

# Cross-protection to new drifted influenza A(H3) viruses and prevalence of protective antibodies to seasonal influenza, during 2014 in Portugal

Vaccine 35 (2017) 2092–2099 ; <http://dx.doi.org/10.1016/j.vaccine.2017.02.019>

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## Background:

Immune profile for influenza viruses is highly changeable over time. Serological studies can assess the prevalence of influenza, estimate the risk of infection, highlight asymptomatic infection rate and can also provide data on vaccine coverage. The aims of the study were to evaluate pre-existing cross-protection against influenza A(H3) drift viruses and to assess influenza immunity in the Portuguese population during 2014.

## Methods:

Was developed a cross-sectional study based on a convenience sample of 626 sera collected during June 2014, covering all age groups, both gender and all administrative health regions of Portugal. Sera antibody titers for seasonal and new A(H3) drift influenza virus were evaluated by hemagglutination inhibition assay (HI). Seroprevalence to each seasonal influenza vaccine strain virus and to the new A(H3) drift circulating strain [A/Switzerland/9715293/2013 and A/Hong Kong/5738/2014] was estimated by age group, gender and region and compared with seasonal influenza-like illness (ILI) incidence rates before and after the study period.

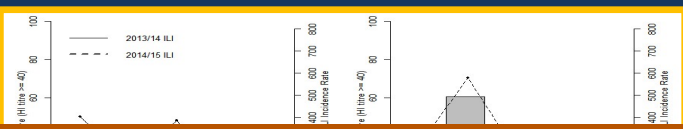
Seroprotection rates against seasonal influenza by hemagglutination inhibition assay (HI titer  $\geq 40$ ) and geometric means titer (GMT) in June 2014 on Portuguese population.

Viruses	Estimation of p	HI $\geq 40$			GMT	
		number/total	%	95% CI	value	95% CI
AH1pdm09 <sup>a</sup>		186/626	29.7	26.3 - 33.4	16.4	15.0 - 18.0
AH3 <sup>b</sup>		250/626	39.9	36.2 - 43.8	22.6	20.3 - 25.3
B_Mass <sup>c</sup>		144/626	23.0	19.9 - 26.5	13.6	12.6 - 14.7
B_Brisb <sup>d</sup>		57/626	9.1	7.1 - 11.6	9.6	9.1 - 10.2
	p-value*	<0.001			<0.001	

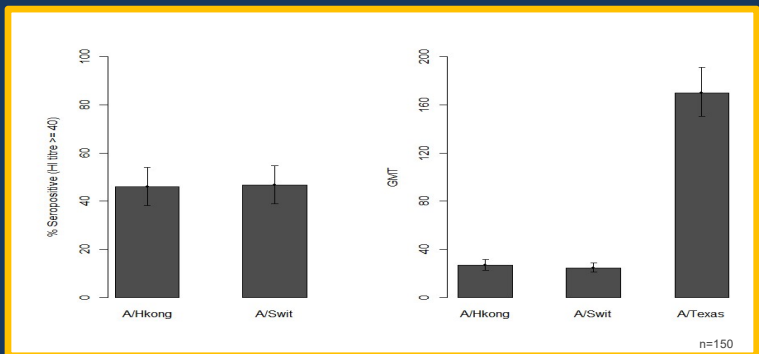
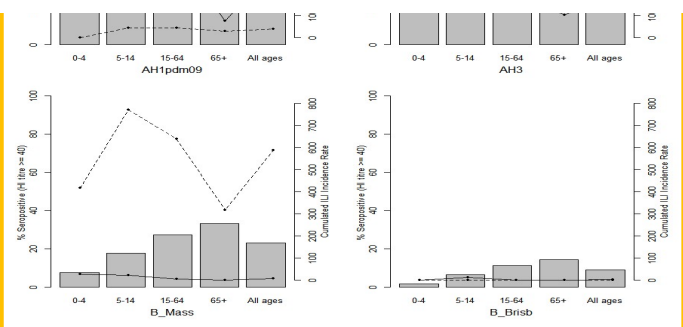
\*p-value refers to the comparison of ratio of viruses (chi-square test), as well as to the comparison of virus titers (Kruskal-Wallis test).

<sup>a</sup>A/California/7/2009; <sup>b</sup>A/Texas/50/2012; <sup>c</sup>B/Massachusetts/2/2012 (Yamagata lineage); <sup>d</sup>B/Brisbane/60/2008 (Victoria lineage).

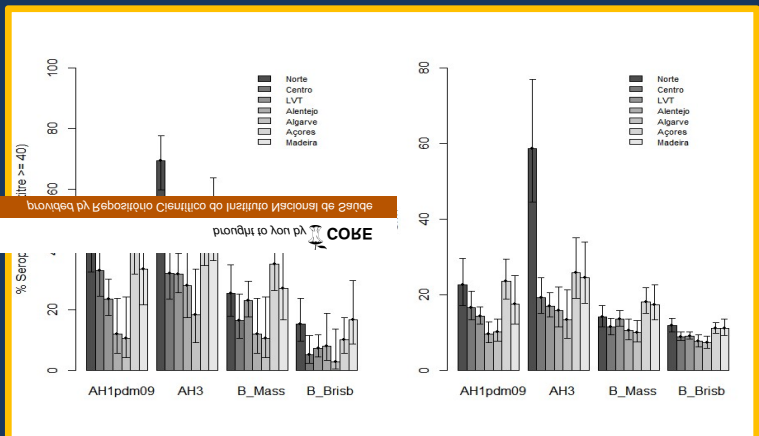
- Low pre-existing cross-protection against new A(H3) drift viruses.
- Seroprevalences for A(H3) and A(H1)pdm09 were higher than influenza B.
- Influenza A(H3) and A(H1)pdm09 seroprevalence was higher in children and adults.
- Influenza B seroprevalence was higher in the elderly.



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Protective antibodies titers against new drift A(H3) viruses [A/Hong Kong/5738/2014 and A/Switzerland/9715293/2013] were found in 46% of A/Texas/50/2012 seroprotected individuals. Seroprotection was higher in age groups under 15 and above 64.



A decreasing trend in seroprotection for influenza, from north to south of Portugal mainland was observed. The highest seroprevalence rate was observed in the north region to A(H3) (69.4%), and the lowest seroprevalence rate in Algarve to influenza B/Victoria lineage (2.6%).

## Conclusions:

There was a correlation between virus circulation, incidence rates for each age group and the previous seroprotection for seasonal influenza viruses and a limited pre-existing cross-reactive antibodies to new drift A(H3) viruses. Our study emphasize the value of seroepidemiological studies to inform policy makers on the need for vaccination and/or additional preventive measures.

