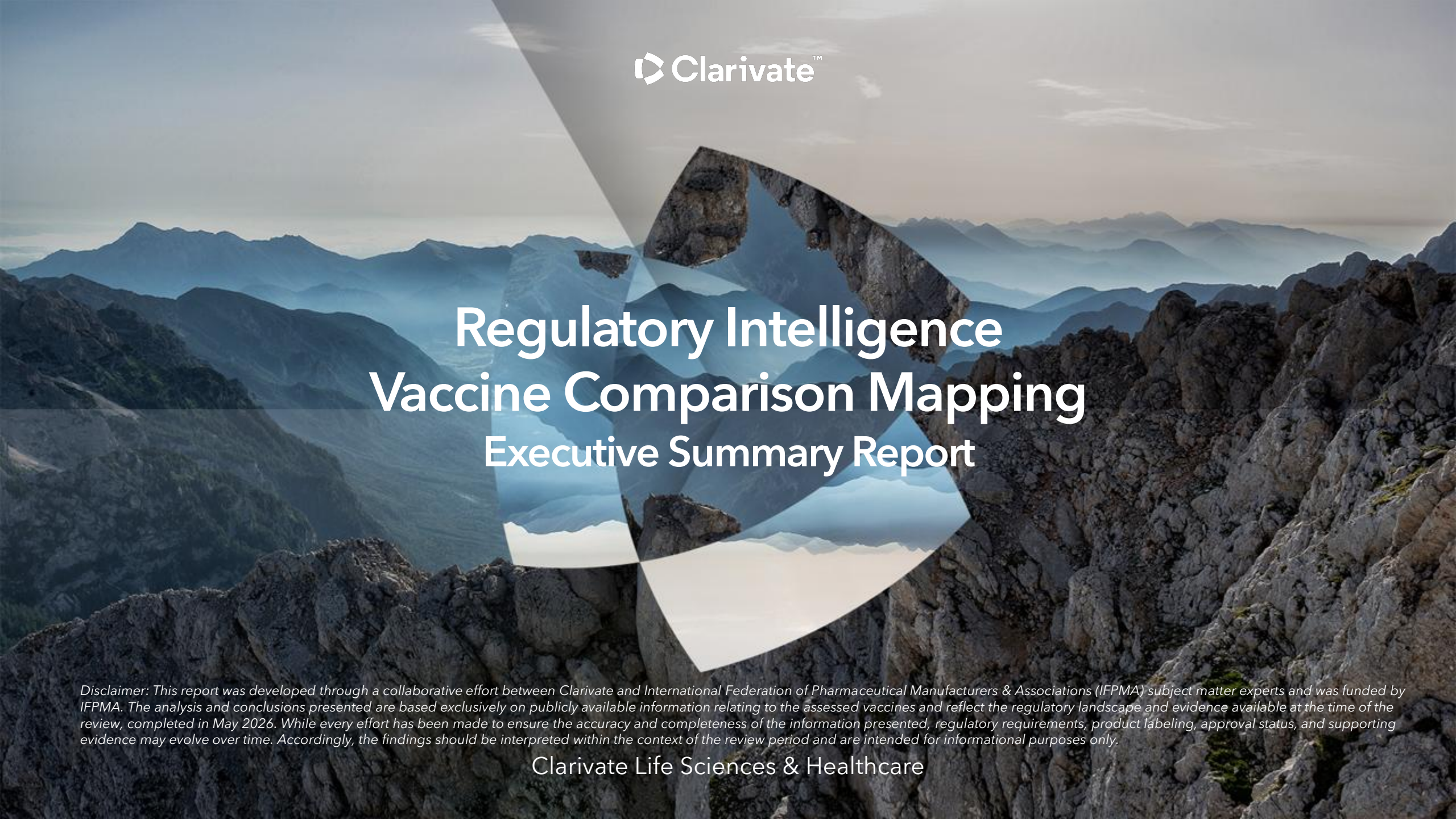

Regulatory Intelligence
Vaccine Comparison Mapping
Executive Summary Report

Disclaimer: This report was developed through a collaborative effort between Clarivate and International Federation of Pharmaceutical Manufacturers & Associations (IFPMA) subject matter experts and was funded by IFPMA. The analysis and conclusions presented are based exclusively on publicly available information relating to the assessed vaccines and reflect the regulatory landscape and evidence available at the time of the review, completed in May 2026. While every effort has been made to ensure the accuracy and completeness of the information presented, regulatory requirements, product labeling, approval status, and supporting evidence may evolve over time. Accordingly, the findings should be interpreted within the context of the review period and are intended for informational purposes only.

Clarivate Life Sciences & Healthcare

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Clarivate™

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1. Project Overview

Scope

- Comparison of key licensing criteria for 9 vaccines for the 3 indications in scope.
- Parameters to compare:
  1. Indication wording and age bands
  2. Approval pathways
  3. Primary efficacy endpoints
  4. Pivotal study designs
  5. Immunobridging criteria
  6. Safety dataset size and PV commitments
  7. Comparator landscape
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Markets

- Phase 1: European Union, United States, Japan.
- Phase 2: Australia, Canada, China

Indication	Vaccine	Company
RSV	Arexvy	GSK
	Abrysvo	Pfizer
	mRESVIA	Moderna
Pneumococcal	Apexxnar	Pfizer
	Vaxneuvance	MSD
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Deliverables

- Deliverable 1: Vaccine tabulated comparison for EU, US, JP (xls)
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2. Vaccines overview

2. RSV vaccines. AREXVY

AREXVY (GSK)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization for the prevention of Lower Respiratory Tract Disease (LRTD) caused by Respiratory Syncytial Virus (RSV)				
Age band 1	≥ 60 years				
Efficacy endpoints	Clinical efficacy				
Pivotal studies	Same pivotal studies				
Comparator	Placebo				
Indication 2	Active immunization for the prevention of LRTD caused by RSV				
Age band 2	50-59 years at increased risk				
Efficacy endpoints	Immunobridging				
Pivotal studies	Same pivotal studies				
Comparator	Older adults (OA) ≥60 years cohort				

Arexvy is not approved in China.
Arexvy has recently been approved in the EU and the US for adults aged 18-59 years; these approvals are not included in the analysis.

2. RSV vaccines. ABRYSVO

ABRYSVO (RSV preF) (Pfizer)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization for the prevention of LRTD caused by RSV				
Age band 1	≥ 60 years				
Efficacy endpoints	Clinical efficacy				
Pivotal studies	Same pivotal studies				
Comparator	Placebo				
Indication 2	Active immunization for the prevention of LRTD caused by RSV				
Age band 2	Maternal immunization				
Efficacy endpoints	Clinical efficacy				
Pivotal studies	Same pivotal studies				
Comparator	Placebo				
Indication 3	Active immunization for the prevention of LRTD caused by RSV			Not approved in Australia	Not approved in Japan
Age band 3	18-59 years at increased risk	≥ 18 years	18-59 years at increased risk	-	-
Efficacy endpoints	Immunobridging			-	-
Pivotal studies	Same pivotal studies			-	-
Comparator	Older adults (OA) ≥60 years cohort			-	-

Abrysvo is not approved in China.

2. RSV vaccines. mRESVIA

mRESVIA (Moderna)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization for the prevention of LRTD caused by RSV				
Age band 1	≥ 60 years				
Efficacy endpoints	Clinical efficacy				
Pivotal studies	Same pivotal studies				
Comparator	Placebo				
Indication 2	Active immunization for the prevention of LRTD caused by RSV			Not approved in Australia	Not approved in Japan
Age band 2	18-59 years at increased risk	≥ 18 years	18-59 years at increased risk	-	-
Efficacy endpoints	Immunobridging			-	-
Pivotal studies	Same pivotal studies			-	-
Comparator	Older adults (OA) ≥60 years cohort			-	-

In Australia, mRESVIA for adults aged 18 to 59 years of age who are at increased risk of RSV has been under evaluation by the TGA since June 2025.
mRESVIA is not approved in China.

2. Pneumococcal vaccines. VAXNEUVANCE

VAXNEUVANCE (PCV15) (MSD)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization for the prevention of invasive disease caused by S. pneumoniae	Active immunisation for the prevention of invasive disease and pneumonia caused by S. pneumoniae	Active immunization for the prevention of invasive disease caused by S. pneumoniae	Active immunisation for the prevention of pneumococcal disease caused by S. pneumoniae	Prevention of infectious disease caused by S. pneumoniae
Age band 1	≥ 18 years				≥ 18 years at high-risk
Efficacy endpoints	Immunobridging				
Pivotal studies	Same pivotal studies				Study with Human Immunodeficiency Virus (HIV) population
Comparator	13vPnC and PPSV23				
Indication 2	Active immunization for the prevention of invasive disease caused by S. pneumoniae	Active immunisation for the prevention of invasive disease, pneumonia and acute otitis media caused by S. pneumoniae	Active immunization for the prevention of invasive disease caused by S. pneumoniae	Active immunisation for the prevention of pneumococcal disease caused by S. pneumoniae	Prevention of infectious disease for individuals at high-risk, and prevention of invasive disease caused by S. pneumoniae
Age band 2	6 weeks – 17 years				2 months – 17 years
Efficacy endpoints	Immunobridging				
Pivotal studies	Pivotal study for 4-Dose (3+1) schedule	Pivotal study for a 3-dose (2+1) schedule			Pivotal study with JP infants
Comparator	13vPnC	13vPnC and paediatric vaccines per country schedule			13vPnC

mRESVIA is not approved in China.

13vPnC: 13-valent pneumococcal conjugate vaccine
PPSV23: 23-valent pneumococcal polysaccharide vaccine

2. Pneumococcal vaccines. APEXXNAR/PREVENAR 20

APEXXNAR/PREVENAR 20 (PCV20) (Pfizer)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization for the prevention of invasive disease and pneumonia caused by S. pneumoniae	Active immunisation for the prevention of invasive disease and pneumonia caused by S. pneumoniae	Active immunisation for the prevention of invasive disease and pneumonia caused by S. pneumoniae	Active immunisation for the prevention of pneumococcal disease caused by S. pneumoniae	Active immunization for the prevention of infectious disease caused by S. pneumoniae
Age band 1	≥ 18 years				Elderly/individuals at high-risk
Efficacy endpoints	Immunobridging				
Pivotal studies	Same pivotal studies				Pivotal in JP population
Comparator	13vPnC and PPSV23				
Indication 2	Active immunization for the prevention of invasive disease and pneumonia caused by S. pneumoniae, and otitis media (7 serotypes, 6w-5years)	Active immunisation for the prevention of invasive disease, pneumonia, and acute otitis media caused by S. pneumoniae	Active immunization for the prevention of invasive disease caused by S. pneumoniae	Active immunisation for the prevention of pneumococcal disease caused by S. pneumoniae	Active immunization for the prevention of invasive disease caused by S. pneumoniae
Age band 2	≥ 6 weeks of age – 17 years				2 months – 6 years
Efficacy endpoints	Immunobridging				
Pivotal studies	Same pivotal studies	Pivotal study for a 3-dose (2+1) schedule			Pivotal in JP population
Comparator	13vPnC. US accepted historical PCV7 efficacy data for Otitis Media	13vPnC	13vPnC	13vPnC	13vPnC

Apexxnar is not approved in China.

PCV7: 7-valent pneumococcal conjugate vaccine

2. Pneumococcal vaccines. CAPVAXIVE

CAPVAXIVE (PCV21) (MSD)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization for the prevention of invasive disease caused by S. pneumoniae (22 serotypes) and for the prevention of pneumonia caused by S. pneumoniae (21 serotypes)	Active immunisation for the prevention of invasive disease and pneumonia caused by S. pneumoniae (22 serotypes)	Active immunization for the prevention of invasive disease caused by S. pneumoniae (23 serotypes)	Active immunisation for the prevention of pneumococcal disease caused by S. pneumoniae (22 serotypes)	Prevention of infectious diseases caused by S. pneumoniae (22 serotypes)
Age band 1	≥ 18 years				≥ 65 years or ≥ 18 years at high-risk
Efficacy endpoints	Immunobridging				
Pivotal studies	Main pivotal is the same				Domestic JP trials
Comparator	PCV20, PCV15	PCV20, PPSV23	PCV20		PPSV23, PCV20, PCV15

Capvaxive is not approved in China.

PCV20 (Apexxnar): 20-valent pneumococcal conjugate vaccine
PCV15 (Vaxneuvance): 15-valent pneumococcal conjugate vaccine

2. Influenza vaccines. FLUARIX Trivalent

FLUARIX Trivalent (GSK)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization against influenza disease caused by influenza virus subtypes A and type B	Active immunisation for the prevention of influenza disease caused by the two subtypes of influenza A virus and one lineage of influenza B virus present in the vaccine.	Not approved in Canada	Active immunisation for the prevention of influenza disease caused by the two subtypes of influenza A virus and one lineage of influenza B virus present in the vaccine.	Not approved in Japan
Age band 1	≥ 18 years		-	≥ 18 years	-
Efficacy endpoints	Immunogenicity	Not enough information is available due to the old approval date	-	Not enough information is available due to the old approval date	-
Pivotal studies	No immunobridging studies		-		-
Comparator	Placebo		-		-

Fluarix is not approved in China.

2. Influenza vaccines. FLUARIX Quadrivalent

FLUARIX Quadrivalent (GSK)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 2	Active immunization for the prevention of disease caused by influenza A subtype viruses and type B viruses contained in the vaccine	Active immunisation for the prevention of influenza disease caused by the two influenza A virus subtypes and the two influenza B virus types contained in the vaccine	Not approved in Canada	Active immunisation for the prevention of influenza disease caused by the two influenza A virus subtypes and the two influenza B virus types contained in the vaccine	Not approved in Japan
Age band 2	≥ 3 years		-	≥ 3 years	-
Efficacy endpoints	Immunobridging		-	Immunobridging	-
Pivotal studies	Same pivotal studies		-	Same pivotal studies	-
Comparator	aTIV-1 (FLUAD) and aTIV-2		-	aTIV-1 (FLUAD) and aTIV-2	-
Indication 3	Active immunization for the prevention of disease caused by influenza A subtype viruses and type B viruses contained in the vaccine	Active immunisation for the prevention of influenza disease caused by the two influenza A virus subtypes and the two influenza B virus types contained in the vaccine	Not approved in Canada	Active immunisation for the prevention of influenza disease caused by the two influenza A virus subtypes and the two influenza B virus types contained in the vaccine	Not approved in Japan
Age band 3	6 – 35 months of age	≥ 6 months of age	-	≥ 6 months of age	-
Efficacy endpoints	Clinical efficacy		-	Clinical efficacy	-
Pivotal studies	No immunobridging studies		-	No immunobridging studies	-
Comparator	Non-influenza vaccine comparators		-	Non-influenza vaccine comparators	-

Fluarix is not approved in China.

aTIV-1 (Fluad season 2010/2011): Adjuvanted Trivalent Inactivated Influenza Vaccine
aTIV-2 (Fluad with B/Yamagata lineage strain): Adjuvanted Trivalent Inactivated Influenza Vaccine

2. Influenza vaccines. FLUZONE HD/EFLUELDA Trivalent

FLUZONE HD/EFLUELDA Trivalent (Sanofi)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization for the prevention of disease caused by influenza A subtype viruses and type B virus contained in the vaccine	Active immunisation for the prevention of influenza disease	Active immunization against influenza caused by the specific strains of influenza virus contained in the vaccine	Active immunisation for the prevention of influenza disease	Not approved in Japan
Age band 1	≥ 65 years	≥ 60 years	≥ 65 years	≥ 60 years	-
Efficacy endpoints	Immunobridging and clinical efficacy	Clinical efficacy	Immunobridging and clinical efficacy		-
Pivotal studies	Both clinical and immunobridging	No immunobridging studies	Both clinical and immunobridging		-
Comparator	Fluzone (TIV-SD)				-

Fluzone HD is not approved in China.

2. Influenza vaccines. FLUZONE HD/EFLUELDA Quadrivalent

FLUZONE HD/EFLUELDA Quadrivalent (Sanofi)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 2	Active immunization for the prevention of disease caused by influenza A subtype viruses and type B virus contained in the vaccine	Active immunisation for the prevention of influenza disease	Active immunization against influenza caused by the specific strains of influenza virus contained in the vaccine – status dormant -	Active immunisation for the prevention of influenza disease	Not approved in Japan
Age band 2	≥ 65 years				-
Efficacy endpoints	Immunobridging	Immunobridging and clinical efficacy	Immunobridging		-
Pivotal studies	Same pivotal studies (clinical efficacy in trivalent vaccine)	Both clinical and immunobridging	Same pivotal studies (clinical efficacy in trivalent vaccine)		-
Comparator	TIV-HD1, TIV-HD2	TIV-HD1, TIV-HD2, TIV-SD	TIV-HD1, TIV-HD2		-
Indication 3	Not approved in the US	Active immunisation for the prevention of influenza disease	Not approved in Canada	Not approved in Australia	Active immunization in individuals 60 years of age and older for the prevention of influenza caused by influenza virus types A and B
Age band 3	-	≥ 60 years	-	-	≥ 60 years
Efficacy endpoints	-	Immunogenicity	-	-	Immunobridging and clinical efficacy
Pivotal studies	-	No immunobridging studies	-	-	Domestic trials
Comparator	-	QIV-SD	-	-	QIV-SD

Fluzone HD is not approved in China.

TIV-HD1 (licensed Fluzone HD with B/Victoria lineage strain): Trivalent Inactivated Influenza Vaccine High Dose
TIV-HD2 (Investigational TIV-HD with B/Yamagata lineage strain): Trivalent Inactivated Influenza Vaccine High Dose
TIV-SD (Fluzone trivalent): Trivalent Inactivated Influenza Vaccine Standard Dose
QIV-SD: Quadrivalent Inactivated Influenza Vaccine Standard Dose

2. Influenza vaccines. FLUAD Trivalent

FLUAD Trivalent (CSL Seqirus)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 1	Active immunization against influenza disease caused by influenza virus subtypes A and type B	Prophylaxis of influenza	Active immunization against influenza disease caused by influenza virus subtypes A and B contained in the vaccine	Active immunisation against influenza	Not approved in Japan
Age band 1	≥ 65 years	≥ 50 years	≥ 65 years	≥ 50 years	-
Efficacy endpoints	Immunobridging		There is very limited information available due to the old approval date	Immunobridging	-
Pivotal studies	Different pivotal studies	Same pivotal studies than those for Fluad Tetra approval		Same pivotal studies than those for Fluad Tetra approval	-
Comparator	Agriflu (TIV)	Agriflu (TIV), aTIV-1 (Fluad trivalent) and aTIV-2, Fluarix tetra (QIV)		Agriflu (TIV), aTIV-1 (Fluad trivalent) and aTIV-2, Fluarix tetra (QIV)	-

Fluad is not approved in China.
Fluad trivalent was first approved in the EU in 1997 for adults ≥65 years. Due to limited information from this early approval, the later EU approval in 2024 was used for the comparison.

QIV: Quadrivalent Inactivated Influenza Vaccine

2. Influenza vaccines. FLUAD Quadrivalent

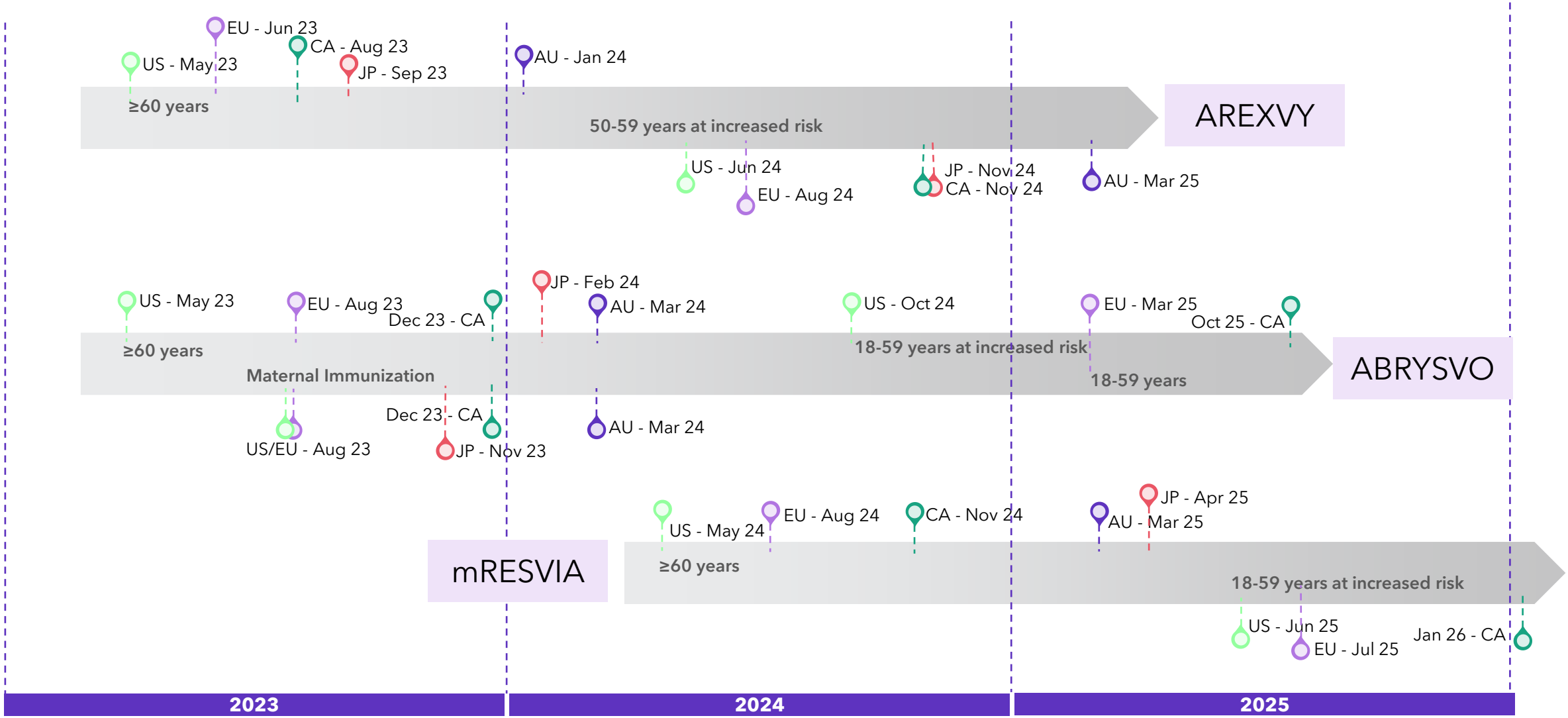
FLUAD Quadrivalent (CSL Seqirus)					
Country	**US**	**EU**	**CA**	**AU**	**JP**
Indication 2	Active immunization against influenza disease caused by influenza virus subtypes A and types B	Prophylaxis of influenza - withdrawn 23/02/26 -	The company cancelled the submission before the final decision from Health Canada	Active immunisation against influenza	Not approved in Japan
Age band 2	≥ 65 years		-	≥ 65 years	-
Efficacy endpoints	Clinical efficacy	Immunobridging and clinical efficacy	-	Immunobridging and clinical efficacy	-
Pivotal studies	Same pivotal studies		-	Same pivotal studies	-
Comparator	Active non-influenza control (Boostrix)	aTIV-1 (FLUAD trivalent) and aTIV-2, Agriflu (TIV), active non-influenza control (Boostrix)	-	aTIV-1 (FLUAD trivalent) and aTIV-2, Agriflu (TIV), active non-influenza control (Boostrix)	-
Indication 3	Not approved in the US	Prophylaxis of influenza - withdrawn 23/02/26 -	Not approved in Canada	Active immunisation against influenza	Not approved in Japan
Age band 3	-	≥ 50 years	-	≥ 50 years	-
Efficacy endpoints	-	Immunobridging	-	Immunobridging	-
Pivotal studies	-	Same pivotal study	-	Same pivotal study	-
Comparator	-	Fluarix Tetra	-	Fluarix Tetra	-

Fluad is not approved in China.

3. Approval timeline

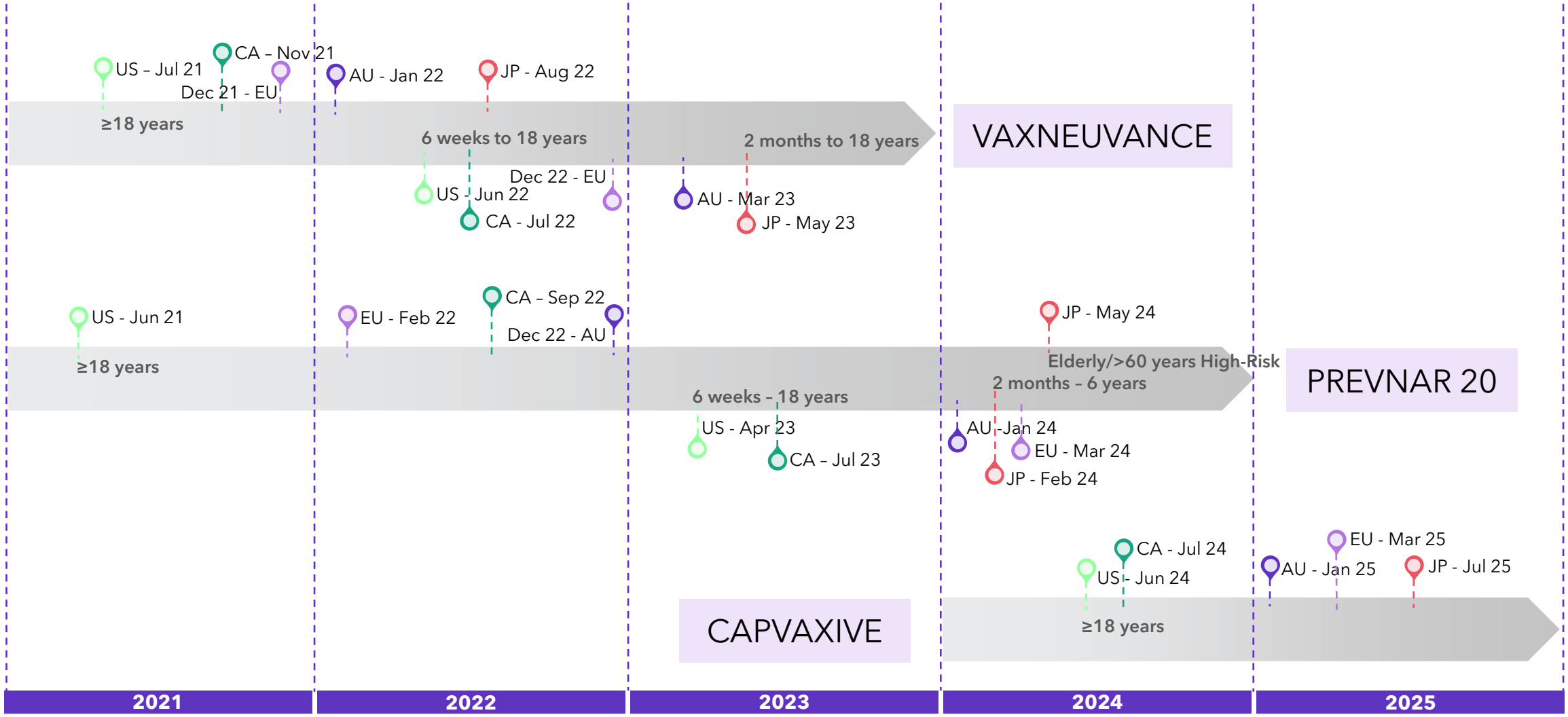
3. Approval timeline

RSV vaccines



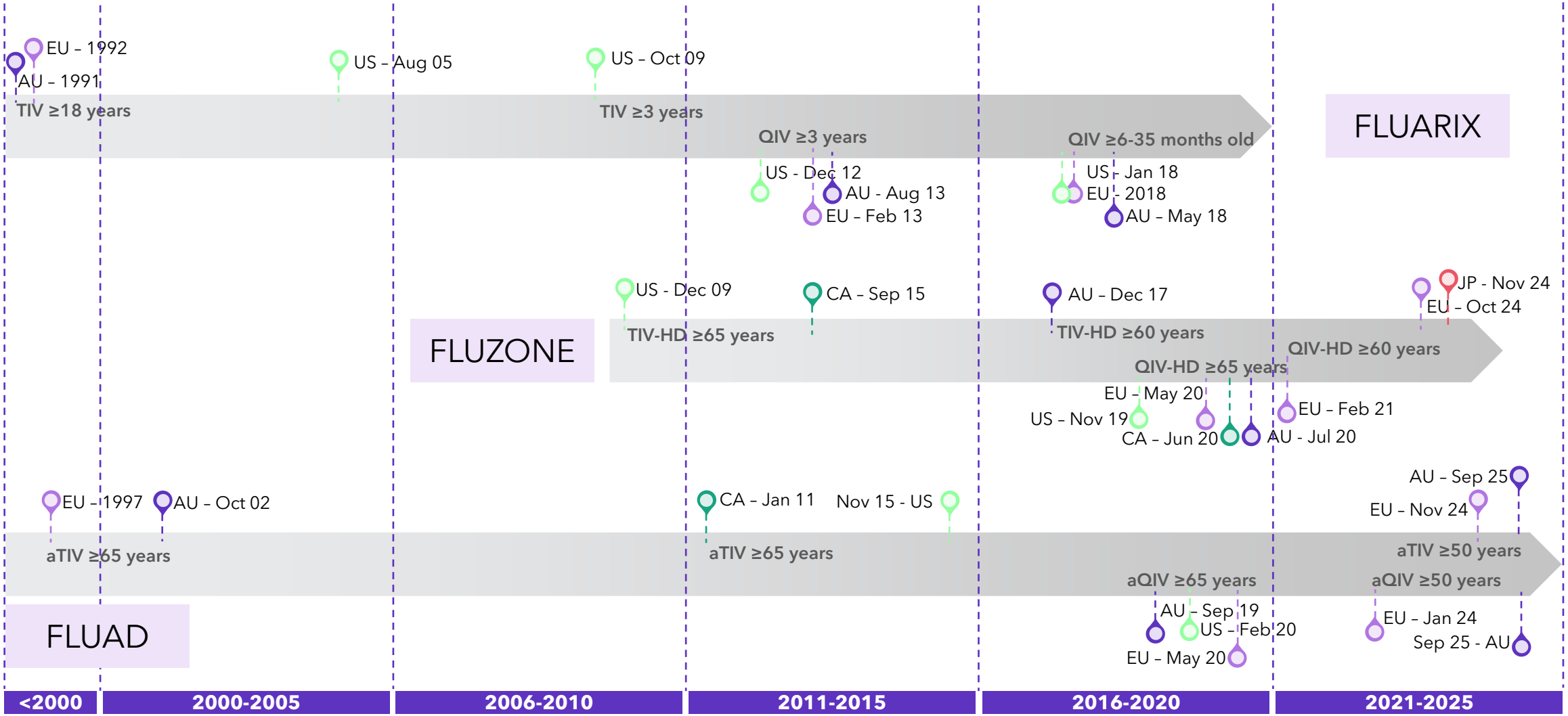
3. Approval timeline

Pneumococcal vaccines



3. Approval timeline

Influenza vaccines



4. Comparison across markets

3. RSV vaccines comparison

Summary

	EU-US	EU-JP	US-JP	CA-AU	CA-EU	CA-US	CA-JP	AU-EU	AU-US	AU-JP
Arexvy (GSK)	H	H	H	H	H	H	H	H	H	H
Abrysvo (Pfizer)	M	H	M	M	M	H	M	H	H	H
mRESVIA (Moderna)	H	H	H	H	H	H	H	H	H	H

Legend:
- Low convergence (L): 0-2 parameters aligned
- Medium convergence (M): 3-4 parameters aligned
- High convergence (H): 5-6 parameters aligned

RSV vaccines not approved in China

High-Medium

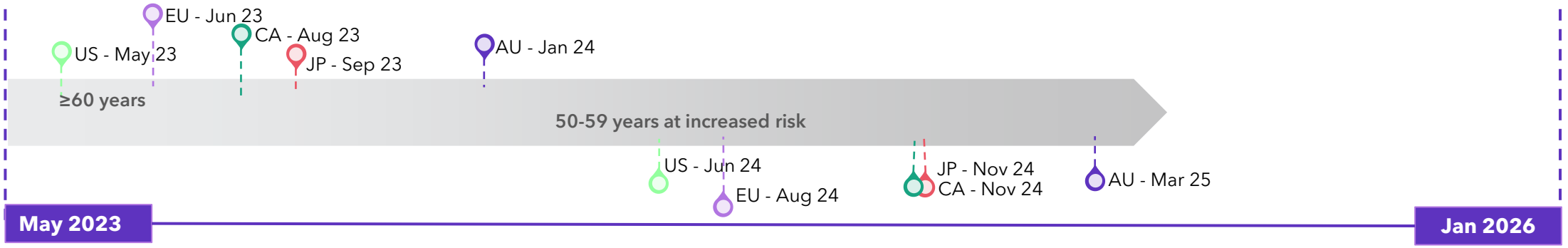
The approvals were sustained by multiregional clinical trials (MRCT) and immunobridging strategy, with slight differences in PV commitments, indication, and safety dataset size

There was no standard of care for prevention of LRTD caused by RSV

3. RSV vaccines comparison

AREXVY

AREXVY

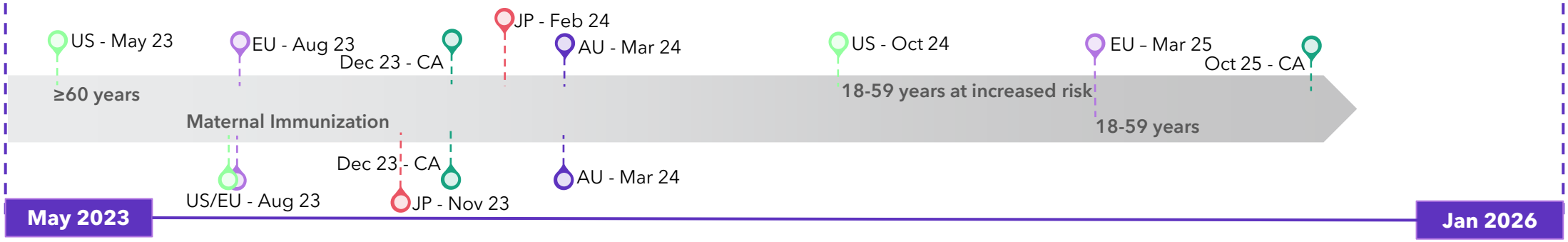


High convergence between all countries

- Arexvy is not approved in China. A BLA was submitted in February 2026.
- Indications and age bands are consistent across countries. Approvals followed a similar pattern: initial approval in the US, followed by EU and other countries, with Australia among the last approvals.
    - ≥60 years: 8 months between the first (US) and the last approval (Australia).
    - 50-59 years at increased risk: 9 months between the first (US) and the last approval (Australia).
- Pivotal studies and immunobridging criteria supporting approval are consistent across regions.
- Larger and country-specific safety dataset in Japan, including a dedicated Japanese population. PV commitments vary across countries.
- At the time of initial authorisations, no RSV vaccines had been approved globally. The clinical program was designed to demonstrate superiority over placebo for adults aged ≥ 60 years. Approval in adults aged 50–59 years was based on a bridging strategy, using the ≥60-year cohort as comparator.
- Arexvy has been approved in the EU and US for adults aged 18–59 years; however, these approvals are not included in this analysis.

3. RSV vaccines comparison

ABRYSVO

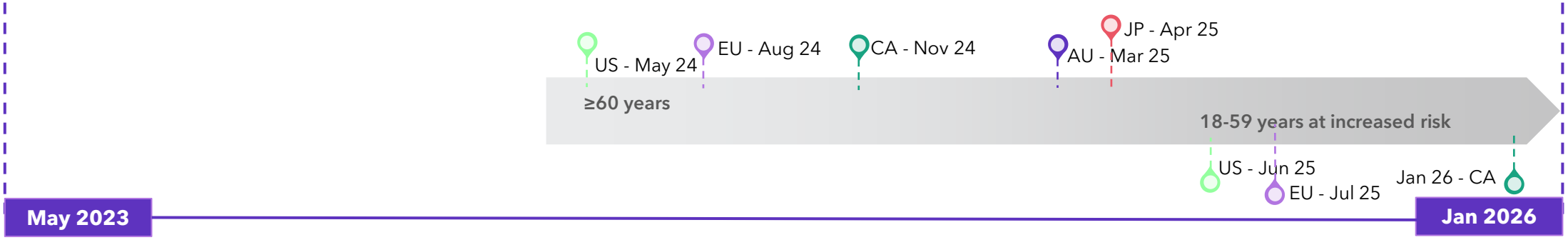


High convergence EU-JP, medium convergence EU-US and US-JP

- Abrysvo is not approved in China.
- Indications and approved age groups vary across regions. Approvals followed a similar pattern: initial approval in the US, followed by the EU and other countries, with Australia among the last.
  - ≥60 years: 10 months between the first (US) and the last approval (Australia).
  - Maternal immunization: 7 months between the first (US) and last approval (Australia).
  - 18-59 years: Approved for at-risk individuals in the US and Canada, and for the general population in the EU; 12 months between the first (US) and the last approval (Canada). Not approved in Japan or Australia.
- Pivotal studies and immunobridging criteria supporting approval are consistent across regions.
- Larger and country-specific safety dataset in Japan, including a dedicated Japanese population. PV commitments vary across countries.
- At the time of submission, no RSV vaccines had been approved globally for adults aged ≥60 years or for maternal/neonatal prevention. The clinical program was designed to demonstrate superiority over placebo in adults aged ≥60 years. Approval in adults aged 18-59 years relied on a bridging strategy, using the ≥60 years cohort as comparator.

3. RSV vaccines comparison

mRESVIA



High convergence EU-US, EU-JP and US-JP

- mRESVIA is not approved in China.
- Indications and age bands are consistent across countries. Approvals followed a similar pattern: initial approval in the US, followed by EU and other countries.
  - ≥60 years: 10 months between the first (US) and the last approval (Japan).
  - 18-59 years at increased risk: 10 months between the first (US) and the last approval (Canada). Not approved in Japan or Australia.
- Pivotal studies and immunobridging criteria supporting approval are consistent across regions.
- Larger and country-specific safety dataset in Japan, including a dedicated Japanese population. PV commitments vary across countries.
- At the time of mRESVIA approval, the preventive landscape for RSV-associated disease in adults aged ≥60 years included two previously approved recombinant vaccines, Arexvy and Abrysvo. The clinical program was designed to demonstrate superiority over placebo in adults aged ≥60 years. Approval in adults aged 18-59 years relied on a bridging strategy, using the ≥60 years cohort as comparator.

3. Pneumococcal vaccines comparison

Summary

	EU-US	EU-JP	US-JP	CA-AU	CA-EU	CA-US	CA-JP	AU-EU	AU-US	AU-JP
Vaxneuvance (PCV15) (MSD)	M	M	M	M	M	M	M	H	M	M
Apexxnar (PCV20) (Pfizer)	M	L	L	M	M	M	L	M	M	L
Capvaxive (PCV21) (MSD)	L	L	L	M	L	M	L	L	M	L

Legend:
- Low convergence (L): 0-2 parameters aligned
- Medium convergence (M): 3-4 parameters aligned
- High convergence (H): 5-6 parameters aligned

Pneumococcal vaccines not approved in China

Medium-Low

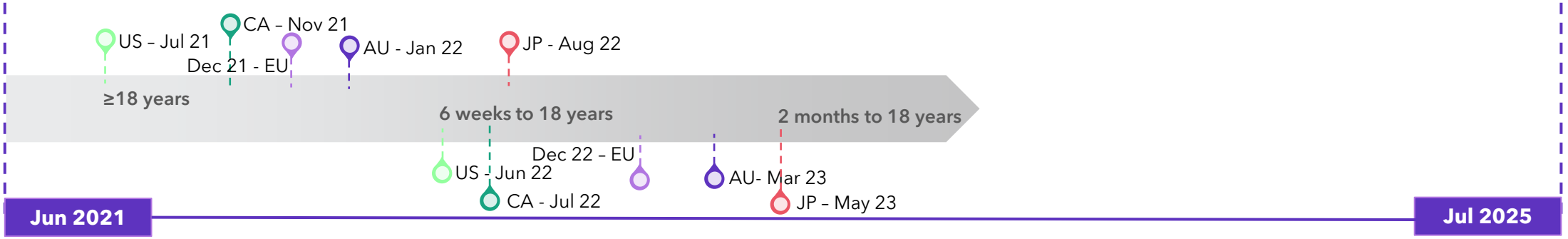
Vaxneuvance and Apexxnar targeted paediatric and adult population, while Capvaxive is tailored to adult population

Japan is the most divergent country, mainly due to pivotal domestic trials including Japanese population

3. Pneumococcal vaccines comparison

VAXNEUVANCE

VAXNEUVANCE (PCV15)



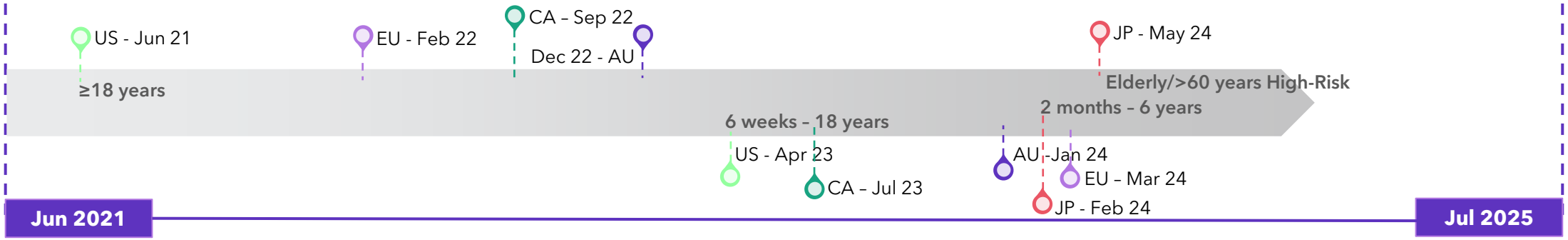
High convergence EU-AUS, medium convergence between the other countries

- Vaxneuvance is not approved in China.
- Age groups are generally consistent across countries (with slight differences in paediatric age bands in Japan). Vaxneuvance targets both paediatric and adult populations. Approvals followed a similar pattern: initial approval in the US, followed by the Canada and other countries, with Japan among the last.
  - ≥18 years: 13 months between the first (US) and the last approval (Japan) .
  - Paediatric population (6 weeks–18 years; from 2 months in Japan): 11 months between the first (US) and the last approval (Japan).
- Indications vary across regions; only the US and Canada share the same indication.
- Pivotal studies differ across regions for the paediatric population. The EU, Canada, and Australia required a pivotal study evaluating the safety and immunogenicity of a 3-dose (2+1) schedule, while in the US was not required, as approved schedule is a 4-Dose (3+1) regimen. In Japan, pivotal studies included HIV/immunocompromised populations, and local Japanese data were required for approval.
- Differences exist in both adult and paediatric populations across regions. Japan includes a dedicated Japanese population, while the EU and Australia share similar safety datasets. PV commitments vary across countries.
- Given the established clinical efficacy of pneumococcal conjugate vaccines, clinical development relied on immunobridging studies, using licensed PCV13 and PPSV23 as active comparators. In paediatric populations, comparators were aligned with country-specific immunisation schedules and co-administered vaccines.

3. Pneumococcal vaccines comparison

PREVNAR 20

APEXXNAR/PREVENAR 20 (PCV20)



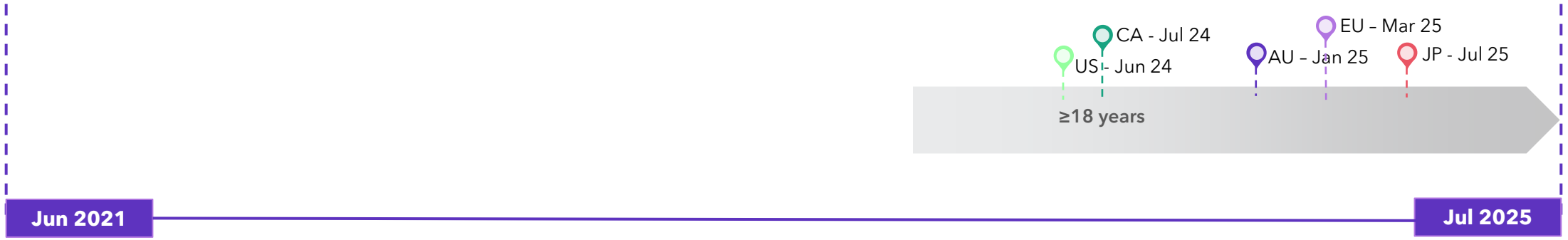
Medium convergence EU-US, CA-AUS, CA-EU, CA-US, and low convergence between all countries and Japan

- Apexxnar is not approved in China.
- Age groups are generally consistent across countries (with variations in Japan). Apexxnar targets both adult and paediatric populations:
  - ≥18 years: First approved in the US and last in Australia, with 18 months between first and last approvals.
  - Elderly and 60 years at high-risk (Japan): Approved 3 years after the initial US approval for adult population.
  - Paediatric population (6 weeks–18 years; 2 months-6 years in Japan): First approved in the US and last in the EU, with ~11 months between approvals. In Japan, the paediatric indication was approved before the adult indication.
- Indications vary across regions, ranging from prevention of invasive and infectious diseases to pneumonia and otitis media (in paediatric population) caused by S. pneumoniae.
- Pivotal studies are largely consistent across regions, except in Japan, where additional domestic trials including a Japanese population were required.
- Differences in the safety database populations across countries, with Japan including a dedicated Japanese population. PV commitments vary between countries.
- Due to the marked reduction in IPD following widespread PCV7 and PCV13 use, large endpoint trials are no longer feasible; approvals relied on immunobridging with PCV13, PPSV23, and PCV15 as comparators. In paediatrics, the US accepted historical PCV7 efficacy data for otitis media, while other regions relied on PCV13 bridging.

3. Pneumococcal vaccines comparison

CAPVAXIVE

CAPVAXIVE (PCV21)



Medium convergence US-CA, US-AUS and CA-AUS, medium convergence between the other countries

- Capvaxive is not approved in China.
- Age bands are consistent across countries. Capvaxive targets the adult population:
  - ≥18 years: First approved in the US, with 13 months between the first and last approval in Japan.
- Indications vary across regions, ranging from prevention of invasive and infectious diseases to pneumococcal disease and pneumonia caused by S. pneumoniae. Serotype coverage also differs between countries.
- Pivotal studies differ across regions: the EU included a PPSV23-controlled study, while Japan relied on multiple trials, including domestic studies. Overall, trial design, comparators, and the extent of local studies varied, although all were based on immunological surrogates rather than clinical efficacy endpoints.
- The safety dataset size is different in the EU and Japan than in the other countries. PV commitments vary across countries.
- At the time of review and approval of Capvaxive, other pneumococcal vaccines were already available for adult use. Clinical development was based on immunobridging studies, using PCV20, PPSV23 and PCV15 as comparators.

3. Influenza vaccines comparison

Summary

	EU-US	EU-JP	US-JP	CA-AU	CA-EU	CA-US	CA-JP	AU-EU	AU-US	AU-JP
Fluarix (GSK)	M	NA in JP	NA in JP	L	L	L	NA in JP	H	M	NA in JP
Fluzone HD (Sanofi)	M	L	L	M	M	H	L	M	M	L
Fluad (CSL Seqirus)	M	NA in JP	NA in JP	NA in CA	NA in CA	NA in CA	NA in CA/ JP	H	M	NA in JP

Legend:

- Low convergence (L): 0-2 parameters aligned
- Medium convergence (M): 3-4 parameters aligned
- High convergence (H): 5-6 parameters aligned

Influenza vaccines not approved in China
Fluarix and Fluad not approved in Japan
Fluad-QIV not approved in Canada, Fluad-TIV with limited available information, not allowing the comparison between countries

Medium-Low

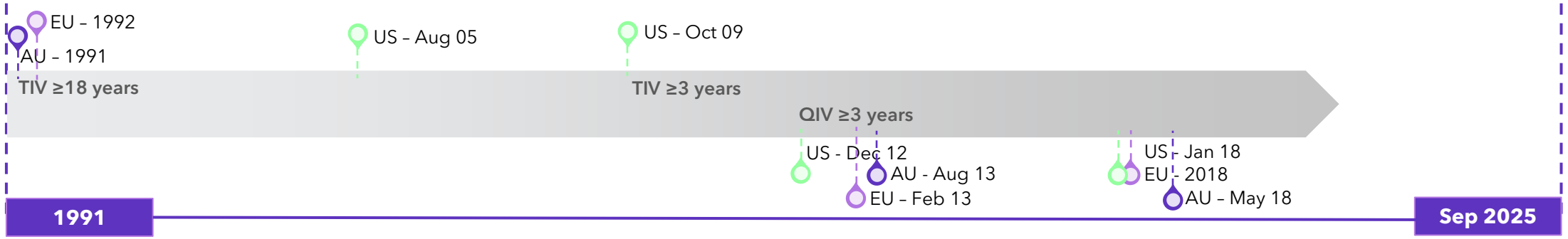
Fluarix and Fluad show high convergence between EU and Australia

Fluzone HD is the only influenza vaccine analysed approved in all countries analysed

Countries are moving from quadrivalent to trivalent vaccines due to the WHO recommendation of removing B/Yamagata lineage antigen

3. Influenza vaccines comparison

FLUARIX



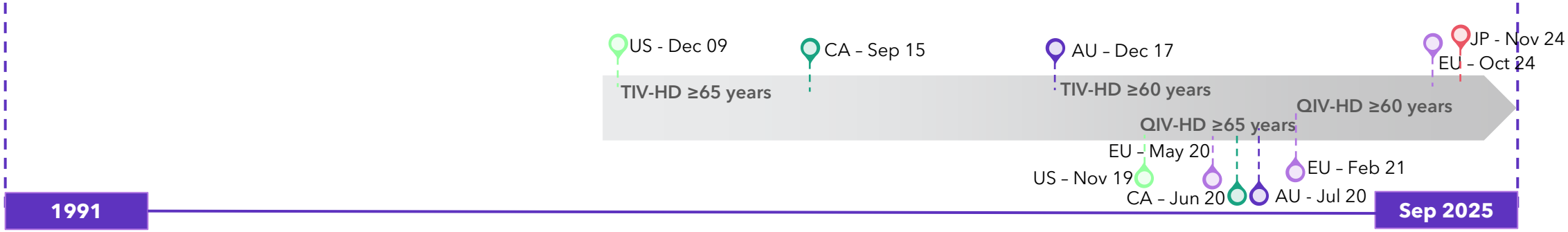
High convergence EU-AU, medium EU-US and AU-US, and low CA with EU, US and AU

- Fluarix is not approved in China or Japan.
- Formulations evolved over time:
  - TIV: First approved in Australia and the EU.
  - QIV: First approved in the US, with 3 years delay in other regions, to reduce B-lineage mismatch.
  - Currently, some countries are reverting to TIV formulations, following WHO recommendations to remove the B/Yamagata lineage antigen.
- Indications are consistent across countries, but age bands differ:
  - TIV: Approved in the 90's for adults (≥18 years) in Australia and the EU, and later in the US. Paediatric expansion approved only in the US (≥ 3 years).
  - QIV: Approved for population ≥ 3 years between 2012-2013 in the US, EU and Australia. Expansion to the 6-35 months population 5 years later.
- Pivotal studies and immunobridging criteria are consistent across regions, although US criteria were more stringent.
- The safety dataset size is similar across regions, although PV commitments differ.
- Fluarix (TIV) approval in the US adults relied mainly on placebo-controlled studies, while paediatric expansion relied on an immunobridging study using Fluzone as the primary comparator. Fluarix (TIV) served as the reference vaccine for evaluating the safety and efficacy of the QIV formulation.

3. Influenza vaccines comparison

FLUZONE

FLUZONE HD/EFLUELDA

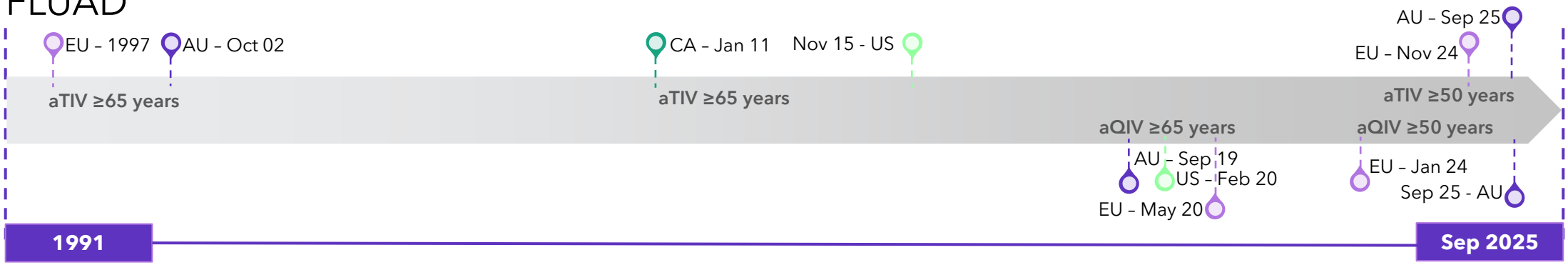


High convergence US-CA, medium EU-US, CA-AU, CA-EU, AU-EU and AU-US, low convergence all countries with Japan

- Fluzone HD is not approved in China.
- TIV-HD was first approved in the US, followed several years later by Canada and Australia. In the EU, it was initially approved as QIV-HD and later switched to TIV-HD, in line with other regions, following the WHO recommendation to remove the B/Yamagata lineage antigen.
- Indications are consistent across countries, but age bands differ:
  - TIV-HD: First approved in the US (≥65 years), followed several years later by Canada (≥ 65 years) and Australia (≥ 60 years). Approved in the EU (≥ 60 years) several years later after the WHO recommendation. TIV-HD is the only formulation available in Japan (≥ 60 years) since 2024.
  - QIV-HD: Approved between 2019 and 2020 in the US, Canada, Australia (≥65 years) and the EU (first approved for ≥65 years and expanded 9 months later to ≥60 years population). Switched from TIV-HD in the US, Canada and Australia, and initially approved as QIV-HD in the EU. Not approved in Japan.
- Pivotal studies and immunobridging criteria are generally consistent across countries, except in Japan, where additional studies comparing administration routes were required for approval.
- Dataset sizes and PV commitments vary across countries.
- In the US, the clinical data package relied on active-controlled trials, comparing TIV-HD directly with TIV-SD, rather than a placebo. QIV-HD was evaluated in an immunobridging study, compared with TIV-HD in an active-controlled design. For TIV-HD approval in the US, QIV-HD dossier served as a primary reference. In Japan, domestic QIV-SD vaccines were used as reference products.

3. Influenza vaccines comparison

FLUAD



High convergence EU-AU, medium EU-US and AU-US

- Fluad is not approved in China or Japan.
- Indications are consistent across countries, but age bands differ:
  - aTIV: First approved in the EU (MRP) in the 1990s and in Australia in 2002 for adults ≥65 years. Later approved in Canada and the US, reflecting the FDA's historically cautious approach to new adjuvants.
  - aQIV: Approved between 2019 and 2020 for adults ≥ 65 years, replacing TIV to address B-lineage mismatch. Expanded to adults ≥50 years in the EU and Australia in 2024-2025. Not approved in Canada.
- Pivotal studies and immunobridging criteria are generally consistent across regions; however, in Canada, direct comparison was not feasible due to limited data from the original TIV approval. aQIV approval in the US was supported by a clinical efficacy study.
- Safety dataset size differs notably in Australia. PV commitments vary between countries.
- Comparator landscape varies across regions due to differences in approval timing and target populations.
  - aTIV: The active comparator for the approval in the US, Canada and Australia was another TIV vaccine, while in the EU approvals were supported by multiple pivotal trials using TIV, aTIV-1 and aTIV-2 and QIV as comparators.
  - aQIV: Approval in the US was not supported by immunobridging studies. EU and Australia approval for adults ≥ 65 years was sustained on two immunobridging studies using aTIV and TIV-SD as comparators. Age expansion in the EU and Australia to ≥ 50 years relied on non-adjuvanted QIV as the primary comparator.

5. Project Takeaways

5. Takeaways

RSV vaccines

- RSV vaccines have received regulatory approval globally since 2023.
- Arexvy utilized a recombinant protein combined with the AS01E adjuvant, while Abrysvo used a bivalent unadjuvanted stabilized prefusion F protein. mRESVIA utilized a mRNA platform encapsulated in lipid nanoparticles (LNPs).
- The clinical program was designed to demonstrate superiority over placebo in primary cohorts (≥ 60 years/maternal immunisation), and immunobridging strategy for expanded age bands, using the ≥60 years cohort as comparator.
- Abrysvo was the only RSV vaccine targeting infant protection through maternal immunization. The pivotal study supporting this age band was designed to demonstrate clinical efficacy, using a placebo control (infants born to vaccinated mothers vs those born to unvaccinated mothers). Long-term follow-up was required (18 and 24 months after birth).

5. Takeaways

Pneumococcal vaccines

- Different indications across countries, from prevention of invasive, infectious and pneumococcal diseases to pneumonia, and the prevention of otitis media in paediatric population, caused by S. pneumoniae.
- Vaxneuvance and Apexxnar targeted both paediatric and adult populations. Capvaxive is a specialized formulation exclusively tailored for adults (≥ 18 years).
- Vaxneuvance focused on superior immune response to serotype 3 and superior immunogenicity for shared serotypes vs. PCV13, while Apexxnar was designed for a broadest coverage for the paediatric market. Capvaxive replaces paediatric strains with 8 serotypes unique to adult disease.
- Approvals by the PMDA required pivotal domestic clinical trials, reflecting Japan's stringent local data requirements.

5. Takeaways

Influenza vaccines

- Fluarix (standard dose) served paediatric and adult populations. Fluzone HD (high-antigen) and Fluad (MF59-adjuvanted) were specialized for the elderly (≥ 65 years) to address immunosenescence.
- Fluad received its initial approvals in the EU (starting with Italy), while Fluzone HD was first authorized in the US.
- The US led the transition to Quadrivalent (QIV) vaccines in 2012 (Fluarix). As of 2025–2026, global markets are reverting to Trivalent (TIV) formulations due to the continued absence of confirmed detection of naturally occurring B/Yamagata lineage*.
- The Japanese market is dominated by local manufacturers in influenza vaccines, with Fluzone HD the only approved vaccine in this market.

*Frequently Asked Questions: Transitioning to Trivalent Seasonal Influenza Vaccines

5. Takeaways

- Vaccines included in the comparison studies were typically submitted and authorised first in the US via a BLA, followed by the EU through the Centralised Procedure, and subsequently by Canada. The final approvals were usually in Australia or Japan.
- Several of the selected vaccines utilised expedited regulatory pathways, such as accelerated approval. This mechanism allows approval based on surrogate or intermediate clinical endpoints reasonably likely to predict clinical benefit, contingent upon post-marketing requirements (PMRs) to verify and describe clinical benefit.
- Once clinical efficacy had been established in a primary cohort, regulatory authorities frequently used immunobridging studies to grant extended indications (e.g., additional age bands or risk groups), thereby bypassing the need for new large-scale Phase 3 efficacy trials.
- In certain markets, supplemental pivotal studies were required to address local practices, especially in paediatric populations (e.g. dose regimen, concomitant administration of vaccines).
- The PMDA typically mandated local clinical data, with studies including Japanese populations, to evaluate ethnic sensitivities and ensure vaccine safety and performance within the domestic population.
- None of the products analysed had been approved in China to date.

Most Convergent

Greater convergence is observed between the EU and Australia, and between the US and Canada

Least Convergent

Japan is the least convergent country

China has not approved any of the vaccines analysed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