

Vaccine manufacture and composition is complex and tightly regulated to maximise potency and safety. The safety of the individual components, and of the vaccine itself, in the amounts administered, must be demonstrated before a vaccine can be approved for use in New Zealand.

All vaccines contain an active component (the antigen) which generates the protective immune response. Vaccines may also contain additional components. A description of these, their function and safety are summarised in this fact sheet.

## Types of vaccines and vaccine antigens

There are many approaches to vaccine development, but vaccines can be broadly classified by how the antigen(s), the active component(s) that generate a specific immune response against the disease-causing organism, are prepared. Vaccines may be viral (live or inactivated), viral vector, subunit (protein or polysaccharide) or nucleic acid (DNA or RNA). Combination vaccines may include inactivated, protein-based and/or protein-conjugated polysaccharide vaccine components. Other ingredients in vaccines vary depending on the manufacturing process and the nature of the antigen(s).

### Live attenuated vaccines

The virus or bacteria is functional/alive but has been weakened so it can replicate in the body several times and generate an immune response without causing the disease, e.g., chickenpox, measles, mumps and rubella, rotavirus, and shingles vaccine viruses. The BCG vaccine contains live weakened tuberculosis bacteria.

### Inactivated or dead vaccines

These vaccines do not contain live viruses or bacteria. Viruses in these vaccines are inactivated or split, e.g., polio or influenza vaccines in New Zealand, and bacteria killed. New Zealand does not have a killed bacteria vaccine on the Immunisation Schedule, but a travel-related vaccine is available for purchase. They cannot cause the disease but the inclusion of adjuvants (immune enhancers) in the vaccine help generate an immune response.

### Subunit vaccines

These vaccines present proteins or sugars derived from the disease-causing organism.

### Protein vaccines

Protein vaccines may include fragments extracted from a virus or bacteria such as inactivated bacterial toxoid proteins, e.g., tetanus and diphtheria vaccines, or be engineered without the disease-causing organism, e.g., virus-like particles in hepatitis B and human papillomavirus (HPV) vaccines.

Protein vaccines may also include bacterial sugar/carbohydrate (polysaccharide) molecules that are joined (conjugated) to proteins, e.g., *Haemophilus influenzae* type b (Hib), meningococcal and pneumococcal conjugate vaccines. The immune system of infants and young children is not able to generate a useful immune response to the sugar molecules on these bacteria, which is one reason why their risk of disease and complications is so high. Joining (conjugating) each sugar molecule to a protein helps their immune system can generate a protective immune response. These vaccines also generate an excellent immune response in adults.

Protein vaccines cannot cause the disease and the inclusion of adjuvants in some vaccines help generate an immune response.

### Pure polysaccharide vaccines

Some vaccines only include sugar/carbohydrate (polysaccharide) molecules found on the outside of some bacteria, e.g., some vaccines to protect against pneumococcal or typhoid disease. This type of vaccine can generate a protective immune response in older children and adults and cannot cause the disease.

## Pandemic responsive vaccines

Emerging infectious diseases and pandemic threats, such as zika, influenza and SARS-CoV-2 highlight the need for vaccine platforms that allow rapid development and manufacture of vaccines customised to protect against the diseases as they emerge.

Vaccines using different nucleic-acid and viral vector-based platforms have been in developmental, pre-clinical and clinical evaluation phases for more than 20 years. Use of these vaccine platforms to address the COVID-19 pandemic enabled the development, production, and global rollout of vaccines to protect against COVID-19 disease less than 12 months after the outbreak began.

### Nucleic acid-based and viral vector vaccines

These vaccine platforms get the vaccine recipient's own cells to make proteins that teach their immune system how to recognise and fight the disease.

The nucleic acid-based vaccines use DNA or RNA to deliver the instructions. DNA is fired directly in the host cells using a brief electrical pulse, and RNA is encapsulated into lipid nanoparticle and injected.

The viral vector vaccines use a common virus, such as an adenovirus, to deliver the instructions

## Vaccine additives

If required, vaccines may contain the following:

### Adjuvant

An adjuvant encourages a stronger immune response to the vaccine antigen.

### Excipients

A substance other than the active ingredient included in the manufacturing process or contained in a finished pharmaceutical product. They include:

- Buffers and ionic compounds
- Preservatives
- Residuals
- Stabilisers
- Surfactants/emulsifiers
- Diluents
- Solvents

## Adjuvants

### Aluminium salts

Aluminium salts have been used as adjuvants for over 80 years. Most commonly these are aluminium hydroxide, aluminium phosphate and potassium aluminium sulphate (alum).

Aluminium adjuvants work by helping to retain the antigen at the injection site long enough for an immune response to be generated and by inducing immune system cells and a range of inflammatory factors to the local injection site to enhance the immune response. Generally, the use of aluminium adjuvants in vaccines means that less antigen is required, or, with some vaccines, fewer doses are needed. Most current inactivated and protein-based, and some protein-conjugated polysaccharide, vaccines use aluminium salts in some form.

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## Aluminium salts continued

We are born with some aluminium already stored in our body and continue to add to our aluminium stores through eating, drinking, and some medicines. Vaccines contribute very little to this and are given infrequently.

Even though we regularly consume food and drinks containing aluminium throughout our lifetime, only a small amount of aluminium travels into the blood stream from digestion, the rest comes out in faeces.

Most of the aluminium that enters our blood stream is quickly processed and removed by the kidneys in urine. The small amount that stays in our body is mainly stored in our bones, with some stored in our lungs and brain.

Use of aluminium salts in vaccines has a long and impressive safety record. Some studies have found aluminium containing vaccines to be associated with local reactions and, less often, with the development of subcutaneous nodules at the injection site. This is particularly so if the injection is given too superficially. Other studies have reported fewer reactions with aluminium containing vaccines than those without. This depends on the overall vaccine formulation.

A review of all the available studies of aluminium-containing diphtheria, tetanus and pertussis vaccines (either alone or in combination) did not find any evidence that aluminium salts in vaccines cause serious or long-term adverse events.

## Emulsion adjuvants

### AS01B and AS01E

No vaccines currently used in New Zealand contain the oil-in-water/QS-21 AS01B or AS01E adjuvants. They are made with modified molecules from the *Salmonella minnesota* bacterium and purified saponin found in the bark of the *Quillaja saponaria* tree. In 2017, the overseas vaccine against shingles (herpes zoster) containing AS01B was approved for use. A vaccine against malaria that contains AS01E has been used since 2019 in Ghana, Kenya and Malawi, and an AS01E containing vaccine against tuberculosis is undergoing clinical trials.

### AS03

No vaccines currently used in New Zealand contain the oil-in-water/emulsion AS03 adjuvant. It is made using squalene and DL- $\alpha$ -tocopherol (vitamin E). First approved for use in 2009, it being used in influenza and malaria vaccines overseas.

### AS04

No vaccines currently used in New Zealand contain the oil-in-water/aluminium salts AS04 adjuvant. It is made with modified molecules from the *Salmonella minnesota* bacterium and aluminium salts. It has been used in an overseas human papillomavirus vaccine since 2009.

### MF59

No vaccines currently used in New Zealand contain the oil-in-water/emulsion MF59 adjuvant. It is made using squalene (a hydrocarbon oil) which is common in foods as well as being produced in the body as precursor to cholesterol and steroid hormones. MF59 significantly enhances immune response to a variety of antigens. First approved for use in 1997, it is mainly used in influenza vaccines overseas.

## Nucleotide adjuvants

### CpG-ODN

No vaccines currently used in New Zealand contain the nucleotide CpG-ODN adjuvant. Some molecule (nucleotide) sequences that link together to form bacterial DNA have been found to enhance an immune response. This adjuvant is a

synthetic (man-made) molecule that has the same pattern as a one of these sequences. In 2017, an overseas hepatitis B vaccine was the first to be approved. Since then, malaria and other hepatitis B vaccines have started early clinical trials.

## Other adjuvants

Research continues to identify other adjuvants, such as calcium phosphate that is naturally found in humans, polysaccharides and virus-like particles, that can contribute to the development of specific, protective immune responses to vaccine-preventable diseases.

## Excipients

### Buffers and ionic compounds

Buffers serve to resist changes in pH, such as monopotassium phosphate and sodium borate. Ionic compounds adjust tonicity and maintain osmolarity. Sodium chloride (table salt) is the most common ionic compound used.

### Preservatives

Preservatives stop unwanted microbial contamination of vaccines. They have been used in vaccines for many years. Very few serious adverse events have been associated with the use of these preservatives.

### 2-phenoxyethanol

2-phenoxyethanol is the most common preservative used in vaccines. It is also used in cosmetics, eye and ear drops, and baby care products where it is absorbed through skin. 2-phenoxyethanol is excreted by being exhaled and in urine and faeces after being metabolised (broken down). There is little toxicity in humans and some irritation with very high doses in animals.

### Phenol

Phenol is an aromatic alcohol that is infrequently used as a preservative in vaccines.

### Thiomersal

No vaccines on the New Zealand Immunisation Schedule contain thiomersal, also called thimerosal. Thiomersal is a mercury derived compound that was used as a preservative in vaccines and other health care products internationally for many years. There is no evidence that thiomersal caused any serious or long-term adverse events.

## Residuals

Residuals are the remaining minute quantities of substances that have been used during the manufacturing or production process of individual vaccines. Residuals depend on the process used, which may have involved cell culture mediums, egg proteins or other animal derived ingredients, culture cells, yeast, antibiotics such as neomycin or streptomycin, or inactivating agents such as formaldehyde. These substances are only present as traces and often measured as parts per million and parts per billion in the final vaccine formulation.

## Stabilisers

Stabilisers inhibit chemical reactions and prevent components separating or sticking to the vial during transport and storage. Examples of stabilisers include sugars such as lactose and sucrose, amino acids such as glycine and monosodium glutamate (salts of amino acids), proteins such as recombinant human albumin (Recombunin<sup>®</sup>) derived from baker's yeast or fetal bovine (cow) serum and gelatin, partially hydrolysed collagen usually of porcine (pig) but can be of bovine origin.

## Surfactants

Surfactants are a type of emulsifier. They assist particles remain suspended in liquid, preventing settling and clumping by lowering the surface tension of the liquid.

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## Excipients continued

An example is polysorbate 80 (Tween 80®), made from sorbitol (sugar alcohol) and oleic acid (omega-9 fatty acid), which is also used in foods such as ice cream. Surfactants are also used in shampoos, toothpastes, inks and fabric softeners.

## Diluents

A diluent is a liquid used to dilute a vaccine to the proper concentration immediately prior to administration. This is usually sterile water.

## Solvents

A solvent is a substance that dissolves another substance, creating a solution. The most common solvent used in everyday living and vaccine manufacture is water.

## Animal derived products

Some people have concerns about animal derived products such as gelatin in vaccines. This may be for faith-based reasons or concerns about the safety of animal derived products. More information on animal derived products in vaccines can be found on the Written Resources page on the Immunisation Advisory Centre web site.

## Allergies to vaccine ingredients

Very rarely, vaccines provoke a serious allergic reaction called anaphylaxis. The risk of this occurring is between less than once to up to three times out of every million doses of a vaccine. The components more likely to cause such a reaction are gelatin, egg proteins and antibiotics, although theoretically an allergic reaction can be triggered by almost anything.

There are very few occasions when vaccines should not be given. However, a person's allergy history should always be assessed prior to immunisation. A vaccine should not be given when there is a history of anaphylaxis to an ingredient in the vaccine, except for egg anaphylaxis and influenza vaccine, or to a previous dose of the same vaccine. A vaccine can be given when past reactions were not anaphylaxis, for example, reactions which have only involved the skin.

A person with a history of anaphylaxis after exposure to egg can usually be given MMR vaccine and influenza vaccine safely as these vaccines do not contain enough of the egg protein to cause a problem. The presence of hydrolysed gelatin in some live vaccines has been recognised as a cause of post-immunisation anaphylaxis.

Antibiotics in vaccines are only present in minute traces, usually an insufficient amount to cause a problem. An allergy to sulfonamide, beta-lactam or cephalosporin antibiotics is not a contraindication for vaccines containing traces of neomycin, streptomycin, polymyxin B, or gentamicin, the antibiotics typically found in vaccines.

Yeast protein is only present in a trace amount in yeast-made recombinant vaccines. The amount is not expected to cause a problem, should an individual have anaphylaxis to yeast.

Further advice about allergies and vaccine contraindications should be sought from a medical practitioner with expertise in vaccines or by calling 0800 IMMUNE.

## National Immunisation Schedule

Ingredients of vaccines on the current and recent New Zealand National Immunisation Schedules are presented in tables on the following pages. A table showing the vaccine brands on the current Immunisation Schedule can be found on the Written Resources page of the Immunisation Advisory Centre website.

National Immunisation Schedule vaccines are fully funded for certain age groups of children and some adults, for information about who is eligible for specific vaccines ask your doctor, nurse or 0800 IMMUNE.

## Vaccine ingredients tables

Ingredients in the National Immunisation Schedule vaccines are presented on the following pages:

Vaccine	Page	Vaccine	Page
Infanrix-hexa	4	Prevenar 13	6
Infanrix-IPV	4	Gardasil 9	6
Boostrix	5	Rotarix	7
Ipol	5	Priorix	7
Engerix-B	5	Varivax	7
Hiberix	5	Varilrix	7
Synflorix	6	Zostavax	7

## References

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<b>Infanrix-hexa vaccine against diphtheria, tetanus, pertussis, polio, hepatitis B, <i>Haemophilus influenzae</i> type b (Hib) diseases</b>		<b>Type: Combination subunit protein and inactivated virus vaccines</b>
<b>Ingredients (0.5 mL)</b>	<b>Function</b>	
<b>Active substances</b>		
Diphtheria toxoid, adsorbed – Not less than 30 IU (25 Lf U)	Antigen	
Tetanus toxoid, adsorbed – Not less than 40 IU (10 Lf U)		
Pertussis toxoid, adsorbed – 25 µg		
Filamentous haemagglutinin, adsorbed – 25 µg		
Pertactin (69 kiloDalton outer membrane protein) – 8 µg		
r-Hepatitis B surface antigen, adsorbed (HBsAg) – 10 µg		
Inactivated Polio Virus Type 1 – 40 DU		
Inactivated Polio Virus Type 2 – 8 DU		
Inactivated Polio Virus Type 3 – 32 DU		
<i>Haemophilus influenzae</i> type b (Hib) polysaccharide – 10 µg, conjugated to tetanus toxoid – 20–40 µg	Antigen Carrier protein	
<b>Adjuvants</b>		
Aluminium as aluminium hydroxide – 0.5 mg	Adjuvant	
Aluminium as aluminium phosphate – 0.32 mg		
<b>Excipients</b>		
Culture media including bovine derived material	Produce or stabilise vaccine antigen	
Formaldehyde	Inactivating agent	
Potassium chloride, Sodium chloride	Adjust tonicity	
Neomycin, Polymyxin B	Antibacterial	
Disodium phosphate, Monopotassium phosphate	Buffer	
Glycine, Lactose	Stabiliser	
Polysorbate 20, Polysorbate 80	Surfactant	
Water for injection	Solvent	
<b>Infanrix-IPV vaccine against diphtheria, tetanus, pertussis and polio diseases</b>		<b>Type: Combination subunit protein and inactivated virus vaccines</b>
<b>Ingredients (0.5 mL)</b>	<b>Function</b>	
<b>Active substances</b>		
Diphtheria toxoid, adsorbed – Not less than 30 IU (25 Lf U)	Antigen	
Tetanus toxoid, adsorbed – Not less than 40 IU (10 Lf U)		
Pertussis toxoid, adsorbed – 25 µg		
Filamentous haemagglutinin, adsorbed – 25 µg		
Pertactin, (69 kiloDalton outer membrane protein) – 8 µg		
Inactivated Polio Virus Type 1 – 40 DU		
Inactivated Polio Virus Type 2 – 8 DU		
Inactivated Polio Virus Type 3 – 32 DU		
<b>Adjuvants</b>		
Aluminium as aluminium hydroxide – 0.5 mg	Adjuvant	
<b>Excipients</b>		
Culture media including bovine derived material	Produce or stabilise vaccine antigen	
Formaldehyde	Inactivating agent	
Potassium chloride, Sodium chloride	Adjust tonicity	
Neomycin, Polymyxin B	Antibacterial	
Disodium phosphate, Monopotassium phosphate	Buffer	
Glycine	Stabiliser	
Polysorbate 80	Surfactant	
Water for injection	Solvent	

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<b>Boostrix vaccine against diphtheria, tetanus and pertussis diseases</b>		Type: Subunit protein vaccine
<b>Ingredients/dose (0.5 mL)</b>		Function
<b>Active substances</b>		
Diphtheria toxoid, adsorbed – not less than 2.5 Lf U	Antigen	
Tetanus toxoid, adsorbed – not less than 5 Lf U		
Pertussis toxoid, adsorbed – 8 µg		
Filamentous haemagglutinin, adsorbed – 8 µg		
Pertactin (69 kiloDalton outer membrane protein) – 2.5 µg		
<b>Adjuvants</b>		
Aluminium as aluminium hydroxide – 0.3 mg	Adjuvant	
Aluminium as aluminium phosphate – 0.2 mg		
<b>Excipients</b>		
Culture media including bovine derived materials		Produce vaccine antigen
Formaldehyde, Glutaraldehyde		Inactivating agent
Sodium chloride		Adjust tonicity
Glycine		Stabiliser
Polysorbate 80		Surfactant
Water for injection		Solvent
<b>Ipol vaccine against polio disease</b>		Type: Inactivated virus vaccine
<b>Ingredients (0.5 mL)</b>		Function
<b>Active substances</b>		
Inactivated Polio virus type 1 (Mahoney) – 40 DU	Antigen	
Inactivated Polio virus type 2 (MEF-1) – 8 DU		
Inactivated Polio virus type 3 (Saukett) – 32 DU		
<b>Excipients</b>		
Culture media including phenylalanine, bovine derived material		Produce and stabilise vaccine antigen
Sodium chloride		Adjust tonicity
Neomycin Polymyxin B, Streptomycin		Antibacterial
Hydrochloric acid or sodium hydroxide		Buffer
Formaldehyde		Inactivating agent
2-phenoxyethanol		Preservative
Polysorbate 80		Surfactant
Water for injection		Solvent
<b>Engerix-B vaccine against hepatitis B disease</b>		Type: Subunit protein vaccine
<b>Ingredients (1.0 mL)</b>		Function
<b>Active substances</b>		
Hepatitis B surface antigen – 20 µg		Antigen
<b>Adjuvants</b>		
Aluminium as aluminium hydroxide – 0.5 mg		Adjuvant
<b>Excipients</b>		
Culture media including yeast protein		Produce vaccine antigen
Sodium chloride		Adjust tonicity
Dibasic sodium phosphate dihydrate, Monobasic sodium phosphate dihydrate		Buffer
Polysorbate 20		Surfactant
Water for injection		Solvent
<b>Hiberix vaccine against <i>Haemophilus influenzae</i> type b (Hib) disease</b>		Type: Subunit protein vaccine
<b>Ingredients (0.5 mL)</b>		Function
<b>Active substances</b>		
<i>Haemophilus influenzae</i> type b (Hib) polysaccharide – 10 µg, conjugated to tetanus toxoid – Approximately 25 µg		Antigen Carrier protein
<b>Excipients</b>		
Culture media including bovine derived material		Produce vaccine antigen
Formaldehyde		Inactivating agent
Lactose		Stabiliser
Sodium chloride 0.9%		Diluent

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<b>Synflorix vaccine against pneumococcal disease (10-valent)</b>		Type: Subunit protein vaccine
<b>Ingredients (0.5 mL)</b>		Function
<b>Active substances</b>		
Pneumococcal polysaccharide serotypes 1, 5, 6B, 7F, 9V, 14, 23F <sup>†</sup> – 1 µg each	Antigen	
Pneumococcal polysaccharide serotype 4 <sup>†</sup> – 3 µg		
Pneumococcal polysaccharide serotype 18C <sup>††</sup> – 3 µg		
Pneumococcal polysaccharide serotype 19F <sup>†††</sup> – 3 µg		
Conjugated to:		
<sup>†</sup> Protein D (derived from non-typeable <i>Haemophilus influenzae</i> ) – 9–16 µg	Carrier protein	
<sup>††</sup> Tetanus toxoid – 5–10 µg		
<sup>†††</sup> Diphtheria toxoid – 3–6 µg		
<b>Adjuvants</b>		
Aluminium as aluminium phosphate – 0.5 mg	Adjuvant	
<b>Excipients</b>		
Culture media	Produce vaccine antigen	
Sodium chloride	Adjust tonicity	
Water for injection	Solvent	
<b>Prevenar 13 vaccine against pneumococcal disease (13-valent)</b>		Type: Subunit protein vaccine
<b>Ingredients (0.5 mL)</b>		Function
<b>Active substances</b>		
Pneumococcal polysaccharide serotypes – 1, 3, 4, 5, 6A, 7F, 9V, 14, 18C, 19A, 19F, 23F – 2.2 µg	Antigen	
Pneumococcal polysaccharide serotype 6B – 4.4 µg		
All conjugated to diphtheria CRM197 – 34 µg	Carrier protein	
<b>Adjuvants</b>		
Aluminium as aluminium phosphate	Adjuvant	
<b>Excipients</b>		
Culture media	Produce vaccine antigen	
Sodium chloride	Adjust tonicity	
Succinic acid	Buffer	
Polysorbate 80	Surfactant	
Water for injection	Solvent	
<b>Gardasil 9 vaccine against human papillomavirus disease (9-valent)</b>		Type: Subunit protein vaccine
<b>Ingredients (0.5 mL)</b>		Function
<b>Active substances</b>		
r-HPV 31, 33, 45, 52 & 58 – 20 µg each	Antigen	
r-HPV 6 L1 protein – 30 µg		
r-HPV 11 & 18 L1 proteins – 40 µg each		
r-HPV 16 L1 protein – 60 µg		
<b>Adjuvants</b>		
Aluminium as amorphous aluminium hydroxyphosphate sulphate – 500 µg	Adjuvant	
<b>Excipients</b>		
Culture media including yeast protein	Produce vaccine antigen	
Sodium chloride	Adjust tonicity	
Sodium borate	Buffer	
L-histidine	Stabiliser	
Polysorbate 80	Surfactant	
Water for injection	Solvent	

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<b>Rotarix vaccine against rotavirus disease</b>		<b>Type: Live-attenuated virus vaccine</b>
<b>Ingredients (1.5 mL)</b>		<b>Function</b>
<b>Active substances</b>		
Attenuated RIX 4414 strain of human rotavirus of the G1P[8] type - $10^{6.0}$ CCID <sub>50</sub>		Antigen
<b>Excipients</b>		
Culture media including bovine and porcine derived material		Produce vaccine antigen
DNA from porcine circoviruses 1		From porcine-derived material used during manufacture
Disodium adipate		Buffer
Sucrose		Stabiliser
Water for injection		Solvent
<b>Priorix vaccine against measles, mumps and rubella diseases</b>		<b>Type: Live-attenuated virus vaccine</b>
<b>Ingredients (0.5 mL)</b>		<b>Function</b>
<b>Active substances</b>		
Attenuated Schwartz measles virus - Not less than $10^{3.0}$ CCID <sub>50</sub>		Antigen
Attenuated RIT 4385 (derived from Jeryl Lynn) mumps virus - Not less than $10^{3.7}$ CCID <sub>50</sub>		
Attenuated Wistar RA 27/3 rubella virus - Not less than $10^{3.0}$ CCID <sub>50</sub>		
<b>Excipients</b>		
Culture media including bovine derived material		Produce vaccine antigen
Neomycin		Antibacterial
Amino acids, Lactose monohydrate, Mannitol, Sorbitol		Stabiliser
Water for injection		Diluent
<b>Varivax vaccine against varicella (chickenpox) disease</b>		<b>Type: Live-attenuated virus vaccine</b>
<b>Ingredients (0.5 mL)</b>		<b>Function</b>
<b>Active substances</b>		
Attenuated Oka/Merck strain varicella-zoster virus - 1350 PFU		Antigen
<b>Excipients</b>		
Culture media including bovine calf serum, MRC-5 cell DNA and protein		Produce vaccine antigen
Potassium chloride, Sodium chloride		Adjust tonicity
Neomycin		Antibacterial
Monosodium L-glutamate, Potassium phosphate monobasic, Sodium phosphate dibasic, Hydrolysed gelatin		Buffer
Sucrose, Urea		Stabiliser
<b>Varilrix (human albumin-free) vaccine against varicella (chickenpox) disease</b>		<b>Type: Live-attenuated virus vaccine</b>
<b>Ingredients (0.5 mL)</b>		<b>Function</b>
<b>Active substances</b>		
Attenuated Oka strain varicella-zoster virus - $10^{3.3}$ PFU		Antigen
<b>Excipients</b>		
Culture media including amino acids, fetal bovine serum		Produce vaccine antigen
Neomycin		Antibacterial
Lactose, Mannitol, Sorbitol		Stabiliser
Water for injection		Diluent
<b>Zostavax vaccine against herpes zoster (shingles) disease</b>		<b>Type: Live-attenuated virus vaccine</b>
<b>Ingredients (0.65 mL)</b>		<b>Function</b>
<b>Active substances</b>		
Attenuated Oka/Merck strain varicella-zoster virus - 19400 PFU		Antigen
<b>Excipients</b>		
Culture media including bovine calf serum, MRC-5 cell DNA and protein		Produce vaccine antigen
Potassium chloride, Sodium chloride		Adjust tonicity
Neomycin		Antibacterial
Monosodium L-glutamate, Potassium phosphate monobasic, Sodium phosphate dibasic		Buffer
Hydrolysed porcine gelatin, Sucrose, Urea		Stabiliser