



Impact des revaccinations sur l'efficacité vaccinale

Bruno LINA

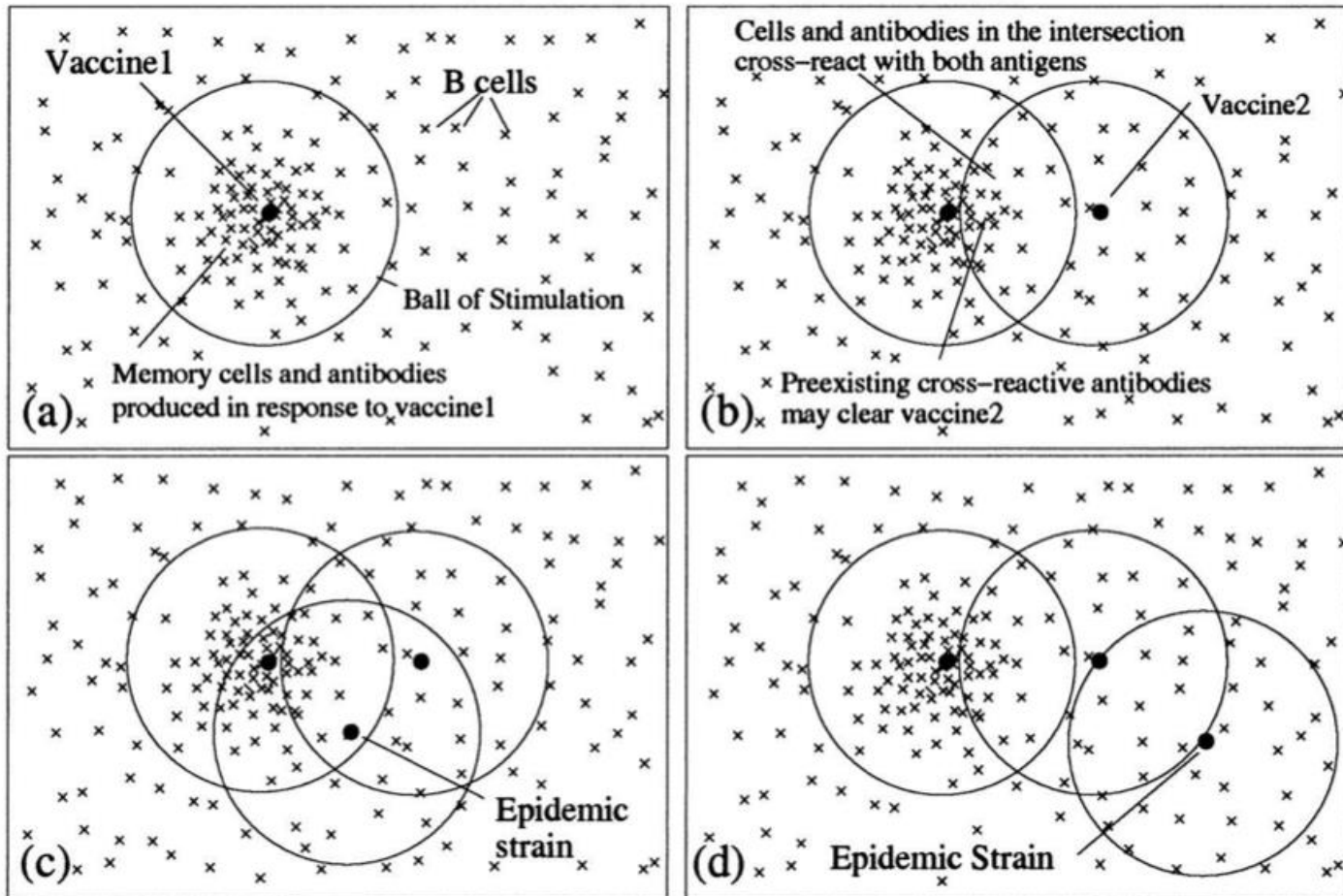
CNR des virus influenzae, HCL,
Virpath, CIRI, U1111, UMR 5308, ENS, UCBL,
Lyon, France

Question en cours depuis 1997

- Plusieurs études historiques rapportent que :
 - La revaccination annuelle pourrait entraîner une baisse de l'efficacité vaccinale d'une moins bonne réponse chez les revaccinés
- Une étude de cet hiver a montré
 - Une absence d'efficacité vaccinale pour les enfants vaccinés par le Vaccin atténué en 2015-2016

Variable efficacy of repeated annual influenza vaccination.

Smith DJ¹, Forrest S, Ackley DH, Perelson AS.



L'efficacité vaccinale dépend de l'âge, du sous type, de l'adéquation et du type de vaccin

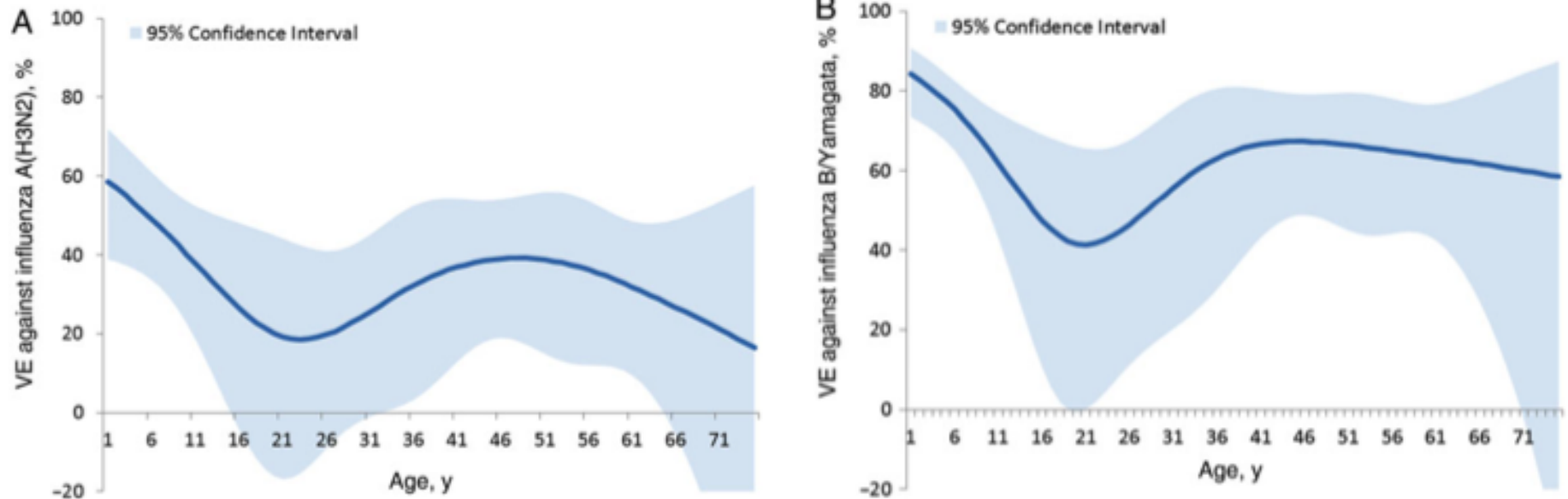
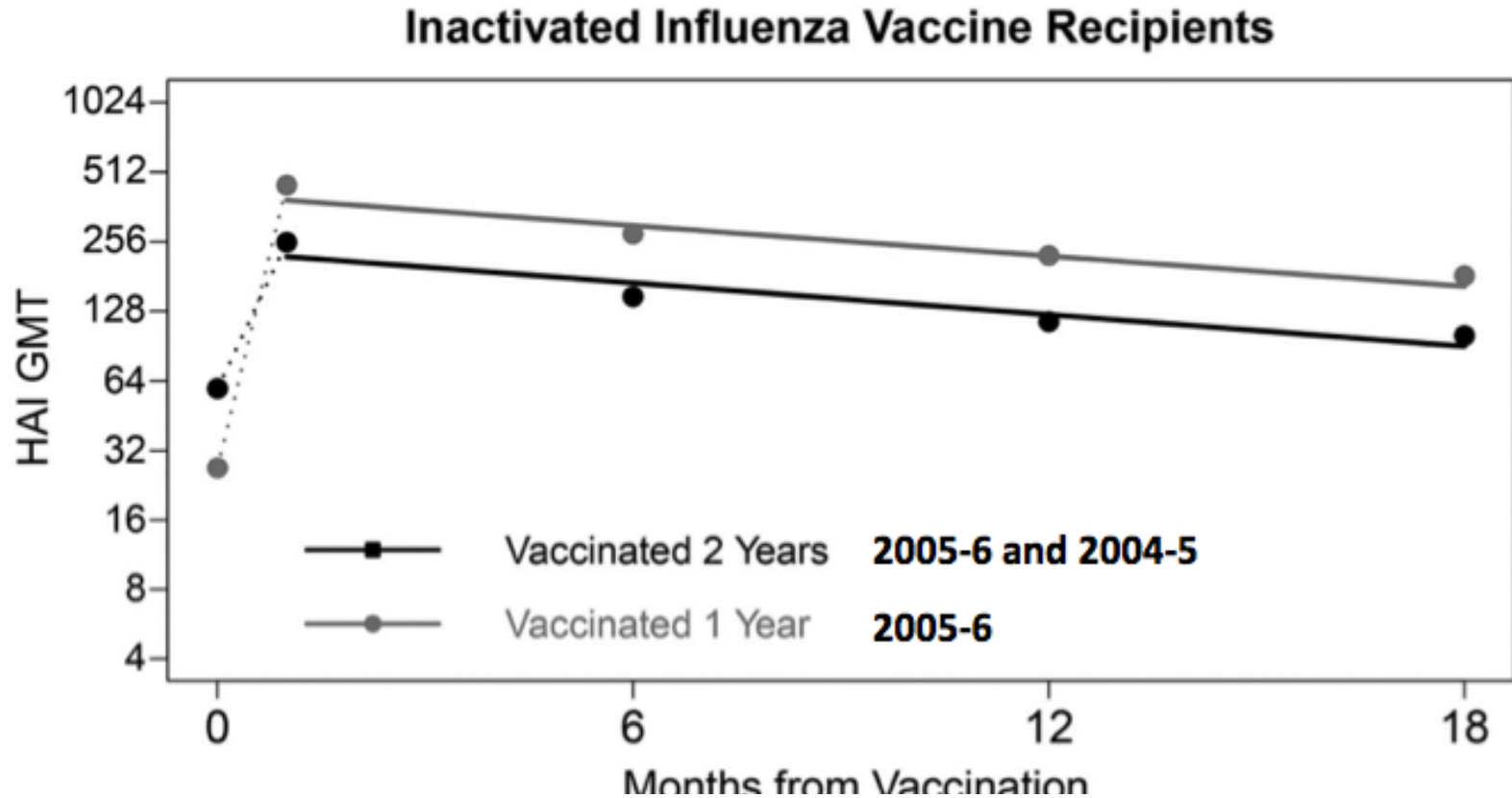


Figure 1. Trivalent inactivated influenza vaccine effectiveness (VE) against influenza A(H3N2) (A) and influenza B/Yamagata (B), by year of age among persons aged 1–75 years.

Que disent les données récentes?

Mesure d'une baisse des titres IHA chez les revaccinés

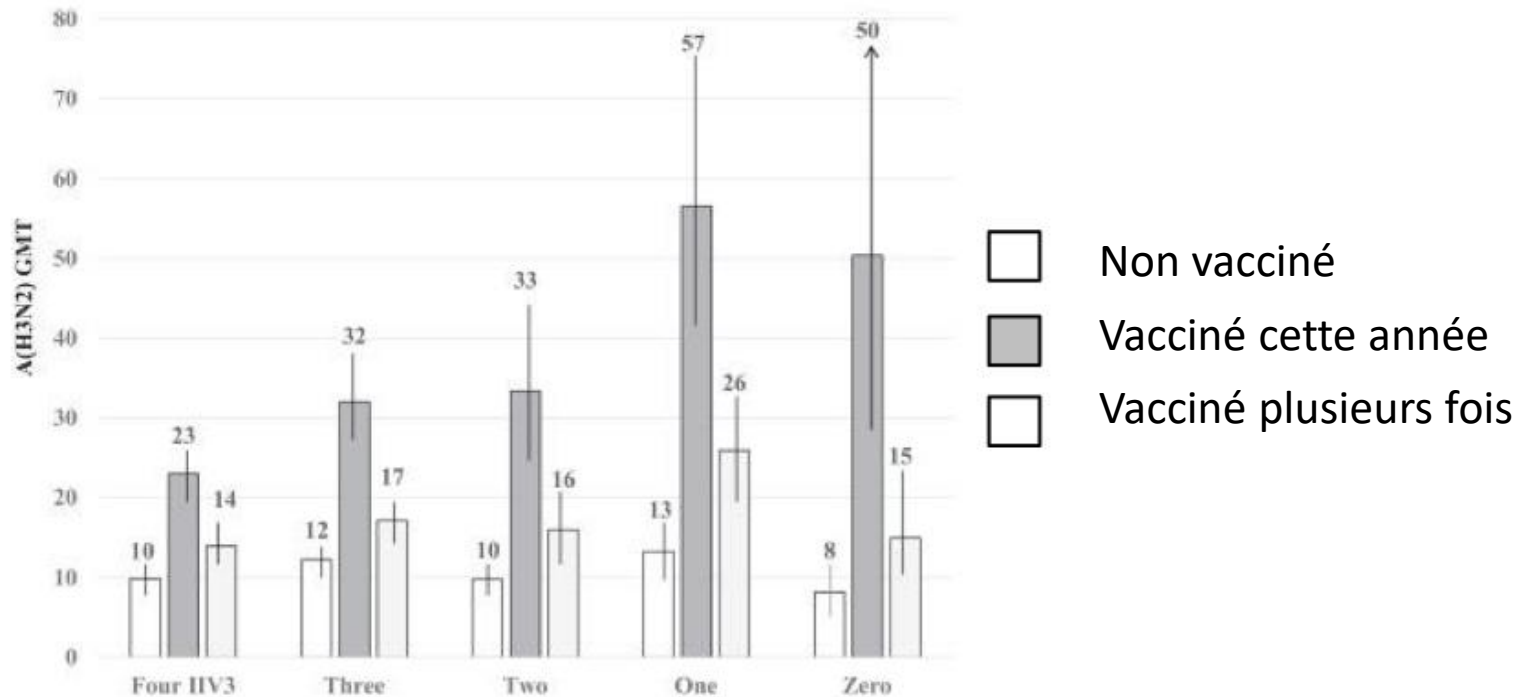


J Infect Dis. 2015 May 15;211(10):1519-28. doi: 10.1093/infdis/jiu650. Epub 2014 Nov 21.

Influenza vaccine effectiveness in households with children during the 2012-2013 season: assessments of prior vaccination and serologic susceptibility.

Ohmit SE¹, Petrie JG¹, Malosh RE¹, Fry AM², Thompson MG², Monto AS¹.

Mesure d'une baisse des titres IHA chez les revaccinés



Vaccine. 2016 Feb 10;34(7):981-8. doi: 10.1016/j.vaccine.2015.10.119.

Effects of Repeated Annual Inactivated Influenza Vaccination among Healthcare Personnel on Serum Hemagglutinin Inhibition Antibody Response to A/Perth/16/2009 (H3N2)-like virus during 2010-11.

Thompson MG¹, Naleway A², Fry AM³, Ball S⁴, Spencer SM³, Reynolds S³, Bozeman S², Levine M³, Katz JM³, Gaglani M⁵.

Mesure d'une baisse de l'EV en cas de revaccination

Current-Season Vaccination Status and 5-Year Vaccination History					
Vaccination Status	Current-Season Vaccination + Frequent Vaccinee	Current-Season Vaccination + Infrequent Vaccinee	Current-Season Vaccination + Non-vaccinee	No Current-Season Vaccination + Frequent Vaccinee	No Current-Season Vaccination + Infrequent Vaccinee
All Ages	24	35	65	36	6
Age 9-49 y	17	48	70	41	-3
Fully Adjusted Age 18-49 y	26	53	69	68	3
Age ≥50	28	20	58	37	32

Clin Infect Dis. 2014 Nov 15;59(10):1375-85. doi: 10.1093/cid/ciu680. Epub 2014 Sep 29.

Impact of repeated vaccination on vaccine effectiveness against influenza A(H3N2) and B during 8 seasons.

McLean HQ¹, Thompson MG², Sundaram ME¹, Meece JK³, McClure DL¹, Friedrich TC⁴, Belongia EA¹.

Mesure d'une baisse de l'EV en cas de revaccination

Table 4. Estimates of Vaccine Effectiveness (VE) in Preventing Laboratory-Confirmed Influenza During the 2012–2013 Influenza Season, by 2-Year Vaccination Status Among Subjects ≥ 9 Years of Age: Household Influenza VE Study, Ann Arbor, Michigan

Vaccination Status	Influenza Positive, Subjects, Proportion (%)	VE, ^a % (95% CI)
		Adjusted ^b
2012–2013 only	1/88 (1.1)	88 (7–98)
Both 2011–2012 and 2012–2013	23/441 (5.2)	47 (11–69)
2011–2012 only	6/91 (6.6)	43 (–66 to 80)
Neither year	36/344 (10.5)	Reference

Abbreviation: CI, confidence interval.

^a Calculated as $100 \times [1 - \text{hazard ratio}]$.

^b Models adjusted for age in months (natural cubic spline) and documentation (present or absent) of high-risk health status in the medical record.

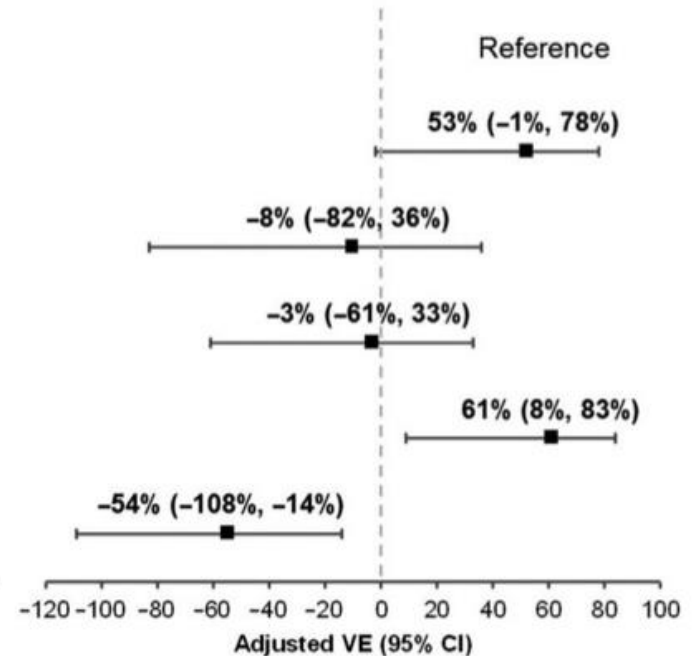
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Influenza vaccine effectiveness in households with children during the 2012-2013 season: assessments of prior vaccination and serologic susceptibility.

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Mesure d'une baisse de l'EV en cas de revaccination

Vaccination History (2012–2013, 2013–2014, and 2014–2015)	Case n (%)	Control n (%)
<i>Unvaccinated all 3 seasons</i>	238 (46)	465 (49)
<i>Current but neither prior (2012–2013 nor 2013–2014)</i>	9 (2)	48 (5)
<i>No current but 1 prior (2012–2013 or 2013–2014)</i>	29 (6)	60 (6)
<i>No current but both prior (2012–2013 and 2013–2014)</i>	44 (8)	75 (8)
<i>Current and 1 prior (2012–2013 or 2013–2014)</i>	7 (1)	38 (4)
<i>Current and both prior (2012–2013 and 2013–2014)</i>	193 (37)	268 (28)



Clin Infect Dis. 2016 Jul 1;63(1):21-32. doi: 10.1093/cid/ciw176. Epub 2016 Mar 29.

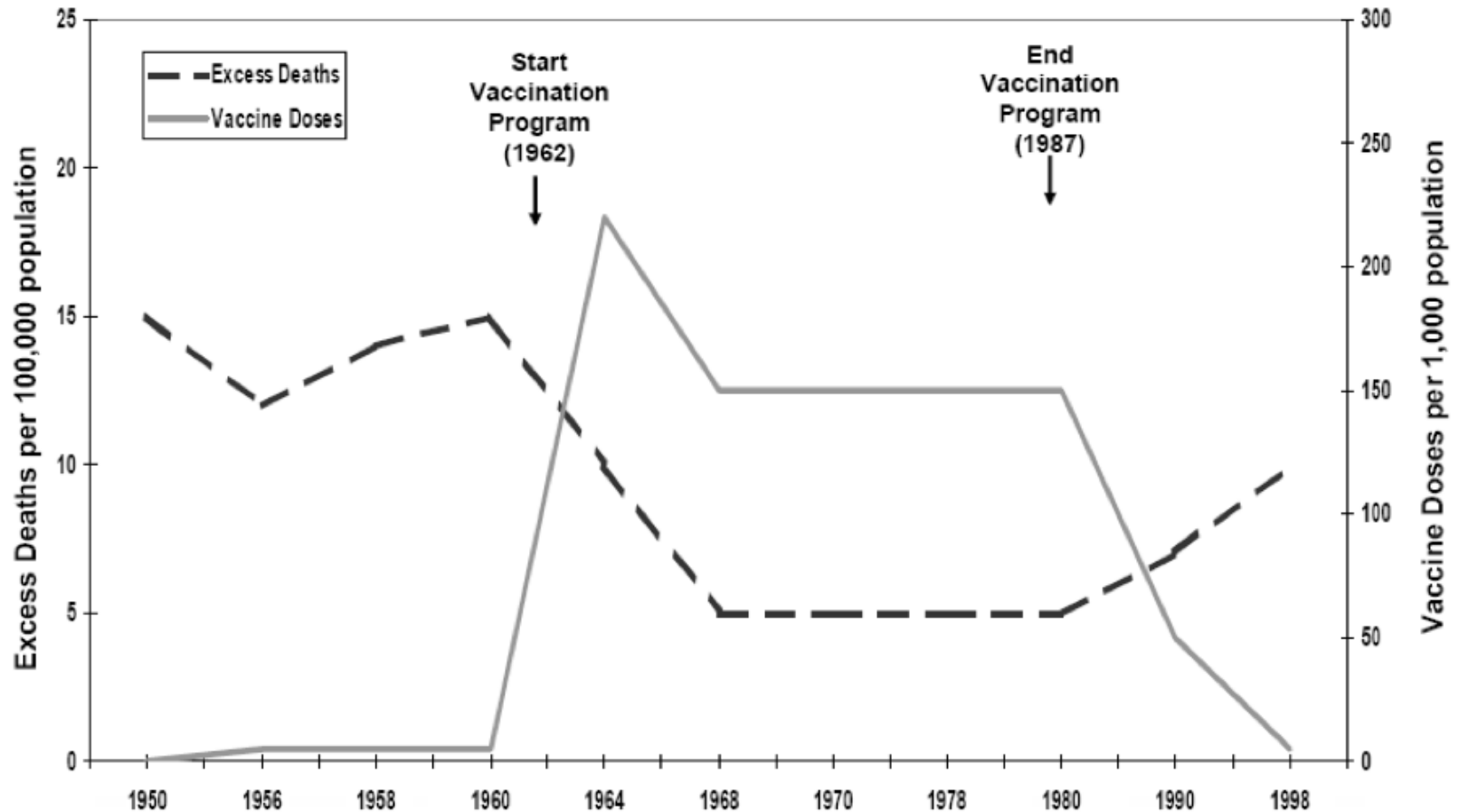
A Perfect Storm: Impact of Genomic Variation and Serial Vaccination on Low Influenza Vaccine Effectiveness During the 2014-2015 Season.

Skowronski DM¹, Chambers C², Sabaiduc S², De Serres G³, Winter AL⁴, Dickinson JA⁵, Kraiden M¹, Gubbay JB⁶, Drews SJ⁷, Martineau C⁸, Eshaghi A⁴, Kwindt TL², Bastien N⁹, Li Y⁹.

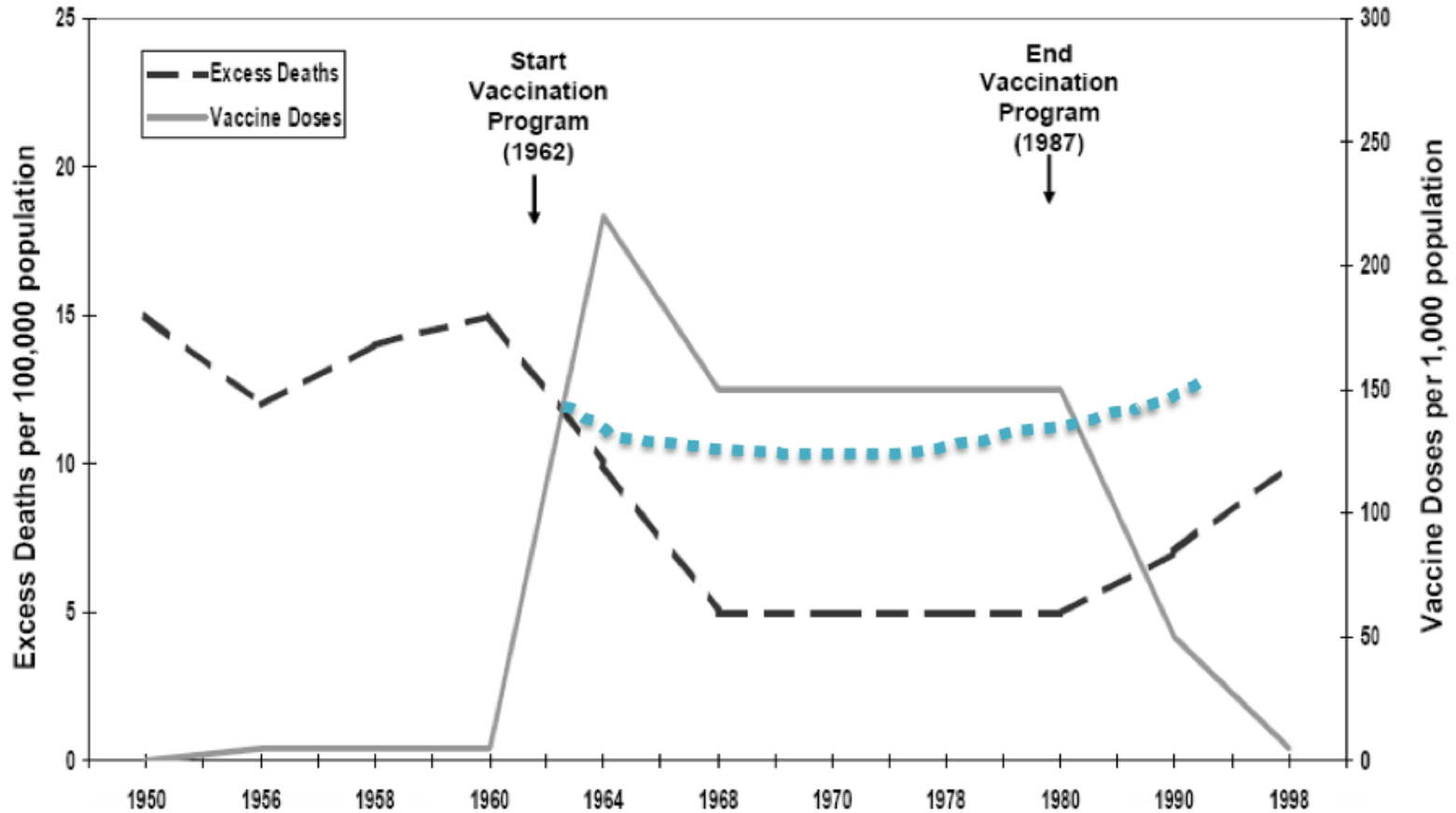
Toutefois

- Des données récentes montrent des résultats différents
 - Pas de différence d'efficacité vaccinale
 - Pas de réduction de l'immunité de groupe lors de vaccinations répétées

Donnée ancienne : impact de la vaccination annuelle des enfants d'âge scolaire au Japon



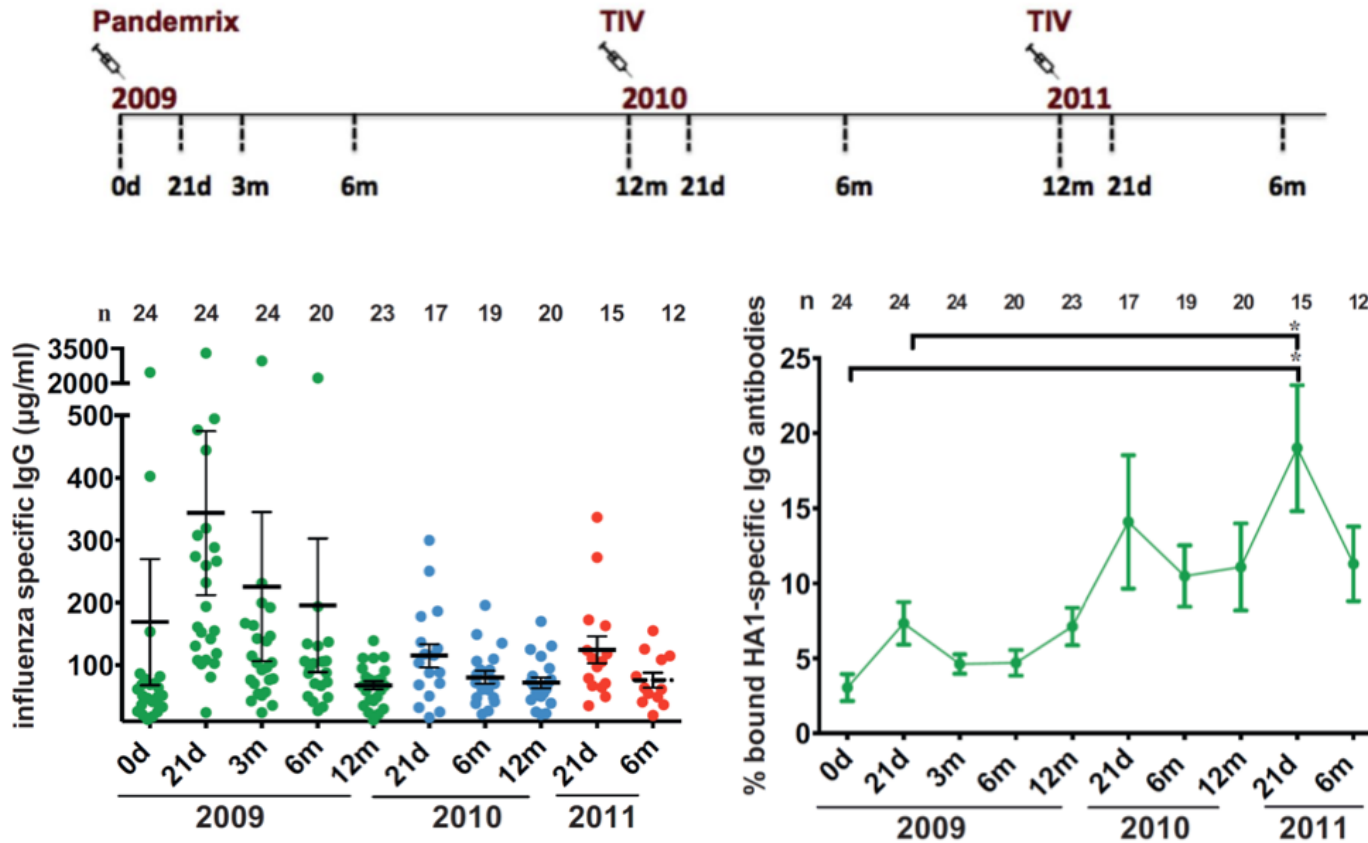
Donnée ancienne : impact de la vaccination annuelle des enfants d'âge scolaire au Japon



Pas de réduction d'efficacité vaccinales mesurée avant le XXIe siècle

Year	Virus Strain	0	1	2	3	4	5	6
H1N1 1983	Brazil (vac)	13	58	63				
	Chile (epi)	6	26	25				
1986	Taiwan (both)	6	41	31	36	36	34	
H3N2 1984	Philippines (both)	5	22	23	20			
1987	Leningrad (vac)	6	17	19	12	14	13	18
	Los Angeles (epi)	7	19	17	12	13	12	15
Type B 1983	Singapore (vac)	3	10	10				
	USSR (epi)	3	5	4				
1985	USSR (vac)	4	15	20	18	20		
	Ann Arbor (epi)	5	11	12	11	10		
1987	Ann Arbor (vac)	6	16	15	12	13	13	14
	Victoria	3	7	7	6	6	5	4

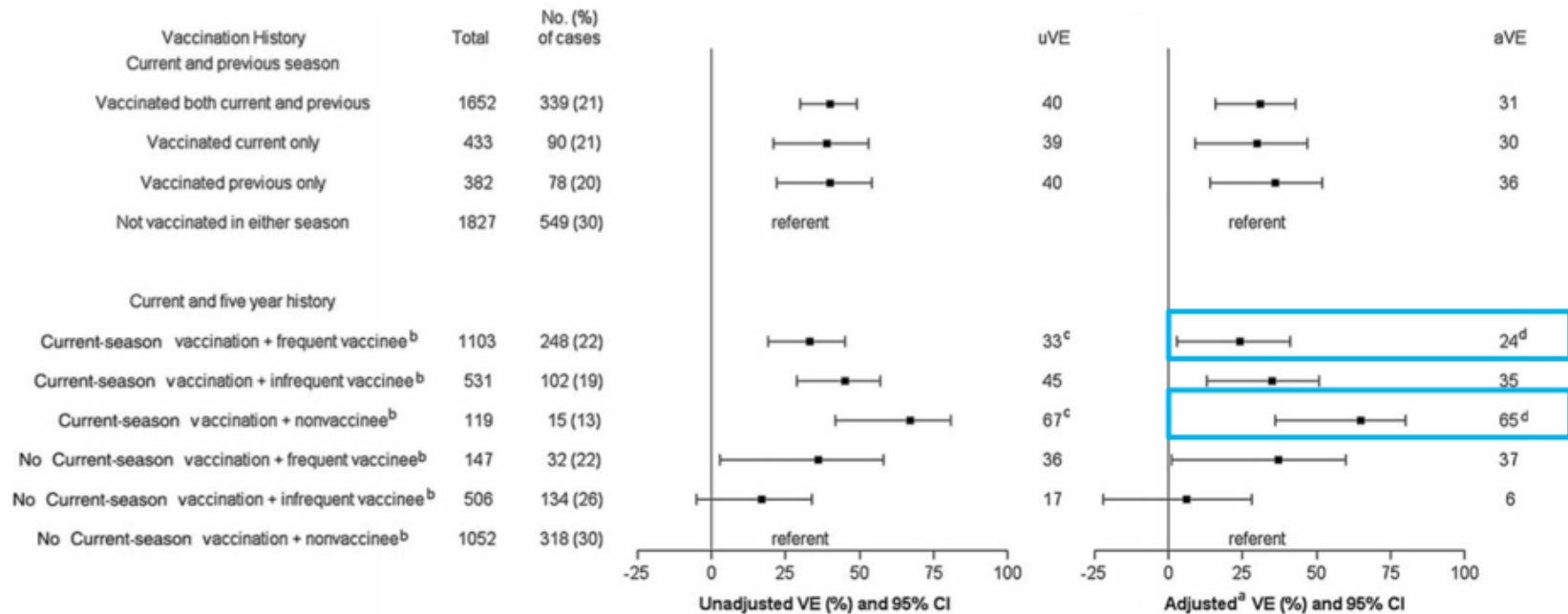
Pas de réduction d'efficacité vaccinale mesurée après la pandémie de 2009



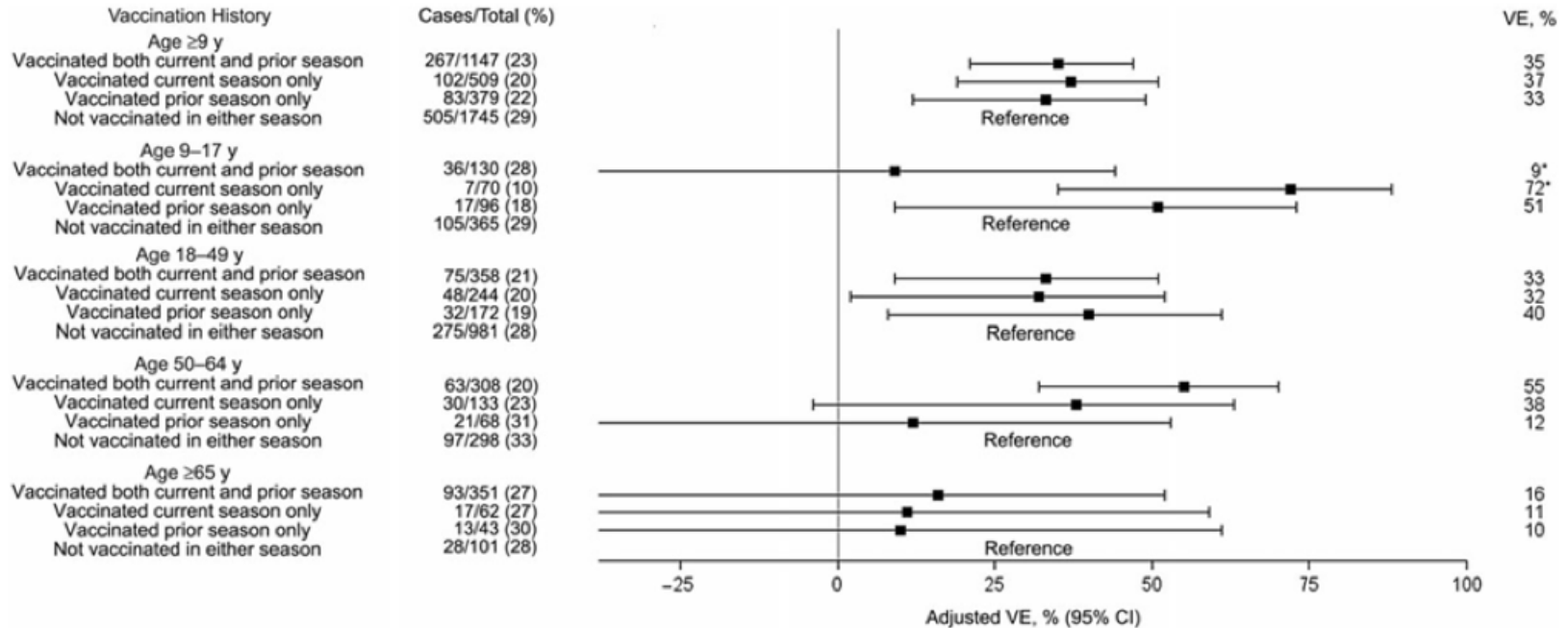
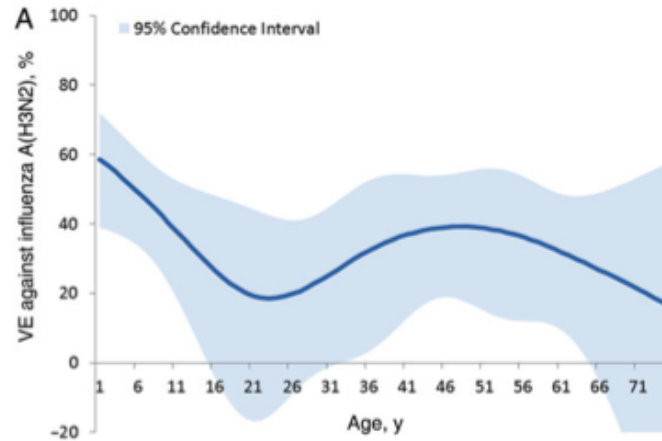
Persistence and avidity maturation of antibodies to A(H1N1)pdm09 in healthcare workers following repeated annual vaccinations

Synnøve Eidem^{a,b,1}, Sarah M. Tete^{a,b,c,1}, Åsne Jul-Larsen^{a,b}, Katja Hoschler^d, Emanuele Montomoli^e, Karl A. Brokstad^f, Rebecca J. Cox^{a,b,c,*}

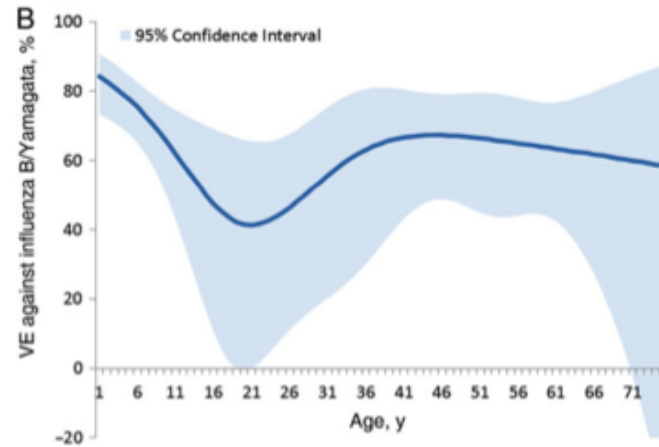
Tous sous types confondus



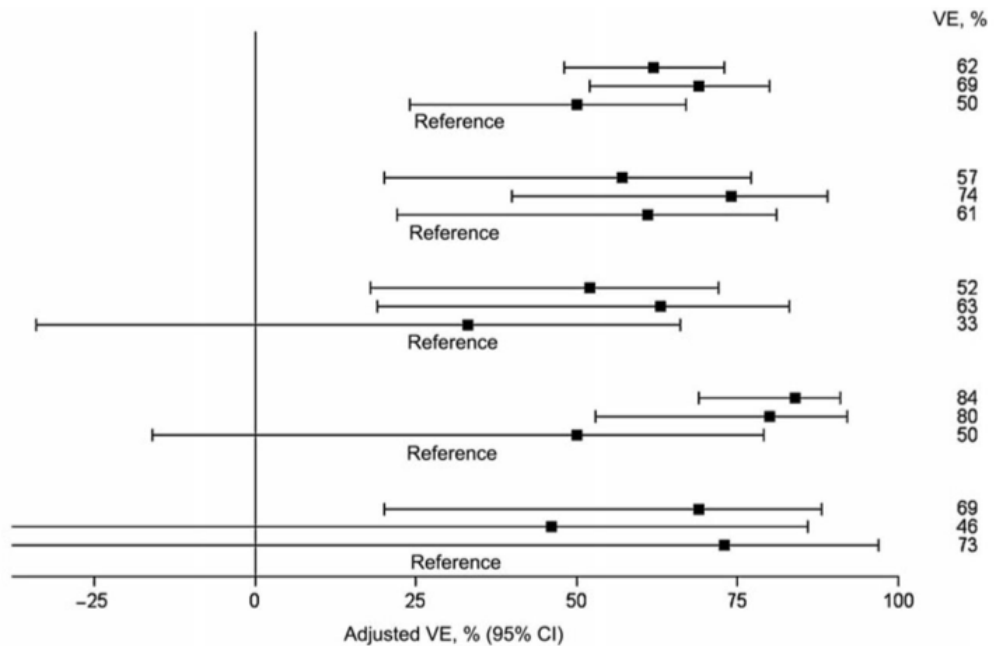
H3N2



B viruses



Vaccination History	Cases/Total (%)
Age ≥9 y	
Vaccinated both current and prior season	59/939 (6)
Vaccinated current season only	24/431 (6)
Vaccinated prior season only	31/327 (9)
Not vaccinated in either season	261/1501 (17)
Age 9–17 y	
Vaccinated both current and prior season	16/110 (15)
Vaccinated current season only	7/70 (10)
Vaccinated prior season only	12/91 (13)
Not vaccinated in either season	98/358 (27)
Age 18–49 y	
Vaccinated both current and prior season	21/304 (7)
Vaccinated current season only	8/204 (4)
Vaccinated prior season only	11/151 (7)
Not vaccinated in either season	94/800 (12)
Age 50–64 y	
Vaccinated both current and prior season	12/257 (5)
Vaccinated current season only	6/109 (6)
Vaccinated prior season only	7/54 (13)
Not vaccinated in either season	60/261 (23)
Age ≥65 y	
Vaccinated both current and prior season	10/268 (4)
Vaccinated current season only	3/48 (6)
Vaccinated prior season only	1/31 (3)
Not vaccinated in either season	9/82 (11)



Au total

- Question difficile et importante :
 - Mais on ne peut pas comparer les hivers les uns avec les autres (virus, variants etc...)
 - Une analyse détaillée de la réponse immunitaire post infectieuse et post-vaccinale semble importante a faire
 - Des études prospectives de large échelle sont a réaliser en fonction des contextes virologiques :
 - Mis match vs pas mis match
 - Variation vs pas de variation
- In fine, on en revient au fait qu'il faut améliorer les vaccins contre la grippe

Remerciements

- GII group pour la reflexion sur ce sujet
- Stanley Plotkin et Ann Falsey pour leurs données et études bibliographiques sur le sujet