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**Press release**

# H1N1 influenza: Vaccination induces an immune memory response comparable to that of a moderate infection

**How long does the immune memory response produced by vaccination last? Is it similar to that induced by the infection itself? New information on the A(H1N1) pandemic influenza virus has just been brought to light by researchers at Joint Research Unit 1135, Cimi-Paris (Centre for Immunology and Infectious Diseases - Inserm - Pierre and Marie Curie University). They have shown that the immune response induced by vaccination is still strong one year later, and that it is similar to that produced by a moderate infection. Their findings have been published in the *Journal of Clinical Investigation.***

Influenza A virus subtype H1N1, originating in pigs, birds and humans, swept across the world between June 2009 and August 2010. While this pandemic was smaller and less severe than that of 1918, it affected young, healthy people too, in some cases causing very serious illness and death. These people were not naturally immune to the new virus strain, which was different from those that cause influenza epidemics every winter. However, some people had been vaccinated and it would be interesting to know how long their immune response to the pandemic A(H1N1) strain lasted, and if it was comparable to that induced by the infection itself.

The researchers sought to answer these two questions by conducting "*the first ever study to compare vaccinated subjects with infected patients on the basis of so many immune response parameters"* says the principal author Béhazine Combadière, Inserm research director at Cimi-Paris. At present, there is only one standard criterion for evaluating the efficacy of an influenza vaccine: the level of antibodies in the blood, which is correlated with the level of protection afforded. "*We pushed our scientific assessment as far as possible, taking into consideration no less than eight parameters",* adds Béhazine Combadière. These eight parameters covered both humoral immunity (where the antibodies bind to the virus and neutralise it) and cell-mediated immunity (where the white blood cells or T cells kill the cells infected by the virus). Thus, for example, in regard to humoral immunity the researchers focused not only on the level of antibodies in the blood, but also on serum avidity (i.e. the strength or affinity with which antibodies bind to virus antigens).

The study was also original in that the researchers compared vaccinated subjects with infected patients. It included 50 volunteers who received a monovalent vaccine that targeted the pandemic H1N1 strain only and contained an adjuvant (designed to boost the effect of the vaccine, which had a low viral strain content). The vaccinated subjects were compared with 61 patients infected with A(H1N1) influenza. The infection was mild to moderate in 48 of the patients and severe in the remaining 13. The latter had to be admitted to hospital and treated with antiviral therapy after developing acute respiratory distress syndrome. The assessment was carried out one year after exposure to the virus or one year after vaccination.

The researchers showed first of all that the immune response induced by the vaccine was still strong one year later. They also identified similarities and differences between the three groups of people, depending on the immune response parameters. Thus, the effect of vaccination was similar to that of a moderate infection on several immune parameters. Both vaccination and moderate infection also caused a more significant migration of T cells to the mucosa.

The researchers then decided to investigate whether different immune response profiles existed, regardless of vaccination or infection status. They identified three profiles. The first one included a majority of vaccinated and moderately-infected subjects. Therefore, this research shows that different people have a different immune response capacity. It also confirms that influenza vaccination can induce an immune memory response of similar strength and quality to that produced by a moderate infection.

This study may have implications in terms of adjusting or optimising vaccination strategies. It could be used to improve vaccine efficacy assessment protocols. As a result, two parameters could be added to the antibody level: markers of T cell migration to the mucosa and the potential cytotoxic activity of one category of T cells (CD8).

## Sources

### Characterization of pandemic influenza immune memory signature after vaccination or infection

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