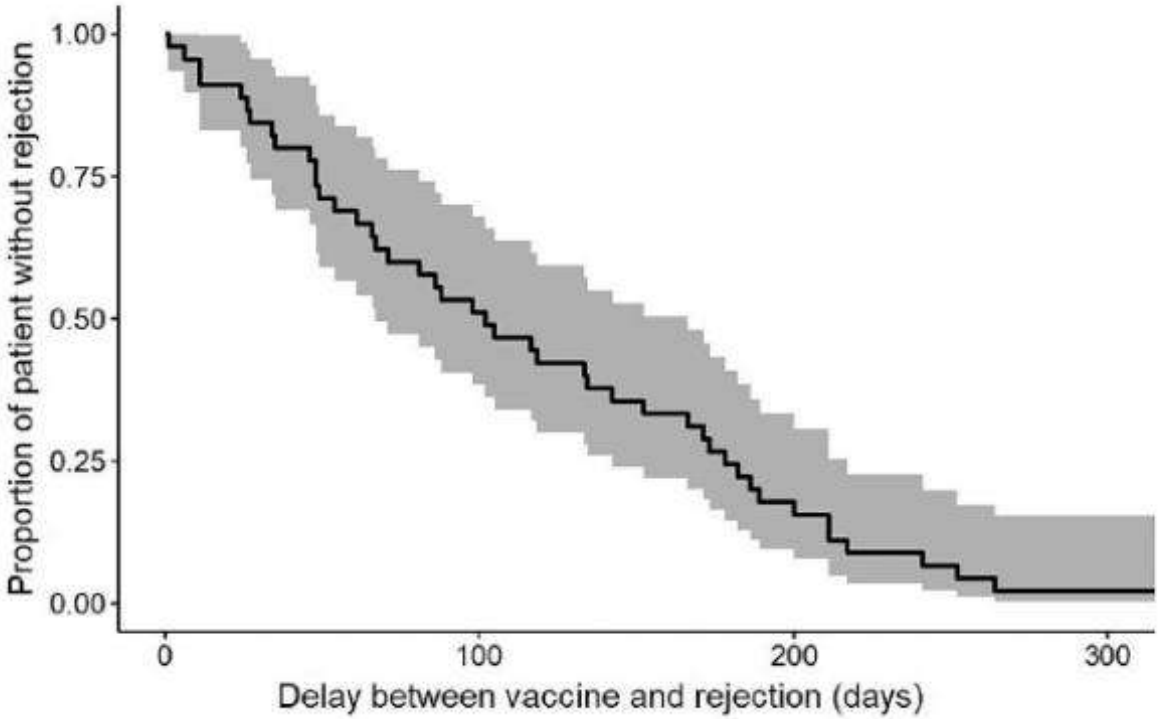

Fig. 1. Distribution of delay between the last vaccine dose and the rejection event (the grey area represents the 95 % confidence interval).

Faut-il faire des sérologies pour apprécier l'efficacité vaccinale ?

- Pas de recommandations générales

- Proposées pour le VHB : pour guider les rappels
- Covid ? Beaucoup d'arguments contre

- Pour les autres :
  - Sérologie pré-vaccinale : oui
    - HAV, HBV, rougeole, varicelle
  - sérologie post-vaccinale : non

Non pas

“Encore un vaccin ! Un de plus !”

mais

“Une maladie de moins”