Intranasal vaccination with an inactivated whole virion vaccine in humans

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Differences between natural infection and vaccination

Natural infection

Intranasal administration

Intramuscular (Subcutaneous) administration

Secretory IgA Antibody

IgG Antibody
Cross-protection by secretory IgA Abs

Hemagglutinin (HA; H1~H16)
Neuraminidase (NA; N1~N9)

IgG Antibody
S-IgA Antibody
Current only one intranasal vaccine

- Temperature-sensitive live attenuated influenza vaccine (FluMist)
- The application is approved for healthy children and adults between 2 and 49 years old only, due to safety concerns.
Inactivated virus vaccine
for the primary vaccination to naïve subjects

The intranasal administration of an inactivated virus alone is not enough to induce protective immunity.

An immunostimulator is necessary for effective intranasal vaccination!
The intranasal administration of an inactivated virus alone is not enough to induce protective immunity.

**Adjuvant**

Synthetic dsRNA;

**Poly(I:C), PolyI:PolyC_{12}U (Ampligen®)**

Intranasal H5N1 vaccine in mice

Vaccine, 1 µg: Inactivated whole virion vaccine NIBRG14 (derived from A/Vietnam/1194/2004)

Adjuvant, 10 µg: PolyI:PolyC$_{12}$U (Ampligen$^\text{®}$)

NIBRG14
A/Vietnam/1194/2004

A/Vietnam/1194/2004(H5N1)

A/Hong Kong/483/97(H5N1)

1000PFU / 2µl
For the primary vaccination to naïve subjects, the intranasal administration of influenza vaccine with dsRNA adjuvant induces secretory IgA antibodies which are not induced by non-mucosal vaccination.

Secretary IgA antibodies have cross protective ability which is effective against infection with different H5N1 viruses.

These antibody responses are maintained for at least one year after the first vaccination (data not shown).
Inactivated influenza vaccine
-- Whole virion vaccine VS HA vaccine --

Immunogenicity;
Whole virion vaccine > HA vaccine


Residual endogenous viral RNA in an inactivated whole virion vaccine is recognized by TLR7 in plasmacytoid DCs.


Now, we have a clinical study of intranasal vaccination with a whole virion vaccine only.
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