

 GC FLU *Quadrivalent*
Pre-filled Syringe in.

HEALTHY



LIFE

AHEAD

 GC Biopharma

GCFLU Quadrivalent

GCFLU Quadrivalent is an egg-based seasonal influenza vaccine developed and manufactured by GC Biopharma, which is a WHO PQ vaccine.¹

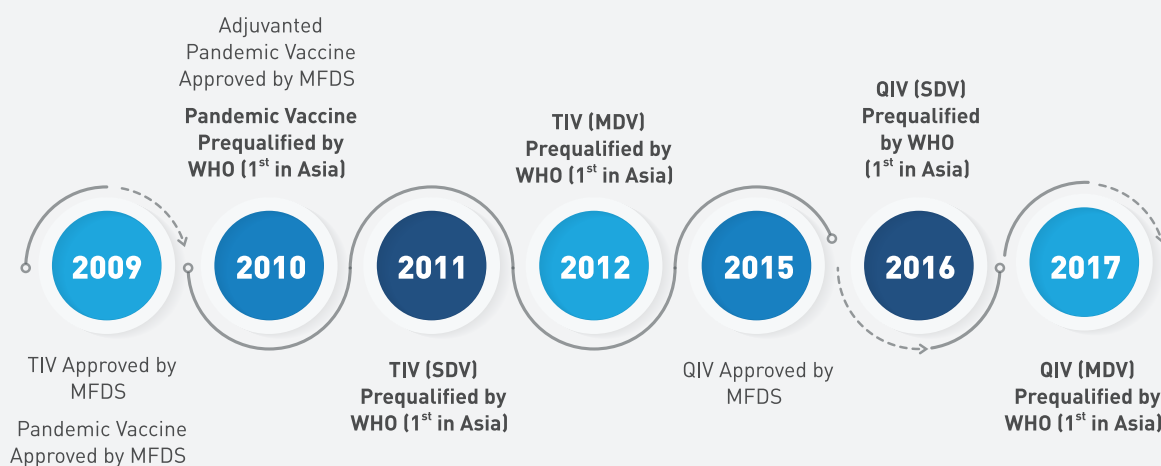
Product Profile



Type	Description
Vaccine Type	Inactivated Quadrivalent Seasonal Influenza Vaccine
Vaccine Strain	WHO Recommended Strains
Virus Culture	Fertilized Egg
Administration	0.5mL Intramuscular Injection
Age Indication	Persons Aged 6 Months and Older
Container	Pre-filled Syringe
Preservative	Thimerosal Free
Manufacturer	GC Biopharma

History

GCFLU TIV and GCFLU QIV have obtained the **WHO prequalification**.²



WHO Prequalified Seasonal Influenza Vaccines²

Prequalified	Type	Commercial Name	Pharmaceutical Form	Presentation	No. of Doses	Manufacturer
12/04/2011	Influenza, seasonal (Trivalent)	GCFLU inj.	Liquid: ready to use	Vial	1	GC Biopharma
07/11/2012	Influenza, seasonal (Trivalent)	GCFLU Multi inj.	Liquid: ready to use	Vial	10	GC Biopharma
21/12/2016	Influenza, seasonal (Quadrivalent)	GCFLU Quadrivalent inj.	Liquid: ready to use	Vial	1	GC Biopharma
03/04/2017	Influenza, seasonal (Quadrivalent)	GCFLU Quadrivalent Multi inj.	Liquid: ready to use	Vial	10	GC Biopharma

- WHO prequalification ensures vaccines used in immunization programmes are safe and effective.³
- It provides Member States and procurement agencies, such as UNICEF.³
- Once a vaccine is prequalified and introduced to the market, WHO ensures it continues to meet standards.³

MDV, multi-dose vial; PQ, pre-qualification; SDV, single-dose vial; TIV, trivalent influenza vaccine; QIV, quadrivalent influenza vaccine; WHO, World Health Organization; MFDS, Ministry of Food and Drug Safety.

Seasonal Influenza

Influenza and its complications have a large social impact including increased demands on the healthcare system and patient disability and mortality.⁴

[WHO's annual estimates about seasonal influenza⁵]



3-5 million cases
of severe illness

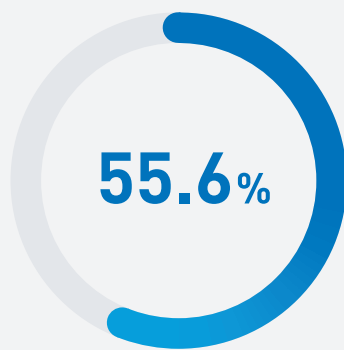


290,000-650,000
respiratory deaths

Influenza Vaccine

The most effective way to prevent the disease is **vaccination**.⁵

Although hospitalization and death were most common from influenza A/H3N2, **the number of hospitalizations and deaths from influenza B was higher than that of seasonal influenza A/H1N1** before the 2009 pandemic.⁶

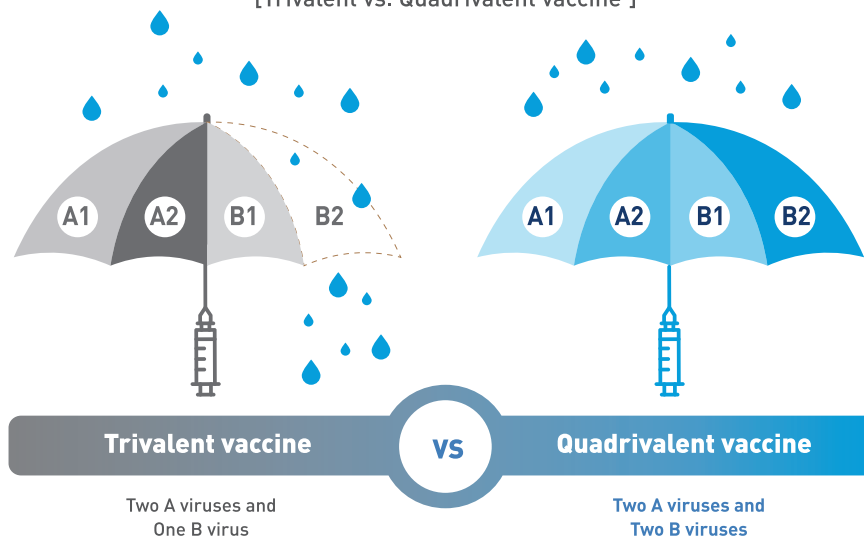


55.6% of circulating B viruses were mismatched

during influenza seasons from 2007 to 2014⁷

Quadrivalent influenza vaccines that reduce the likelihood of vaccine mismatch among influenza type B strains are likely to provide improved protection against influenza type B infection.⁷

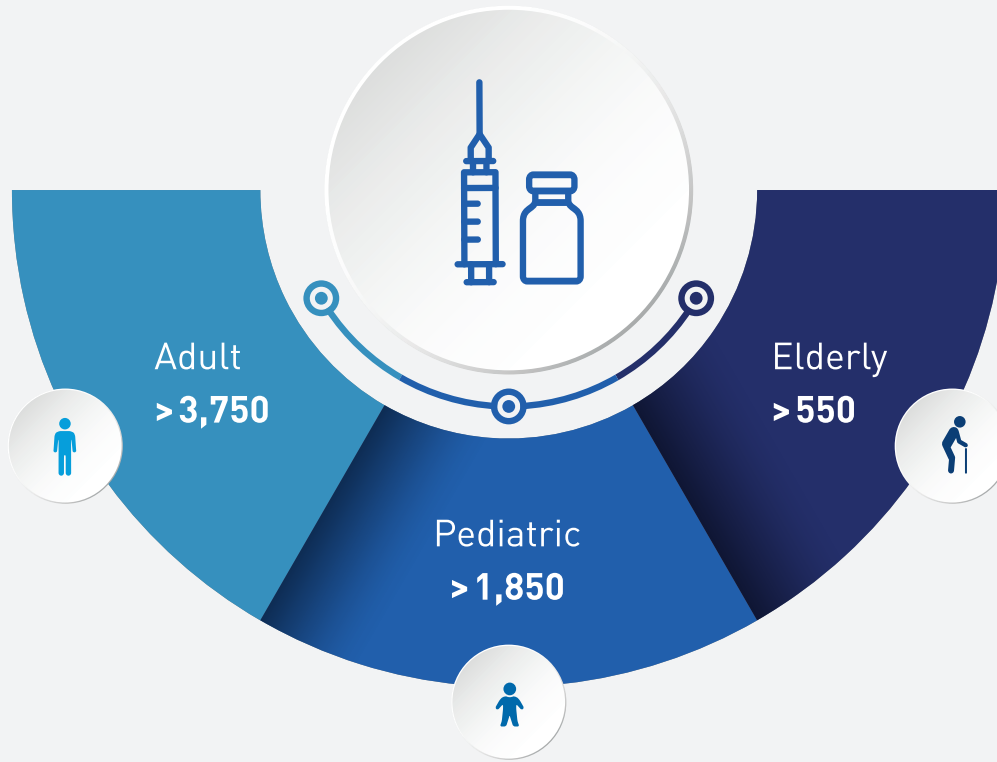
[Trivalent vs. Quadrivalent vaccine⁵]



Quadrivalent vaccines include a 2nd influenza B virus in addition to the viruses in trivalent vaccines, and are expected to provide wider protection against influenza B virus infections.⁵

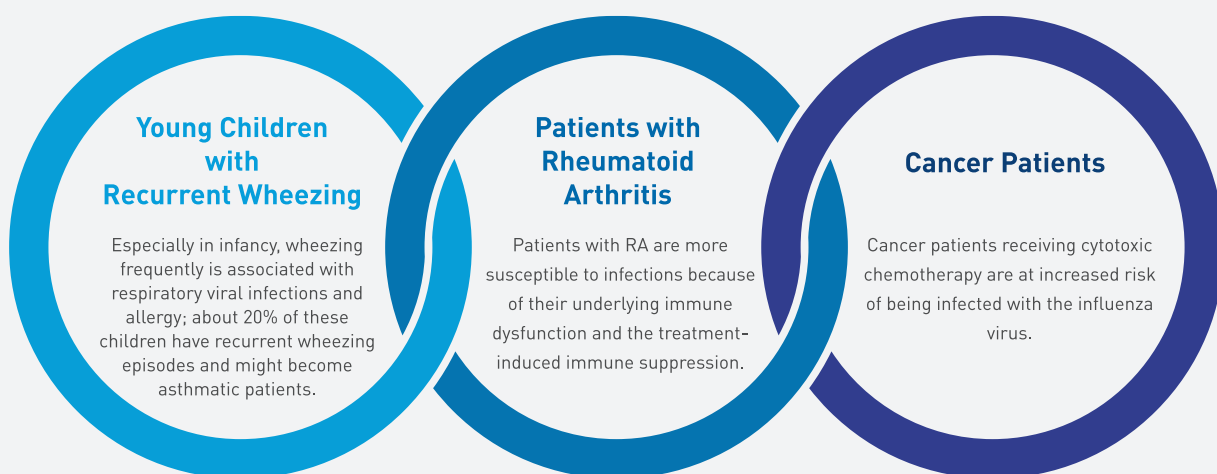
Clinical Studies of GCFLU TIV

Clinical studies have been conducted to examine the immunogenicity and safety of GCFLU TIV, **GCFLU TIV showed excellent immunogenicity and good tolerability in clinical studies involving ~6200 subjects.**⁸



Why is Vaccination Needed for Special Populations?

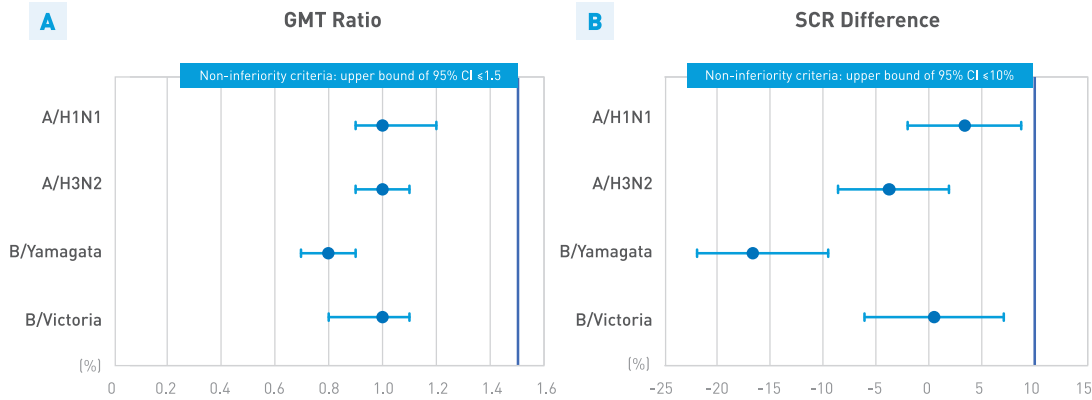
GCFLU has clinical data in various special groups of patients.⁹⁻¹³



GCFLU QIV: Immunogenicity in Adults

GCFLU QIV, compared to the control GCFLU TIV, met the non-inferiority criteria* for all four influenza subtype/lineage strains with respect to GMT ratio and SCR difference in subjects aged ≥ 19 years.⁶

[Post-vaccination non-inferiority analysis of (A) GMT ratio and (B) SCR difference⁶]

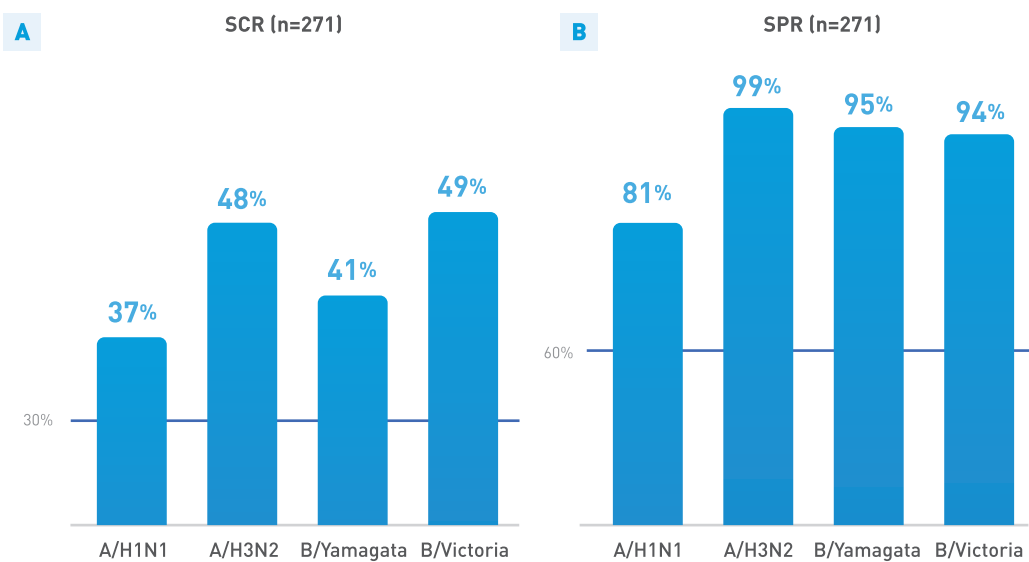


*For non-inferiority, the following criteria should be met: (1) the upper bound of the two-sided 95% CI of the GMTRs (TIV/QIV) for all four vaccine strains should not exceed 1.5, and (2) the upper bound of the two-sided 95% CI for the SCR difference (TIV minus QIV) for all four vaccine strains should not exceed 10%.

GCFLU QIV: Immunogenicity in Adults aged ≥ 65 years

GCFLU QIV induced immunogenicity that met the MFDS standards* in healthy subjects aged ≥ 65 .¹⁴

[SCR (A) and SPR (B) in adults aged ≥ 65 ¹⁴]

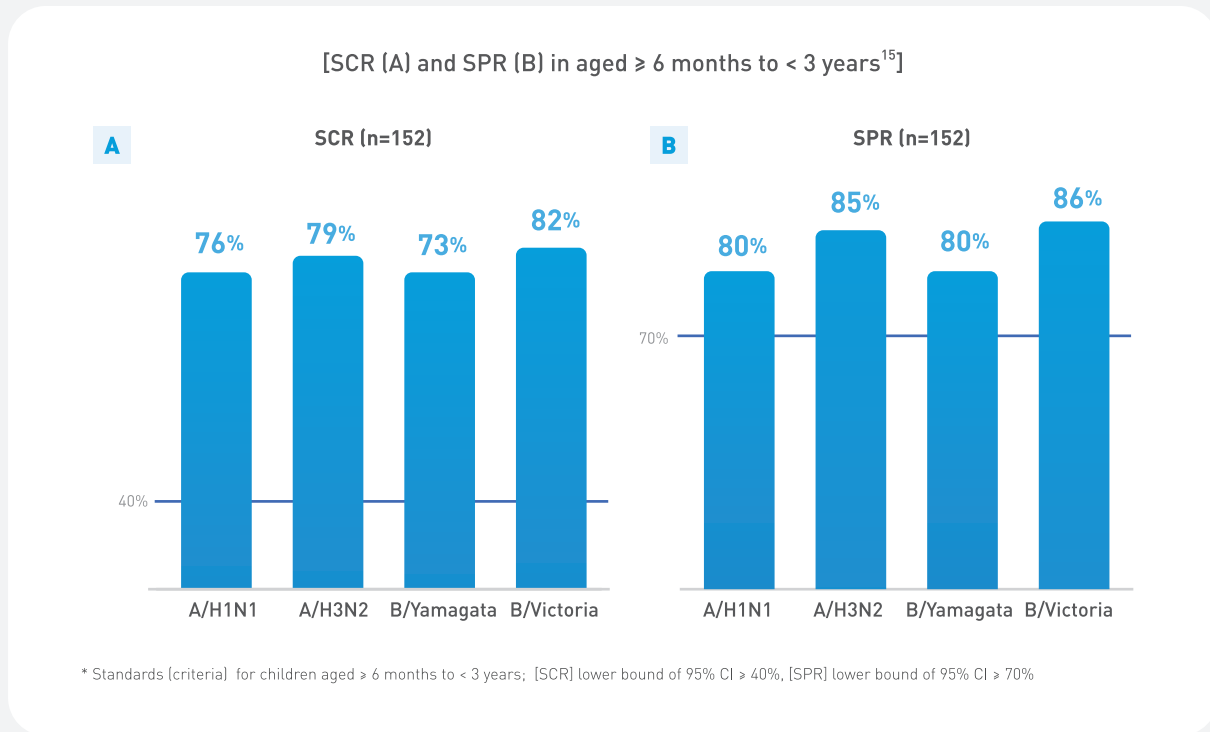


*Standards (criteria) for adults aged ≥ 65 years; [SCR] lower bound of 95% CI $\geq 30\%$, [SPR] lower bound of 95% CI $\geq 60\%$
CI, confidence interval; SCR, seroconversion rate; SPR, seroprotection rate; QIV, quadrivalent influenza vaccine



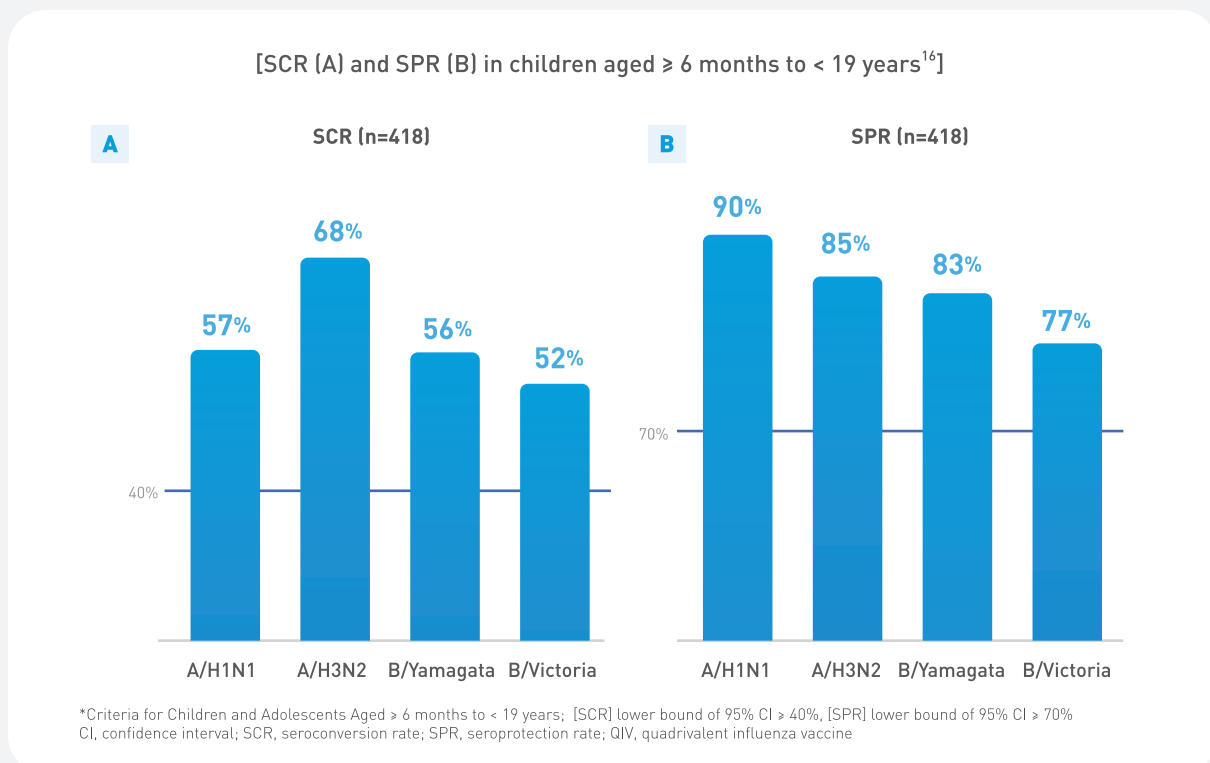
GCFLU QIV: Immunogenicity in Children aged ≥ 6 months to < 3 years

GCFLU QIV induced immunogenicity that met the MFDS standards* in children aged ≥ 6 months to < 3 years.¹⁵



GCFLU QIV: Immunogenicity in Children and Adolescents

GCFLU QIV offered immunogenicity that met the criteria* and broader protection to children and adolescents aged ≥ 6 months to < 19 years than the GCFLU TIV.¹⁶



Prescription Drug

GCFLU *Quadrivalent* Pre-filled Syringe inj.

Split Virion, Influenza Vaccine

[Description]

GCFLU Quadrivalent Pre-filled Syringe inj. is a vaccine containing colorless or slightly whitish liquid made by splitting and inactivating influenza virus cultured by inoculating the allantoic cavity of embryonated egg in order to maintain antigenicity.

[Composition]

1 Pre-filled Syringe 0.5mL contains,

Active Ingredient: Purified inactivated influenza virus antigen (In-house) 60 µg
A/Victoria/2570/2019 (VR-215)(H1N1) 15 µg
A/Darwin/9/2021 (SAN-01)(H3N2) 15 µg
B/Austria/1359417/2021 (VR-26) 15 µg
B/Phuket/3073/2013 15 µg

Buffer: Sodium chloride (EP) 4 mg
Potassium chloride (EP) 0.1 mg
Disodium hydrogen phosphate dihydrate (EP) 0.6 mg
Potassium dihydrogen phosphate (EP) 0.1 mg

Diluent: Water for Injection (EP) q.s.
Needle (Sterilized disposable needle (25G x 5/8 (0.5 x 16 mm)) 1 ea

This vaccine complies with the WHO recommendations (Northern Hemisphere) for 2022-2023 season.

[Indications]

Prophylaxis against influenza caused by influenza A subtype viruses and type B viruses in persons aged 6 months and older.

[Dosage & Administration]

An intramuscular injection of the following dose and immunization of one dose is necessary in every year at same volume. Aged 6 months and older: A single dose of 0.5 mL.

The children younger than 9 years of age who have not been vaccinated should be vaccinated two doses at an interval of at least 4 weeks. The preferred sites for intramuscular injection are the anterolateral aspect of the thigh (or the deltoid muscle of the upper arm if muscle mass is adequate) in children 6 through 35 months of age, or the deltoid muscle of the upper arm in children from 36 months of age and adults. The safety and efficacy of the vaccine was not established in children younger than 6 months.

[Precautions for use]

1. Contraindications

Examine subjects by history taking and visual inspection and if necessary, by auscultation and percussion. Vaccination is prohibited when subject is diagnosed as one of the following cases. However, if there is a possibility of influenza infection and it is determined that there is no concern for significant disorder due to vaccination, subject may be vaccinated.

- 1) Febrile patient or person with malnutrition.
- 2) Patients with cardiovascular disorders, kidney disorders, or liver disease in which the disease is in acute phase, stadium increment, or in active phase.
- 3) Patients with acute respiratory disease or other active infectious disease.
- 4) Patients in latent and convalescence period.
- 5) Person who showed anaphylaxis by the components of the product.
- 6) Person with hypersensitivity to egg, chicken, any other chicken component, and the product component.
- 7) Person who had fever within 2 days or a symptom of allergy such as generalized rash after the injection at previous vaccination.
- 8) Person who showed the symptom of convulsion within 1 year before vaccination.
- 9) Person who showed Guillain-Barre syndrome within 6 weeks from the previous influenza vaccination or person with neurological disorders.
- 10) Person diagnosed with immunodeficiency disease.
- 11) Person in inappropriate condition to be vaccinated.

2. Adverse Reactions

- 1) There is possibility of local reactions such as redness, swelling and pain, or systemic reactions such as fever, chills, headache, fatigue and vomiting. But they usually disappear within 2-3 days.
- 2) In rare cases, acute disseminated encephalomyelitis (ADEM) may occur.
- 3) Fever, headache, convulsions, dyskinesia and consciousness disorder usually occur within 2 weeks following the administration of the vaccine. When these symptoms are suspected, appropriate medical treatment should be available by diagnosis with MRI and so on.
- 4) Allergic reaction or anaphylactic shock may occur in very rare cases.
- 5) Transient disorders of systemic and local nervous system may rarely occur. Palsy, neuralgia, cerebral hemorrhage or inflammation of the nervous system (ex: Guillain-Barre syndrome) have been reported.
- 6) Safety of the vaccine was evaluated for the 4 clinical studies performed with healthy children, adults, and elderly. In children aged 6 through 35 months who received the vaccine, 115 subjects (67.6%) out of 170 subjects showed adverse events. Adverse drug reactions were 82 subjects (48.2%) and no serious adverse drug reactions were reported. In children aged 3 through 18 years who received the vaccine, 218 subjects (68.3%) out of 319 subjects showed adverse events. Adverse drug reactions were 204 subjects (63.9%) and no serious adverse drug reactions were reported. In adults aged 19 through 64 years who received the vaccine, 415 subjects (71.2%) out of 583 subjects showed adverse events. Adverse drug reactions were 399 subjects (68.4%) and no serious adverse drug reactions were reported.
- 7) In elderly over 65 years of age who received the vaccine, 148 subjects (43.8%) out of 338 subjects showed adverse events. Adverse drug reactions were 140 subjects (41.4%) and no serious adverse drug reactions were reported.

(1) Solicited adverse drug reactions within 7 days of vaccination are listed in the table below.

	Children aged 6 through 35 months (n=170)	Children aged 3 through 18 years (n=319)	Adults aged 19 through 64 years (n=583)	Elderly over 65 years of age (n=338)	
Local	Pain	27.6%	52.7%	48.9%	21.0%
	Tenderness	27.6%	54.5%	56.8%	27.5%
	Erythema/Redness	11.8%	6.6%	7.9%	3.8%
	Induration/Swelling	5.9%	8.2%	5.8%	3.6%
	Drowsiness ¹⁾	15.3%	-	-	-
Systemic	Fever	6.5%	3.1%	0.9%	0.3%
	Sweating	2.4%	2.2%	4.3%	2.7%
	Chills	2.4%	5.0%	7.7%	4.4%
	Nausea/Vomiting	2.4%	0.6%	2.2%	0.9%
	Diarrhea	5.9%	0.3%	1.5%	1.2%
	Fatigue	-	15.4%	25.6%	10.7%
	Malaise	-	11.0%	7.5%	8.3%
	Headache	0.6%	6.9%	13.4%	7.1%
	Muscle aches	7.6%	8.2%	26.4%	6.5%
	Arthralgia	-	1.6%	5.8%	3.6%

- 1) Drowsiness only applies for children aged 6 months through 35 months
- 2) Unsolicited adverse drug reactions occurring within 28 days or 21 days of vaccination were reported in 4 subjects (2.4%) from children aged 6 through 35 months (Infections and infestations: 3 subjects, Skin and subcutaneous tissue disorders: 1 subject), 3 subjects (0.9%) from children aged 3 through 18 years (General disorders and administration site conditions: 2 subjects, Infections and infestations: 1 subject), 13 subjects (2.2%) from adults (Infections and infestations: 5 subjects, investigations: 2 subjects, Respiratory thoracic and mediastinal disorders: 2 subjects, Musculoskeletal and connective tissue disorders: 1 subject, Nervous system disorders: 1 subject, Skin and subcutaneous tissue disorders: 1 subject, General disorders and administration site conditions: 2 subjects), and 4 subjects (1.2%) from elderly (Infections and infestations: 1 subject, General disorders and administration site conditions: 1 subject, investigations: 1 subject, Nervous system disorders: 1 subject)
- 3) Serious adverse events occurring within 6 months of vaccination were reported in 13 subjects (7.6%) from children aged 6 through 35 months (Pneumonia: 4 cases, Influenza: 3 cases, Bronchitis: 2 cases, Pneumonia respiratory syncytial virus: 1 case, Bronchitis: 1 case, Croup infectious: 1 case, Gastroenteritis norovirus: 1 case, Gastroenteritis rotavirus: 1 case, Urinary tract infection: 1 case, Gastrointestinal infection: 1 case, Impaired healing: 1 case, Foreign body in gastrointestinal tract: 1 case, Febrile convulsion: 1 case), 5 subjects (1.6%) from children aged 3 through 18 years (Pharyngitis: 1 case, Headache: 1 case, Mesenteric lymphadenitis: 1 case, Acute gastroenteritis: 1 case, Peritonsillar Abscess: 1 case, Acute appendicitis: 1 case), 5 subjects (0.9%) from adults (Otitis: 1 case, Pulmonary Tuberculosis: 1 case, Breast mass: 1 case, Ileus: 1 case, Gastric cancer: 1 case), and 4 subjects (1.2%) from elderly (Pain: 1 case, Arthralgia: 1 case, Herpes zoster: 1 case, Gastric cancer: 1 case), but they were evaluated as 'not related' to the product.
- 6) Results of post-marketing surveillance in South Korea
(1) The results of post-marketing surveillance conducted domestically for 4 years on 2,060 adult subjects aged 19 years and older in order to go through a re-examination showed that the incidence of adverse events was 10.49% (216 out of 2,060 subjects, 578 cases in total), regardless of causal relationship. Among these, no serious adverse events and serious adverse drug reactions have been reported. In addition, unexpected adverse events and unexpected adverse drug reactions are listed in the following table according to their frequency of onset.

	Unexpected Adverse Events Regardless of Causal Relationship 2.33% (48 out of 2,060 subjects, 72 cases)	Unexpected Adverse Drug Reactions of Which Causal Relationship Cannot Be Ruled Out 0.29% (6 out of 2,060 subjects, 7 cases)	
Rarely (≥ 0.01% and < 0.1%)	Respiratory, thoracic, and mediastinal disorders	Asthma	Cough
	Gastrointestinal disorders	Dyspepsia, benign gastrointestinal neoplasm, gastrointestinal disorder NOS, hemorrhoids	-
	General disorders and administration site condition	Injection site inflammation	Injection site inflammation
	Nervous system disorders	Apathy, insomnia, dizziness, cerebral ischemia	Apathy, dizziness
	Eye disorders	Blepharitis, conjunctivitis	-
	General disorders and administration site condition	Back pain	-
	Vascular disorders	Hypertension	-
	Cardiac disorders	Palitation	Palitation
Uncommonly (≥ 0.1% and < 1%)	Metabolism and nutrition disorders	Hypofecidemia	-
	Infections and infestations	Fungal dermatitis, moniliasis	-
	Respiratory, thoracic, and mediastinal disorders	Rhinitis, sinusitis, cough, upper respiratory tract infection	-
	Gastrointestinal disorders	Gastritis, gastroesophageal reflux, abdominal pain, irritable bowel syndrome	-
	Skin and subcutaneous tissue disorders	Dermatitis, pustular rash, contact dermatitis, urticaria	-
	General disorders and administration site condition	Cellulitis, injection site pruritus	Injection site pruritus

(2) The results of post-marketing surveillance conducted domestically for 4 years on 2,033 pediatric subjects aged ≥ postnatal 6 months and < 19 years showed that the incidence of adverse events was 30.74% (625 out of 2,033 subjects, 1,221 cases in total), regardless of causal relationship. Among these, serious adverse events and serious adverse drug reactions are listed in the following table according to their frequency of onset.

	White cell and reticuloendothelial system disorders	Serious Adverse Events 0.10% (2 out of 2,033 subjects; 2 cases)	Serious Adverse Drug Reactions of Which Causal Relationship Cannot Be Ruled Out 0.49% (10 out of 2,033 subjects; 0 cases)
Rarely (≥ 0.01% and < 0.1%)	Kawasaki disease*	-	-
	Respiratory system disorders	Bronchitis	-

* Unexpected serious adverse event

In addition, unexpected adverse events and unexpected adverse drug reactions are listed in the following table according to their frequency of onset.

	Unexpected Adverse Events Regardless of Causal Relationship 7.82% (159 out of 2,033 subjects; 178 cases)	Unexpected Adverse Drug Reactions of Which Causal Relationship Cannot Be Ruled Out 0.49% (10 out of 2,033 subjects, 10 cases)	
Rarely (≥ 0.01% and < 0.1%)	Application site disorders	Cellulitis, injection site bruising	Injection site bruising
	Body as a whole-general disorders	Leg pain, Influenza-like symptoms, Hypothermia, Temperature changed sensation	Leg pain, Hypothermia, Temperature changed sensation
	Gastrointestinal system disorders	Constipation, Gastroesophageal reflux	-
	Skin and appendages disorders	Acne, Dermatitis contact, Dermatitis topical, Skin disorder	Rash pustular
	Resistance mechanism disorders	Moniliasis	Otitis media
	White cell and reticuloendothelial system disorders	Kawasaki disease, Lymphadenopathy	-
	Secondary terms - events	Vaccella	-
	Respiratory system disorders	Sinusitis, Cough, Asthma	-
Uncommonly (≥ 0.1% and < 1%)	Application site disorders	Injection site pruritus	Injection site pruritus
	Gastrointestinal system disorders	Abdominal pain, Stomatitis	-
	Skin and appendages disorders	Dermatitis, Rash pustular, Urticaria, Pruritus	Urticaria
	Resistance mechanism disorders	Otitis media	-
Commonly (1% and < 10%)	Vision disorders	Conjunctivitis	-
	Respiratory system disorders	Rhinitis	-

(3) Adverse events from domestic post-marketing surveillance and spontaneously reported data on side effects were comprehensively assessed at the end of post-marketing surveillance along with the adverse events data (1989 to December 31, 2020) reported for all drugs that have been reported for domestic marketing. Among the adverse events that were reported more frequently with statistical significance for this drug than the adverse events reported for all other drugs, following adverse events were newly identified. However, these results do not mean that the causal relationship between the relevant ingredient and the following adverse events has been demonstrated.

- Systemic and injection site adverse events: Injection site inflammation, injection site warmth, injection site pruritus, injection site bruising
- Infection: Rhinitis (rhinorrhea)

3. General Cautions

- 1) Advise the subjects or their guardians that the subjects take a rest on the day and the next day of vaccination keeping the injection site clean. Symptoms of high fever, convulsion appear after vaccination, they should consult a physician quickly.
- 2) Antibody response in patients with endogenous or iatrogenic immunosuppression may be insufficient.
- 3) Influenza vaccine should be administered before prevalent. Vaccination can be delayed according to epidemiological situation.
- 4) Influenza vaccine should be administered with current-year recommended strains.

4. Drug Interactions

- 1) There is no data or study on co-administration of this product with other vaccines.
- 2) The immunological response may be diminished if the patient is undergoing immunosuppressant treatment.
- 3) Following influenza vaccination, false positive results in serologic tests using the ELISA method to detect antibodies against HIV-1, Hepatitis C, and especially HTLV-1 have been observed (The Western Blot technique disproves the false-positive ELISA test results). These transient false-positive results could be due to the IgM response by the vaccine.

5. Use in Pregnancy and Nursing Mothers

- 1) Pregnancy
- Inactivated Influenza vaccine (egg-derived) is known that it can be used in all pregnancy cycles regardless of the pregnancy stage. There are more safety data for second trimester and third trimester compared with the first trimester. In addition, according to data on the usage of inactivated influenza vaccine collected globally, no adverse effects of the vaccine on the fetus and maternity were reported.
- In addition, no direct or indirect adverse effects related to reproductive toxicity and developmental toxicity were observed in animal studies conducted using this vaccine. However, clinical trials have not evaluated the safety of the pregnant women when administered this vaccine.
- 2) Nursing Mothers
- Inactivated Influenza vaccine (egg-derived) is known that it can be used to lactating women. Restricted data indicate that the vaccine is not known whether the product is excreted in human milk. However, there is no adequate study of vaccination in animals during lactation, and clinical trials have not evaluated the safety of nursing mothers when administered this vaccine.

6. Precautions in Administration

- 1) Before use check this product visually for particles or discoloration. If either is present, do not use.
- 2) The injection site is usually lateral upper arm and disinfected with ethanol or tincture of iodine. Repeated injections at the same site should be avoided.
- 3) Intravenous administration is prohibited.
- 4) The tip of needle should not penetrate blood vessel.
- 5) Do not mix with other vaccines in same syringe.
- 6) Pre-filled syringes are disposable and should not be reused.

7. Precautions for Handling

- 1) Store at 2-8°C without freezing.
- 2) The vaccine should be shaken well and mixed homogeneously before use.

[Storage and Shelf Life]
Store at 2-8°C without freezing in hermetic container and protect from light.
The shelf life is 12 months from the date of manufacture.

[How Supplied]
0.5 mL/Pre-filled Syringe x In-house packing unit



WHO PQ vaccine

- World 2nd prequalified QIV
- World 4th prequalified TIV
- 1st WHO prequalified flu vaccine in Asia



270 million doses distributed worldwide

- More than 10 years' track record (since 2009)



Exporting to over 45 countries



The largest flu vaccine supplier to PAHO & Unicef

- Market share #1



#1 flu vaccine in Korea

- 1st developed flu vaccine in Korea
- Market share #1



Clinical data with ~13,000 subjects

- TIV: ~6,200 subjects/ QIV: ~6,500 subjects
- Special patients data (TIV with recurrent wheezing, rheumatoid arthritis and cancer/ QIV with rheumatoid arthritis and cancer)



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