

**Seasonal Influenza Immunization Program**  
Live Attenuated Influenza Vaccine (LAIV)  
(FluMist® Quadrivalent): Questions and Answers for  
Health Care Providers

**November 2020**

Manitoba Health, Seniors and Active Living  
Population Health Division  
Population and Public Health Branch

# Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

## Table of Contents

Acronyms .....	4
1. What is live attenuated influenza vaccine (LAIV)? .....	5
2. Why is LAIV an intranasal spray? .....	5
3. Why is LAIV indicated for use in children aged $\geq 24$ months? .....	5
4. Can LAIV be administered to children with chronic health conditions? .....	5
5. Can LAIV be administered to healthy adults 18 to 59 years of age? .....	5
6. Can LAIV be administered to adults with immune compromising conditions? .....	6
7. Can LAIV be administered to adults with chronic health conditions? .....	6
8. Can LAIV be administered to health care workers? .....	6
9. When was LAIV approved and available for use in Canada? .....	6
10. Is LAIV available for use in other Countries? .....	6
11. Which four influenza virus strains make-up this year's vaccine? .....	7
12. Who is LAIV publicly-funded for in the 2018/19 season? .....	7
13. What are the dosing schedules for administration of LAIV? .....	8
14. What if a child less than 24 months of age receives LAIV? .....	8
15. What if a child presents for LAIV and the product is no longer available? .....	8
16. Is the expiry date of LAIV different from IIV? .....	8
17. What if a person receives an expired dose of LAIV? .....	8
18. What are the steps for intranasal administration of LAIV? .....	8
19. How should the sprayer be disposed of after use? .....	9
20. Can you provide an illustration of the steps of LAIV intranasal administration? .....	10
21. What if a child sneezes right after being immunized with LAIV? .....	10
22. What if a person receives both half doses of LAIV in the same nostril? .....	11
23. What if during LAIV administration, a person is sprayed in the eye instead of the nostril? .....	11
24. What if during LAIV administration, the person refuses the second half of the dose? .....	11
25. Do I have to use personal protective equipment to administer LAIV? .....	11
26. What are the contraindications to receipt of LAIV? .....	11
27. What are some examples of immunocompromising conditions? .....	12
28. Can you define severe asthma? .....	12
29. Can a child receiving daily intranasal steroids for conditions other than asthma receive LAIV? ..	12
30. What about the use of LAIV in pregnant and breastfeeding women? .....	12
31. What are the potential allergens and product components of LAIV? .....	12
32. Should faith-based clients be concerned about the gelatin content in LAIV? .....	13
33. Are there precautions to the receipt of LAIV? .....	13
34. Can you provide me with more information on LAIV and viral shedding? .....	13
35. Are there any special considerations for co-administration of LAIV and other live vaccines? .....	13
36. Are there any special considerations for a child taking antiviral medications? .....	13

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

37. What are the common side-effects of LAIV? .....	14
38. Should I ask if the vaccine recipient is allergic to any component of LAIV before administration? .....	14
39. Can I give LAIV to an individual who has an egg allergy? .....	14
40. How long does it take after administration of LAIV for the individual to acquire protective immunity levels? .....	14
41. Can LAIV be given to people who are household contacts of someone who is immunocompromised?.....	14
42. Can I give LAIV to people who have experienced common local side-effects to inactivated influenza vaccine? .....	14
43. Can the side-effects listed for LAIV occur late? .....	15
44. Are there suggested positioning techniques parents can use with children receiving the LAIV?.	15
45. Can a health care worker who is immunocompromised administer LAIV?.....	15
46. Can a pregnant health care worker administer LAIV?.....	15
47. Is LAIV the preferred product for children?.....	15
Resources .....	17
References .....	18

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

### Acronyms

**ACIP**      Advisory Committee on Immunization Practices

**AEFI**      Adverse event following immunization

**CI**      Confidence interval

**GBS**      Guillain Barré Syndrome

**IIV**      Inactivated influenza vaccine

**LAIV**      Live attenuated influenza vaccine

**LTCF**      Long-term care facility

**MHSAL**      Manitoba Health, Seniors and Active Living

**NACI**      National Advisory Committee on Immunization

**ORS**      Oculo-respiratory syndrome

**PFS**      Pre-filled syringe

**PHIN**      Personal health identification number

**PVAC**      Provincial Vaccine Advisory Committee

**RHA**      Regional Health Authority

**VE**      Vaccine effectiveness

**WHO**      World Health Organization

# Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

## 1. What is live attenuated influenza vaccine (LAIV)?

FluMist® Quadrivalent is a live attenuated influenza vaccine (LAIV) that is administered by the intranasal route (i.e. nasal spray). Each pre-filled glass sprayer contains 0.2mL dose (given as 0.1mL in each nostril) of live attenuated influenza virus reassortants of four vaccine virus strains.<sup>1</sup> The spray is a colorless to pale yellow, clear to opalescent liquid; small, white particles may be present.

## 2. Why is LAIV an intranasal spray?

LAIV (FluMist® Quadrivalent) is made from attenuated viruses that are able to replicate efficiently only at temperatures present in the nasal mucosa. LAIV is manufactured using the four influenza virus strains recommended by the World Health Organization (WHO) for the northern hemisphere. Through manufacturing processes, the four influenza virus strains become:

- **cold-adapted** so they are only able to replicate at cooler temperatures in the nasal mucosa
- **temperature sensitive** so they are unable to replicate at warmer temperatures of the lower airways and lungs
- **attenuated** so they are unable to cause influenza. Attenuation takes an infectious agent, such as the influenza virus, and alters it so that it becomes harmless or less virulent.

The cumulative effect of these properties is such that the viral strains induce protective immunity without causing disease.<sup>1</sup>

## 3. Why is LAIV indicated for use in children aged ≥ 24 months?

LAIV (FluMist® Quadrivalent) is contraindicated among children less than 24 months of age due to increased risk of wheezing.<sup>4</sup> A multi-centre efficacy trial found that rates of wheezing were statistically and significantly higher among children six to 24 months of age (5.9% LAIV vs. 3.8% trivalent inactivated influenza vaccine) in the weeks following immunization.<sup>3</sup>

## 4. Can LAIV be administered to children with chronic health conditions?

As per the National Advisory Committee on Immunization (NACI)<sup>17</sup>, LAIV can be used in children 24 months and older with stable, non-severe asthma and in children with chronic health conditions. LAIV is contraindicated in children 24 months and older with severe asthma, those who are on aspirin therapy, and those with immunocompromising conditions. The exception to the latter is that LAIV can be considered for use in individuals two to 17 years old with stable HIV infection and adequate immune function. This is described by NACI as individuals who meet the following criteria:

- receiving HAART for ≥4 months
- CD4 count ≥500/μL if 2–5 years of age, or ≥200/μL if 6–17 years of age (measured within 100 days before administration of LAIV)
- HIV plasma RNA <10,000 copies/mL (measured within 100 days before administration of LAIV)

Note, inactivated influenza vaccine remains the preferred vaccine for children with HIV infection, but LAIV can be considered if intramuscular injection is not accepted by the child or their substitute decision-maker.

## 5. Can LAIV be administered to healthy adults 18 to 59 years of age?

Yes. As per NACI and Health Canada, LAIV can be used for the prevention of influenza in **healthy** adults up to 59 years of age. Manitoba Health, Seniors and Active Living (MHSAL) recommends that **healthy** adults up to 59 years of age who are needle averse may be immunized with LAIV if they would otherwise refuse vaccination if only inactivated influenza vaccine (IIV) were available.

NACI conducted a literature search in early 2016 that identified three studies examining the effectiveness of LAIV in adult populations (published since its 2011 literature review). Most of these

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

studies found that LAIV and IIV had similar efficacy and effectiveness or, that IIV was more efficacious. Given the small number of studies with adult participants, it is uncertain what factors influence the relative efficacy and effectiveness of LAIV compared to IIV. Additionally, in efficacy studies, IIV has typically been shown to be more immunogenic in adults than was LAIV. Greater rates of seroconversion to LAIV occurred in baseline seronegative individuals compared to baseline seropositive individuals in both child and adult populations, because pre-existing immunity may interfere with response to a live vaccine.

### 6. Can LAIV be administered to adults with immune compromising conditions?

LAIV is contraindicated for adults with immune compromising conditions due to underlying disease, therapy or both, as the vaccine contains live attenuated virus. These individuals should be offered standard-dose IIV; seniors aged 65 years or older who are living in a long-term care facility should be offered the high-dose IIV.

### 7. Can LAIV be administered to adults with chronic health conditions?

LAIV is contraindicated in adults with chronic health conditions which increase the risk of influenza-related complications or hospitalizations, including (but not limited to):

- Cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis and asthma)
- Diabetes mellitus and other metabolic diseases
- Cancer, immune compromising conditions (due to underlying disease and/or therapy)
- Renal disease
- Anemia or hemoglobinopathy
- Conditions that compromise the management of respiratory secretions and are associated with an increased risk of aspiration
- Morbid obesity (BM $\geq$ 40)

### 8. Can LAIV be administered to health care workers?

No. NACI recommends that IIV, instead of LAIV, be used for health care workers. In rare instances, shed vaccine viruses can be transmitted from vaccine recipients to unvaccinated persons causing an infection.

### 9. When was LAIV approved and available for use in Canada?

LAIV (FluMist<sup>®</sup>- *trivalent formulation*) was approved in Canada in June 2010 for persons two to 59 years of age and was first used in publicly funded immunization programs in Canada for the 2012-13 influenza season. The quadrivalent formulation was approved for use in Canada for the 2014-15 season and has been in use since that time. Trivalent LAIV is no longer available in Canada.

### 10. Is LAIV available for use in other Countries?

LAIV (FluMist<sup>®</sup> Quadrivalent) has been approved in the United States since 2003.<sup>3</sup> Outside of North America, countries with approval for FluMist<sup>®</sup> Quadrivalent (called Fluenz<sup>®</sup> in Europe) are: the United Kingdom, Germany, France, Sweden, Israel, Malaysia and Hong Kong.

The following table is a historical timeline of the use of FluMist<sup>®</sup> Quadrivalent (as well as the previous trivalent formulation) in Canada and the USA including a historical synopsis of NACI and ACIP recommendations.

<b>Canadian Landscape:</b>	<b>American Landscape:</b>  <b>June 2003:</b> FluMist <sup>®</sup> approved for use in individuals 5 to 49 years of age.
----------------------------	--

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

<p><b>June 2010:</b> Health Canada approved FluMist® (trivalent IIV) for use in individuals 2 to 59 years of age.</p> <p><b>2011/12 season:</b> NACI recommended FluMist® for use in healthy individuals 2-17 years of age.</p> <p><b>2013-14 season:</b> NACI preferentially recommended FluMist® in young children (younger than 6 years of age) based on superior efficacy and continued to recommend its use in healthy children 2-17 years of age.</p> <p><b>January 2014:</b> in response to a national vaccine shortage, MB publicly funds FluMist® mid-season for individuals 2-59 years of age.</p> <p><b>October 2014:</b> Health Canada approved FluMist® Quadrivalent for use in individuals two to 59 years of age, replacing the trivalent formulation.</p> <p><b>2014/15 season:</b> MB offers FluMist® Quadrivalent to individuals 2-17 years of age, with preferential use in children younger than 6 years of age. Needle averse adults up to 59 years of age could also get FluMist® Quadrivalent.</p> <p><b>2016/17 season to present:</b> Based on the most recent evidence, NACI continues to recommend FluMist® Quadrivalent but no longer preferentially recommends. MB updated its provincial recommendations to be consistent with NACI.</p>	<p><b>September 2007:</b> FDA extended approval to include individuals 2 to 49 years of age.</p> <p><b>October 2007:</b> ACIP recommended use of FluMist® in children 2-5 years of age. ACIP recommended that either FluMist® or inactivated influenza vaccine could be used for healthy, non-pregnant persons aged 2-49 years (no preference).</p> <p><b>February 2012:</b> FDA licensed FluMist® Quadrivalent, replacing the trivalent formulation beginning with the 2013/14 season.</p> <p><b>2014/15 season:</b> for the first time, ACIP preferentially recommended that when available, FluMist® Quadrivalent should be used for healthy children aged 2-8 years.</p> <p><b>2015/16 season:</b> in the absence of data demonstrating consistent greater relative effectiveness (particularly with respect to the H1N1 strain), ACIP no longer makes a preferential recommendation for FluMist® Quadrivalent; any vaccine type or formulation could be used.</p> <p><b>2016/17 season:</b> ACIP recommended that FluMist® Quadrivalent NOT be used.</p> <p><b>2018/19 season:</b> ACIP is recommending the use of FluMist® Quadrivalent for healthy, non-pregnant individuals 2-49 years of age.</p>
--	--

### 11. Which four influenza virus strains make-up this year's vaccine?

For the northern hemisphere, the WHO<sup>5</sup> recommends that the 2020-21 seasonal quadrivalent influenza vaccine (inactivated and live attenuated) contain:

- **A/Guangdong-Maonan/SWL1536/2019 (H1N1)pdm09-like virus;**
- **A/Hong Kong/2671/2019 (H3N2)-like virus;**
- **B/Washington/02/2019 (B/Victoria lineage)-like virus; and**
- **B/Phuket/3073/2013 (B/Yamagata lineage)-like virus.\***

### 12. Who is LAIV publicly-funded for in the 2020-21 season?

**MHSAL publicly-funds and recommends that** *healthy* children two to 17 years of age can be immunized with LAIV and that a small number of *healthy* adults up to 59 years of age who are

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

needle averse may also be immunized with LAIV if they would otherwise refuse vaccination if only IIV were available.

### 13. What are the dosing schedules for administration of LAIV?

**2 to less than 9 years of age:** one dose given as 0.2mL (0.1mL in each nostril) intranasal spray. A second dose of influenza vaccine is recommended 4 weeks after receipt of the first dose for children who have NEVER received an influenza vaccine.

**9 to 17 years of age:** one dose given as 0.2mL (0.1mL in each nostril) intranasal spray. This product can be used for use in this age group as it offers the advantage of needle-free administration.

**18 to 59 years of age:** one dose given as 0.2mL (0.1 mL in each nostril) intranasal spray. This product is approved for use in this age group but IIV should be used unless the individual would otherwise decline immunization if only IIV were offered.

### 14. What if a child less than 24 months of age receives LAIV?

LAIV (FluMist® Quadrivalent) is not approved for use in this age group due to an increased risk of wheezing found in clinical trials in this group.<sup>4</sup> If FluMist® Quadrivalent is inadvertently administered to a child < 24 months of age, there is no need to offer IIV subsequently as LAIV provides protection in this age group.<sup>6</sup> However, inform the parent/guardian of the risk of increased wheezing and recommend that if wheezing occurs, they contact the child's primary care provider as well as report to public health. Complete the required patient safety/vaccine error documentation within your organization.

Children under nine years of age who have not previously received seasonal influenza vaccine require two doses given four weeks apart. When a child < 24 months is inadvertently given LAIV for the first dose presents for a second dose, give IIV by needle.

### 15. What if a child presents for LAIV and the product is no longer available?

If a child presents for a first or second dose of LAIV and the product is no longer available, offer IIV. Children under nine years of age who have NEVER previously received seasonal influenza vaccine require two doses given four weeks apart. If the child has received one or more doses in any previous season, only a single dose is required.

### 16. Is the expiry date of LAIV different from IIV?

The shelf-life of LAIV is considerably shorter than that of IIV. The default expiry date of this product is **NOT** the last day of the month. Be sure to check the expiry date on the packaging as vaccine stock is received. All health care providers/delegates are asked to optimize planning of use to ensure that the quantities received are used prior to expiry.

### 17. What if a person receives an expired dose of LAIV?

**If an expired product is given inadvertently, the dose must be repeated.** To ensure that the person is protected against the four seasonal influenza strains contained in the vaccine, offer a valid dose of LAIV on the same day the expired vaccine was given or as soon as the error is discovered. There is no minimum interval between an expired and a valid dose of LAIV as it is the same product being administered and protection against influenza should not be delayed.

If the individual (or parent/guardian of the individual) refuses to repeat LAIV administration, offer IIV as an alternative. To document the administration of an expired dose, complete the required patient safety/vaccine error documentation within your organization.

### 18. What are the steps for intranasal administration of LAIV?

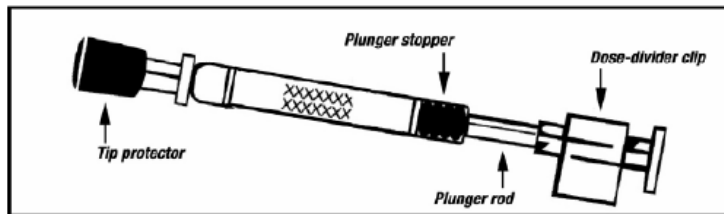
**FLUMIST® QUADRIVALENT IS AN INTRANASAL SPRAY AND IS NOT FOR INJECTION.**



## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

The product is provided in a 'sprayer' in a firm device that looks like a syringe with a tip protector at one end and a plunger with a dose divider clip at the other end. Details and accompanying diagram on how to administer the product are contained in the product monograph and the accompanying text is reproduced below:

1. Remove the rubber tip protector. Do not remove the dose-divider clip at the other end of the sprayer.
2. With the recipient sitting upright, place tip of the sprayer just inside a nostril to ensure vaccine is delivered into the nose.
3. In one motion depress the plunger as rapidly as possible until the dose-divider clip prevents you from going further.
4. Pinch and remove the dose divider clip from the plunger.
5. Place the tip of the sprayer just inside the other nostril and with a single motion depress the plunger as rapidly as possible to deliver the rest of the vaccine.



### 19. How should the sprayer be disposed of after use?

The sprayer should be disposed of according to the standard procedures for medical waste (e.g. sharps container or biohazard container).<sup>1</sup>

20. Can you provide an illustration of the steps of LAIV intranasal administration?

**1**

Check expiration date. Product must be used before the date on sprayer label.

**2**

Remove rubber tip protector. Do not remove dose-divider clip at the other end of the sprayer.

**3**

With the patient in an upright position, place the tip just inside the nostril to ensure FluMist<sup>®</sup> is delivered into the nose.

**4**

With a single motion, depress plunger **as rapidly as possible** until the dose-divider clip prevents you from going further.

**5**

Pinch and remove the dose-divider clip from plunger.

**6**

Place the tip just inside the other nostril and with a single motion, depress plunger **as rapidly as possible** to deliver remaining vaccine.

21. What if a child sneezes right after being immunized with LAIV?

NACI<sup>3</sup> supports that if the vaccine recipient sneezes immediately after administration, the dose should NOT be repeated. The binding of the virus to epithelial cells occurs very rapidly and there are

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

more virus particles in the vaccine than are needed to establish immunity. Therefore, sneezing or blowing your nose immediately after immunization with LAIV will not affect immunity.<sup>7</sup>

### 22. What if a person receives both half doses of LAIV in the same nostril?

It is recommended that LAIV be administered as two divided sprays (0.1 mL into each nostril) to maximize the vaccine's contact surface area of epithelial cells within the nasopharynx. No clinical trials have been conducted using a single-nostril administration. However, there is no need to repeat immunization as each half dose (0.1 mL) contains enough viral particles to induce an immune response.<sup>10</sup> Complete the required patient safety/vaccine error documentation within your organization.

### 23. What if during LAIV administration, a person is sprayed in the eye instead of the nostril?

Immediately flush the area with water or saline. If irritation persists, refer to a physician to assess for possible conjunctivitis. If at least half of the LAIV dose (0.1 mL) was administered into the nostril, the client does not need further vaccine at that time.<sup>15</sup> However, if the first half of the vaccine dose went into the eye, the second half of the dose (0.1 mL) should be offered. If at that time the individual (or the parent/guardian of the individual) does not want to attempt further administration of LAIV, offer IIV. Complete the required patient safety/vaccine error documentation within your organization.

### 24. What if during LAIV administration, the person refuses the second half of the dose?

If an individual refuses the second half of the LAIV dose, attempt to give the second half (0.1 mL) of the LAIV dose in the other nostril. If you are unsuccessful, there is no need to repeat immunization as each half dose (0.1 mL) of LAIV contains enough viral particles to induce an immune response.<sup>10</sup> Complete the required patient safety/vaccine error documentation within your organization.

### 25. Do I have to use personal protective equipment to administer LAIV?

This year in the presence of COVID-19 the use of personal protective equipment such as gloves and masks is needed to administer FluMist® Quadrivalent. Follow additional routine practices, as when administering any immunization, in settings where FluMist® Quadrivalent is given.

### 26. What are the contraindications to receiving LAIV?

- History of anaphylactic reaction to a previous dose of any type of influenza vaccine or to any component of FluMist® Quadrivalent (excluding eggs)
- History of Guillain-Barré Syndrome (GBS) within 6 weeks of receipt of a previous dose of influenza vaccine
- Severe asthma as defined as currently on oral or high-dose inhaled glucocorticosteroids or active wheezing, or those with medically attended wheezing in the seven days prior to immunization
- Individuals two to 17 years of age receiving Aspirin®-containing therapy because of the association of Reye syndrome with Aspirin® and wild-type influenza infection. It is recommended that Aspirin®-containing products in children less than 18 years of age be delayed for four weeks after receipt of FluMist® Quadrivalent
- Pregnancy
- Children less than two years of age
- Individuals with immune compromising conditions
- Health care workers working with immunocompromised individuals
- Receipt of an anti-viral drug in the previous 48 hours.

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

### 27. What are some examples of immunocompromising conditions?

Examples of immunocompromising conditions<sup>17</sup> include (but are not limited to):

- Cancer
- Immunodeficiency (including human immunodeficiency virus (HIV) infection)
- Immunosuppression due to underlying disease or therapy (e.g., severe rheumatoid arthritis requiring immunosuppressive therapies)
- Bone marrow transplant recipients requiring isolation

### 28. Can you define severe asthma?

According to NACI, severe asthma is "...defined as currently on oral or high dose inhaled glucocorticosteroids or active wheezing or those with medically-attended wheezing in the seven days prior to vaccination."<sup>3</sup>

High dose systemic steroids interferes with vaccine induced immune responses (i.e. considered as persons receiving  $\geq 2$  mg/kg per day or  $\geq 20$  mg daily of prednisone for more than 14 days duration to be immune-suppressed). Topical and locally injected steroids do not have an impact on vaccines unless there is clinical or laboratory evidence of immunosuppression from such therapy.<sup>13</sup>

According to the British Columbia Medical Association, high dose inhaled corticosteroids in pediatric patients are those treated with  $\geq 200$   $\mu$ g/day fluticasone (or equivalent) because this high dosage may be associated with systemic side-effects.<sup>14</sup>

In children with asthma, if a parent/guardian of a child cannot identify a child's current dosage of oral or inhaled steroid, IIV should be offered.

### 29. Can a child receiving daily intranasal steroids for conditions other than asthma receive LAIV?

Yes. Intranasal steroids typically used for treatment of allergic rhinitis are not a contraindication because the effects are local and not systemic. These products do not cause immunosuppression so they are not a contraindication to LAIV. Topical and locally injected steroids do not have an impact on vaccines unless there is clinical or laboratory evidence of immunosuppression from such therapy.<sup>13</sup>

### 30. What about the use of LAIV in pregnant and breastfeeding women?

LAIV should not be administered to pregnant women because of the lack of safety data at this time. Although LAIV has not been studied in pregnant women, no unexpected patterns of pregnancy complications or fetal outcomes have been identified after inadvertent administration of LAIV. In the event of inadvertent administration of LAIV to a pregnant woman, complete the required patient safety/vaccine error documentation within your organization. It is not known whether LAIV is excreted in human milk; however LAIV is not contraindicated in breastfeeding women.<sup>3</sup>

AstraZeneca, the manufacturer of FluMist® Quadrivalent, does not maintain a registry for inadvertent administration of LAIV to pregnant women. However, they do have an adverse event reporting phone line (1-800-668-6000) and e-mail ([medinfo.canada@astrazeneca.com](mailto:medinfo.canada@astrazeneca.com)).

### 31. What are the potential allergens and product components of LAIV?

The product monograph (<https://www.astrazeneca.ca/content/dam/az-ca/downloads/productinformation/flumist-qlaiv-product-monograph-en.pdf>) contains a full list of the contents of FluMist® Quadrivalent.

**FluMist® Quadrivalent potential allergens:** ovalbumin, gelatin hydrolysate (porcine Type A), gentamicin, arginine hydrochloride.

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

**FluMist® Quadrivalent other components:** sucrose, dibasic potassium phosphate, monobasic potassium phosphate, monosodium glutamate.

### 32. Should faith-based clients be concerned about the gelatin content in LAIV?

LAIV (FluMist® Quadrivalent) contains porcine-type gelatin. Scholars from the Muslim and Jewish faiths have determined that receipt of gelatin in vaccines is permissible and does not constitute a violation of religious practice. Religious leaders' statements on the use of vaccines containing porcine gelatin are available from: <http://www.vaccinesafety.edu/Porcine-vaccineapproval.htm>

### 33. Are there precautions to receiving LAIV?

Individuals who have experienced ORS without lower respiratory tract symptoms may be safely re-immunized with influenza vaccine. Persons who experienced ORS with lower respiratory tract symptoms should have an expert review.

Also, vaccine recipients should be informed that FluMist® Quadrivalent is a vaccine that contains a weakened strain of influenza virus and could potentially be transmitted to another person through contact with respiratory secretions. An infection with this weakened virus could cause a serious infection in a small category of patients who are severely immunocompromised and receiving care in hospital in a protected environment (e.g. post bone marrow transplant). Close contacts of these patients should be avoided for two weeks after getting FluMist® Quadrivalent. If such contact cannot be avoided, offer IIV instead of FluMist® Quadrivalent.

### 34. Can you provide me with more information on LAIV and viral shedding?

Both children and adults can shed vaccine viruses after LAIV administration and studies have shown that younger children are more likely to shed (and shed higher titers) than older children and adults. Children may shed for a mean duration of 7.6 days and shedding is rare after day 11.<sup>3</sup>

Viral shedding is not synonymous with transmission of vaccine virus. Shedding is generally below levels needed to transmit infection, although in rare instances, shed vaccine viruses can be transmitted from vaccine recipients to unvaccinated persons. Serious illness has not been reported among unvaccinated persons inadvertently infected with vaccine virus and no transmission of vaccine virus has ever been reported in a health care setting.<sup>3</sup>

It is important to note that wild type influenza virus is a community acquired infection readily transmitted from person to person through droplet contact during influenza season, with attack rates ranging from five to 25 per cent depending on the severity of the season. The attenuated virus contained in the vaccine is a much weakened strain of influenza compared to wild influenza viruses.

### 35. Are there any special considerations for co-administration of LAIV and other live vaccines?

Based on expert opinion, intranasal LAIV can be administered with, or at any time before or after, live attenuated or inactivated vaccines. No interference is expected with the administration of LAIV and parenteral live vaccines because the mucosa associated lymphoid tissue is populated by B cells, T cells and accessory cells that are phenotypically and functionally distinct as compared to the systemic lymphoid tissue that responds to parenteral vaccines. Interference is also not expected with the administration of intranasal LAIV and live oral vaccines as mucosal immune responses also demonstrate a high level of compartmentalization between separate mucosal sites (nasal versus oral) as a result of strong restrictions on lymphoid cell recirculation.<sup>4</sup>

### 36. Are there any special considerations for a child taking antiviral medications?

LAIV should not be administered when taking antiviral agents because these drugs interfere with the immune response to FluMist® Quadrivalent. FluMist® Quadrivalent should not be administered to individuals while taking antiviral agents active against influenza (oseltamivir and zanamivir). Such

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

individuals should receive IIV. If antiviral agents are administered from 48 hours before two weeks after receipt of FluMist® Quadrivalent, revaccinate when antiviral agents have been discontinued for at least 48 hours.

### 37. What are the common side-effects of LAIV?

Most people have no reaction to the vaccine. Reactions that do occur are typically mild and last for one to three days. For children requiring two doses of vaccine, symptoms tend to be less frequent following the second dose.<sup>3</sup> As with any immunization, unexpected or unusual side-effects can occur, including anaphylaxis.

- **Common local side-effects:** adults and children - runny nose or nasal congestion.
- **Common systemic side-effects:** children - decreased appetite, weakness, headache, fever. Adults - headache, sore throat, cough, weakness.

### 38. Should I ask if the vaccine recipient is allergic to any component of LAIV before administration?

No, it is unnecessary for immunization providers to list each component of the vaccine to the recipient. Instead, when confirming eligibility for all vaccines, providers must inquire about any allergies that the recipient may have. Providers then must ensure that the recipient is not allergic to any component of the vaccine.

### 39. Can I give LAIV to an individual who has an egg allergy?

Yes, after careful review of recently published studies, NACI concludes that egg allergic individuals may be vaccinated against influenza using LAIV. The full dose may be used without prior vaccine skin test and in settings where vaccines are routinely administered.<sup>16</sup>

As with the administration of any vaccine, an individual should remain in the office and be monitored for 15 minutes after being immunized to monitor for any severe adverse reactions.

### 40. How long does it take after administration of LAIV for the individual to acquire protective immunity levels?

It takes about two weeks for the body to acquire full protection. This is why it is best that people get vaccinated **before** influenza activity starts each season.

### 41. Can LAIV be given to people who are household contacts of someone who is immunocompromised?

Yes. LAIV is contraindicated only for those who are contacts of persons who are severely immunocompromised. Severely immunocompromised is defined by NACI, “as hospitalized and requiring care in a protected environment.”

All vaccine recipients should be informed that FluMist® Quadrivalent is a live attenuated vaccine that contains a weakened strain of influenza virus and has the potential to be transmitted to another person through contact with respiratory secretions. Vaccine recipients should therefore avoid close contact with severely immunocompromised individuals for two weeks after receiving LAIV. If such contact cannot be avoided, IIV should be used.

### 42. Can I give LAIV to people who have experienced common local side-effects to IIV?

Yes. If healthy individuals as well as parents/guardians want themselves or their children to receive LAIV, and the individual/child meets the eligibility requirements, LAIV can be given in place of IIV. This would eliminate some potential side-effects such as redness, warmth and swelling at the injection site.

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

### 43. Can the side-effects listed for LAIV occur late?

The side-effects listed for this product are (1) local: runny nose or nasal congestion; and, (2) systemic: decreased appetite, weakness, headache, fever, sore throat and cough. All of these are non-specific to the vaccine and may occur as a result of other causes such as the common cold. In clinical trials, nasal congestion was identified as the solicited event occurring most commonly. Events were solicited for the first 10 days following vaccine receipt, as this was the period deemed most plausible for such vaccine-associated adverse events.

### 44. Are there suggested positioning techniques parents can use with children receiving the LAIV?

For administration of LAIV, it is best that the child is seated comfortably, or positioned on the parent's lap, if they prefer. They should not lie down nor do they need to tilt their head back. The provider should stabilize the child's chin. Any further restraint, such as of the arms for children expected to cover their nose, should be discussed with the parent and child at the clinic. Some options are that the parent or health care provider may apply slightly more pressure to stabilize the chin, or the forehead. If a child is seated on the parent's lap with their back and head against the parent's chest, this should be enough to avoid the child pulling back.

### 45. Can a health care worker who is immunocompromised administer LAIV?

Yes. LAIV (FluMist® Quadrivalent) contains attenuated (weakened) influenza virus and is to be avoided only by those with such severe immunocompromise that they are "hospitalized and requiring care in a protected environment." This year in the presence of COVID-19 the use of personal protective equipment such as gloves and masks is needed to administer FluMist® Quadrivalent. Follow additional routine practices, as when administering any immunization, in settings where FluMist® Quadrivalent is given.

Used sprayers should be discarded into a sharps container with biological waste.

### 46. Can a pregnant health care worker administer LAIV?

Yes. A pregnant woman can administer FluMist® Quadrivalent. The viruses in the nasal spray vaccine are attenuated or weakened. This means that the vaccine viruses would not cause influenza illness, even if a person inadvertently gets vaccine viruses in their nose.

This year in the presence of COVID-19 the use of personal protective equipment such as gloves and masks is needed to administer FluMist® Quadrivalent. Follow additional routine practices, as when administering any immunization, in settings where FluMist® Quadrivalent is given.

### 47. Is LAIV the preferred product for children?

As a result of the data showing relatively lower VE of FluMist® Quadrivalent, specifically with respect to children aged two to 17 years of age, ACIP recommended that for the 2016/17 and 2017/18 seasons, **FluMist® Quadrivalent NOT be used**. NACI reviewed the data from the United States as cited by ACIP as well as VE data from the United Kingdom, Finland, Canada and the manufacturer (AstraZeneca) and concluded that FluMist® Quadrivalent would continue to be a recommended vaccine option for the 2016/17 and 2017/18 seasons but would no longer be preferentially recommended for children. For the 2018/19 season, ACIP reversed its decision; FluMist® Quadrivalent was used but was no longer preferentially recommended for children in the United States. **That recommendation has not changed. FluMist® Quadrivalent provides comparable protection against influenza to that afforded by Fluzone® Quadrivalent and Flulaval® Tetra.** The observational study data reviewed highlight the challenge in interpreting LAIV and IIV, VE when point estimates by influenza subtype are derived based on small sample sizes associated with wide CIs.

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

**MHSAL recommends that *healthy* children two to 17 years of age can be immunized with LAIV and that a small number of *healthy* adults up to 59 years of age who are needle averse may also be immunized with LAIV if they would otherwise refuse vaccination if only IIV were available.**



## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

### Resources

**To learn more about LAIV (FluMist® Quadrivalent), please refer to the following websites:**

Public Health Agency of Canada (PHAC) - Canadian Immunization Guide

[www.phac-aspc.gc.ca/publicat/cig-gci/p04-eng.php](http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-eng.php)

Recommendations on the use of live attenuated influenza vaccine (FluMist® Quadrivalent):

Addendum – LAIV Use in Children and Adolescents Advisory Committee Statement (ACS) – national Advisory Committee on Immunization (NACI).

<http://www.phac-aspc.gc.ca/naci-ccni/flu-2016-grippe-addendum-children-enfants-eng.php>

Addendum – LAIV Use in Egg Allergic Individuals Advisory Committee Statement (ACS) – National Advisory Committee on Immunization (NACI).

<http://www.phac-aspc.gc.ca/naci-ccni/flu-2016-grippe-addendum-eggs-oeufs-eng.php>

Supplemental Statement on Seasonal Influenza Vaccine for 2011-2012

[www.phac-aspc.gc.ca/publicat/ccdr-rmtc/11vol37/acs-dcc-7/index-eng.php](http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/11vol37/acs-dcc-7/index-eng.php)

National Advisory Committee on Immunization (NACI) Statement on Seasonal Influenza Vaccine:

[www.phac-aspc.gc.ca/naci-ccni/index-eng.php](http://www.phac-aspc.gc.ca/naci-ccni/index-eng.php)

Astra Zeneca Canada Inc.:

Product Monograph: [www.astrazeneca.ca/en/Our-Medicines/en-Products-AZ](http://www.astrazeneca.ca/en/Our-Medicines/en-Products-AZ)

Site for Healthcare Professionals: [www.astrazeneca.ca/en/Healthcare-Professionals](http://www.astrazeneca.ca/en/Healthcare-Professionals)

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

### References

- 1 AstraZeneca Canada. Product Monograph FLUMIST® Influenza Vaccine (live, attenuated) Intranasal spray [Internet]. Mississauga (ON): MedImmune, LLC; 2013 Jun 27 [cited 2013 Aug 2]. Available from <http://www.astrazeneca.ca/en/Our-Medicines/en-Products-AZ>
- 2 AstraZeneca. RE: approval and use of FLUMIST® in Canada and other countries [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 25 [cited 2013 Aug 2]. [3 paragraphs].
- 3 National Advisory Committee on Immunization (NACI). An Advisory Committee Statement (ACS). Recommendations on the use of live, attenuated influenza vaccine (FluMist®): Supplemental Statement of Seasonal Influenza Vaccine for 2011-2012. 2011;37-ACS-5. Available from: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/11vol37/acs-dcc-7/index-eng.php>
- 4 National Advisory Committee on Immunization (NACI). An Advisory Committee Statement (ACS). Statement on Seasonal Influenza Vaccine for 2013-2014 [Internet]. Ottawa (ON): Public Health Agency of Canada; 2013 [cited 2013 Aug 2] Available from: <http://www.phac-aspc.gc.ca/naci-cni/#rec>
- 5 World Health Organization (WHO). Recommended composition of influenza virus vaccines for use in the 2016-17 northern hemisphere influenza season [Internet] WHO, 2016 Feb 25. Available from: [http://www.who.int/influenza/vaccines/virus/recommendations/2016\\_17\\_north/en/](http://www.who.int/influenza/vaccines/virus/recommendations/2016_17_north/en/)
- 6 AstraZeneca. FLUMIST® (Influenza Vaccine [Live, attenuated]) – Use in Children <2 Yrs Old [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 30 [cited 2013 Aug 2]. [5 paragraphs].
- 7 AstraZeneca. Re: FLUMIST® (influenza vaccine [live attenuated]) – Re-administration of FLUMIST® subsequent to sneezing [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 30 [cited 2013 Aug 2]. [2 paragraphs].
- 8 Centers for Disease Control and Prevention. [General Recommendations on Immunization. Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2011 Jan 28] MMWR2011;59(No. RR-2):[9]. Available from: <http://www.cdc.gov/mmwr/pdf/rr/rr6002.pdf>
- 9 Centers for Disease Control and Prevention. [Prevention and Control of Influenza with Vaccines Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2010] MMWR2010;59(No. RR-8):[38]. Available from: <http://www.cdc.gov/mmwr/pdf/rr/rr5908.pdf>
- 10 AstraZeneca. FLUMIST® (Influenza Vaccine [Live, attenuated]) – Single nostril Administration/Inadvertent Single Nostril Administration [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 30 [cited 2013 Aug 2]. [3 paragraphs].
- 11 AstraZeneca. FLUMIST® (Influenza Vaccine [Live, attenuated]) – Inadvertent Oral Administration & Inadvertent Eye Exposure [Internet] Message to: British Columbia Centre for Disease Control. 2013 July 30 [cited 2013 Aug 2]. [3 paragraphs].
- 12 Centers for Disease Control (CDC) and Prevention. (2013). The nasal-spray flu vaccine (live attenuated influenza vaccine [LAIV]) questions and answers. What personal protective equipment is recommended for health-care workers who are giving LAIV (FluMist®) [Internet]. Atlanta (GA): CDC; 2012 Aug 31 [cited 2013 Aug 2]. Available from: <http://www.cdc.gov/flu/about/qa/nasalspray.htm>

## Live Attenuated Influenza Vaccine (LAIV): Questions & Answers

13 British Columbia Centre for Disease Control (BCCDC). Communicable Disease Control (CDC) Manual Chapter II Immunization Program. Section III Immunization of Special Populations [Internet] Vancouver (BC): BCCDC; 2013 Feb [cited 2013 Aug 2]. Available from: <http://www.bccdc.ca/discod/comm-manual/CDManualChap2.htm>

14 British Columbia Medical Association. Guidelines & Protocols Advisory Committee Asthma - Diagnosis and Management [Internet] Victoria (BC): Ministry of Health Services; 2010 Jun 30 [cited 2013 Aug 2]. Available from: <http://www.bcguidelines.ca/pdf/asthma.pdf>

15 Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. Atkinson W, Hamborsky J, Wolfe CS, eds. 12th ed. 2nd printing. Washington (DC): Public Health Foundation, c2012. 26 p. Available from: <http://www.cdc.gov/vaccines/pubs/pinkbook/genrec.html>

16 Canadian Immunization Guide Chapter on Influenza and Statement on Seasonal Influenza Vaccine for 2016-2017  
<http://www.phac-aspc.gc.ca/naci-ccni/flu-2016-grippe-eng.php>

17. National Advisory Committee on Immunization (NACI) Recommendations on the use of Live Attenuated Influenza Vaccine (LAIV) in HIV Infected Individuals.  
[naci-laiv-hiv-statement-eng.pdf \(canada.ca\)](http://www.naci-ccni.ca/naci-laiv-hiv-statement-eng.pdf)