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ΜΥΟΣΚΕΛΕΤΙΚΗ
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2-5
Οκτωβρίου
2025

Ρέθυμνο
Κρήτης

Ξενοδοχείο
**Theartemis
Palace**

Με φυσική παρουσία και
διαδικτυακή παρακολούθηση

18:00-19:00 ΣΥΝΕΔΡΙΑ RSV I. 18:00-18:30

RSV σε ασθενείς με φλεγμονώδη/αυτοάνοσα νοσήματα

Χρήστος Κουτσιανάς MD, PhD



ΓΕΝΙΚΟ ΝΟΣΟΚΟΜΕΙΟ ΑΘΗΝΩΝ

ΙΠΠΟΚΡΑΤΕΙΟ

Επίκουρος καθηγητής Παθολογίας - Ρευματολογίας ΕΚΠΑ
Μονάδα Κλινικής Ανοσολογίας - Ρευματολογίας
Β' Πανεπιστημιακή Παθολογική Κλινική και Ομώνυμο Εργαστήριο, ΓΝΑ «Ιπποκράτειο»
Honorary Consultant, R&D, The Dudley Group NHS Foundation Trust



Disclosures

None relevant to this presentation

- Honoraria for lectures & advisory boards: Genesis Pharma, Abbvie, Novartis, Eli-Lilly, Pfizer, Aenorasis, UCB, GSK, Boehringer, Sobi, J & J, Vianex, Sandoz
- Hospitality: Eli-Lilly, Novartis, Viatris, UCB, Genesis Pharma, Abbvie, Faran, Sobi, J & J, Vianex
- Research:
Sub-investigator: Roche, UCB, Eli-Lilly, Novartis, BMS, Pfizer, Genesis Pharma, AMGEN, Merck, Abbvie, Aenorasis, J & J, GSK

Outline

- **Introduction:** Virology and morbidity
- **RSV infection**
- **RSV burden in high risk groups** (epidemiology + outcomes)
- **Specific risks in rheumatic diseases** (autoimmunity + DMARDs)
- **Current & emerging therapies** (vaccines, monoclonals, prospective studies, surveillance)

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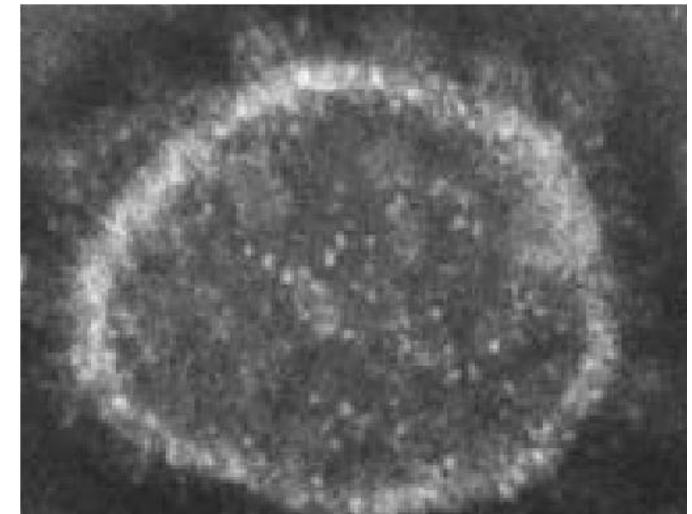
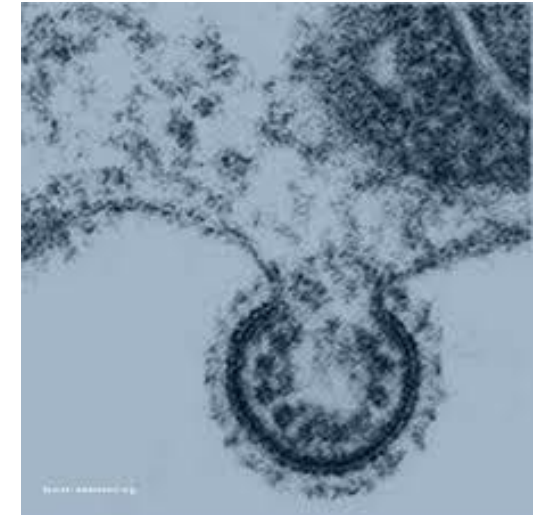
Respiratory Syncytial Virus

History and epidemiology

- **1955**: isolated from chimpanzees at the Walter Reed Army Institute of Research in the United States
Initially named **CCA** [chimpanzee coryza agent]
- **1956**: isolated from infants with severe LRTI
- Quickly recognised as a **ubiquitous pathogen**

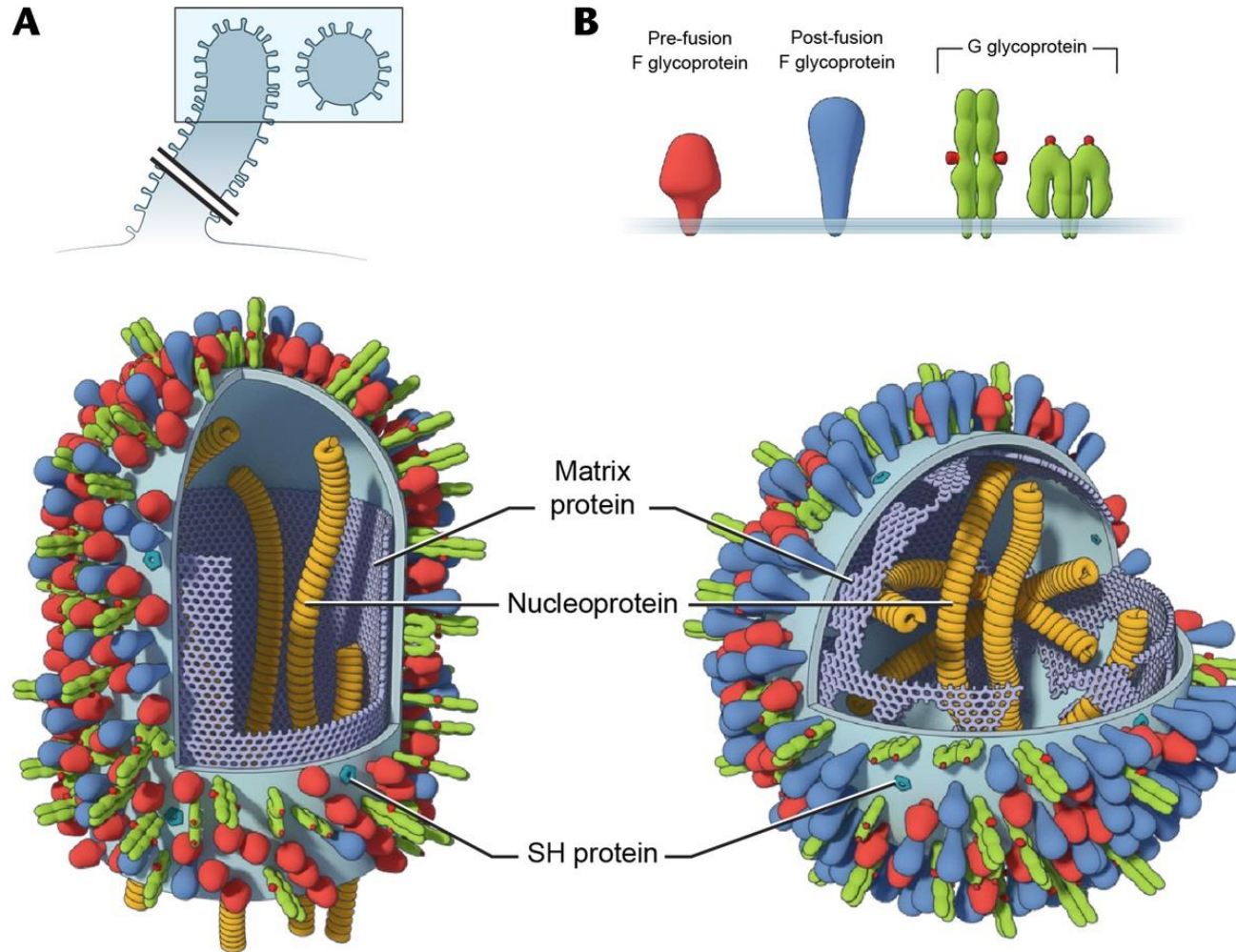
Almost 50% of infants will have had 2 RSV infections by year 2

- Re-infections possible and frequent
Initially thought to be milder infections, but RSV infection recognized as a problem in the 1970s, with **outbreaks** in long-term facilities



Respiratory Syncytial Virus

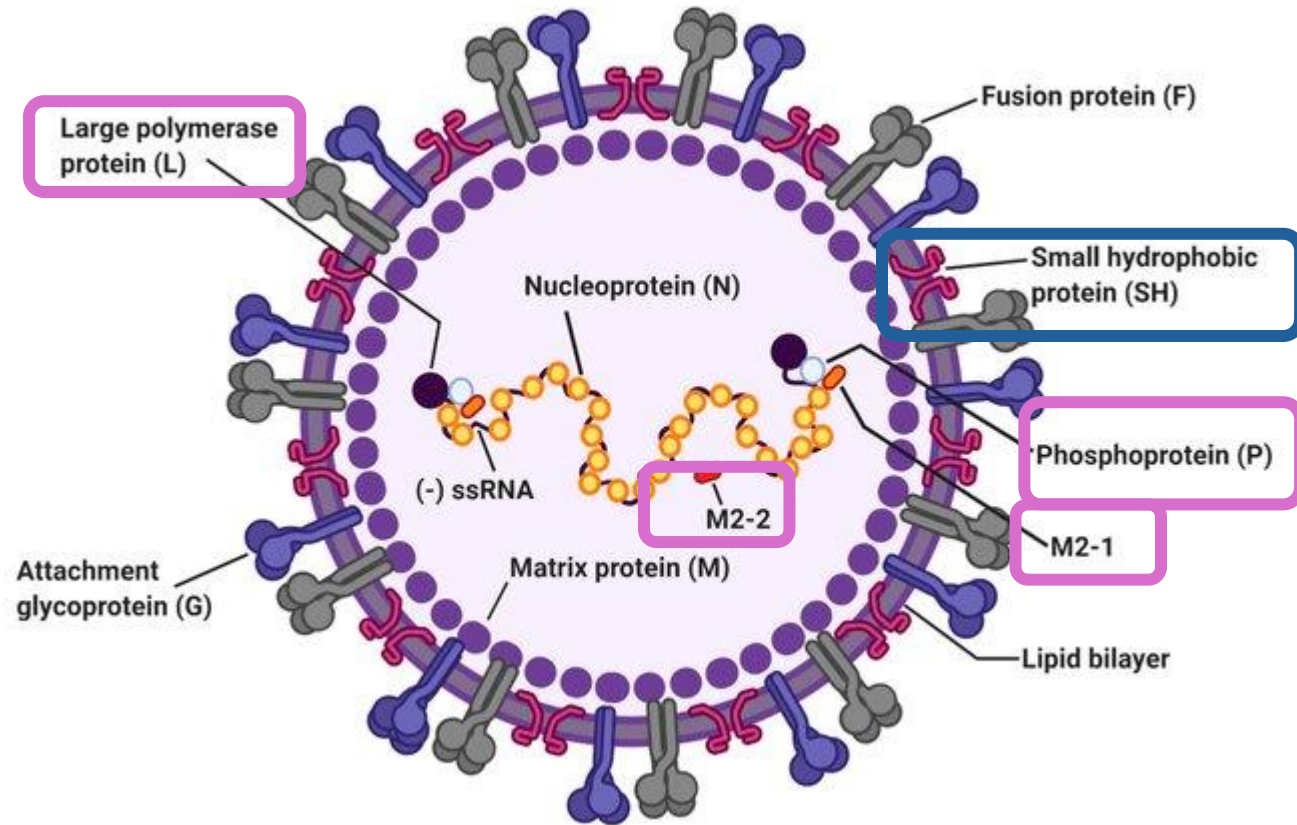
Structure



- Enveloped
- Single-stranded RNA virus
- Pneumoviridae family
- RSV subgroups A and B based on reactivity vs monoclonal antibodies
- Virulence A > B

Respiratory Syncytial Virus

Structure

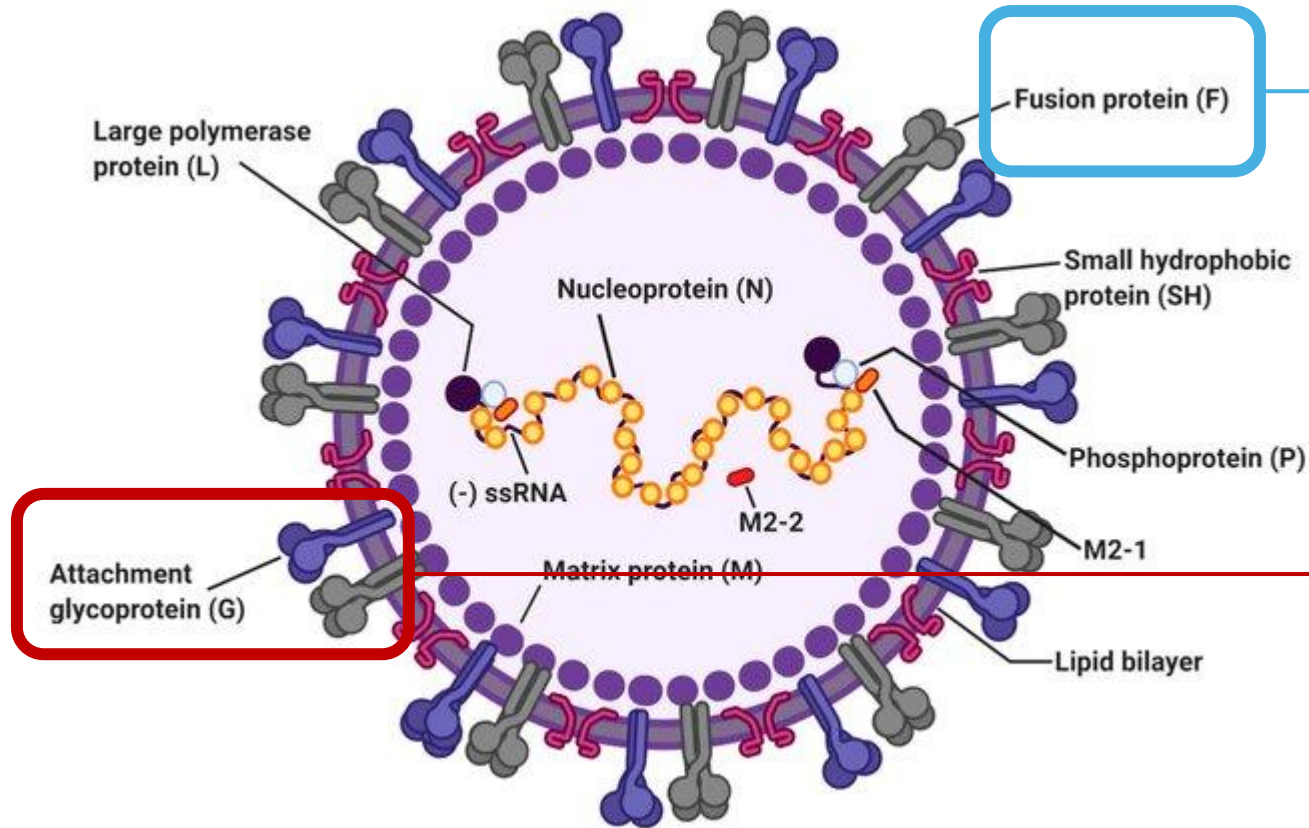


SH protein: enhances membrane permeability in the host

L, P, M2 proteins: viral replication

Respiratory Syncytial Virus

Structure



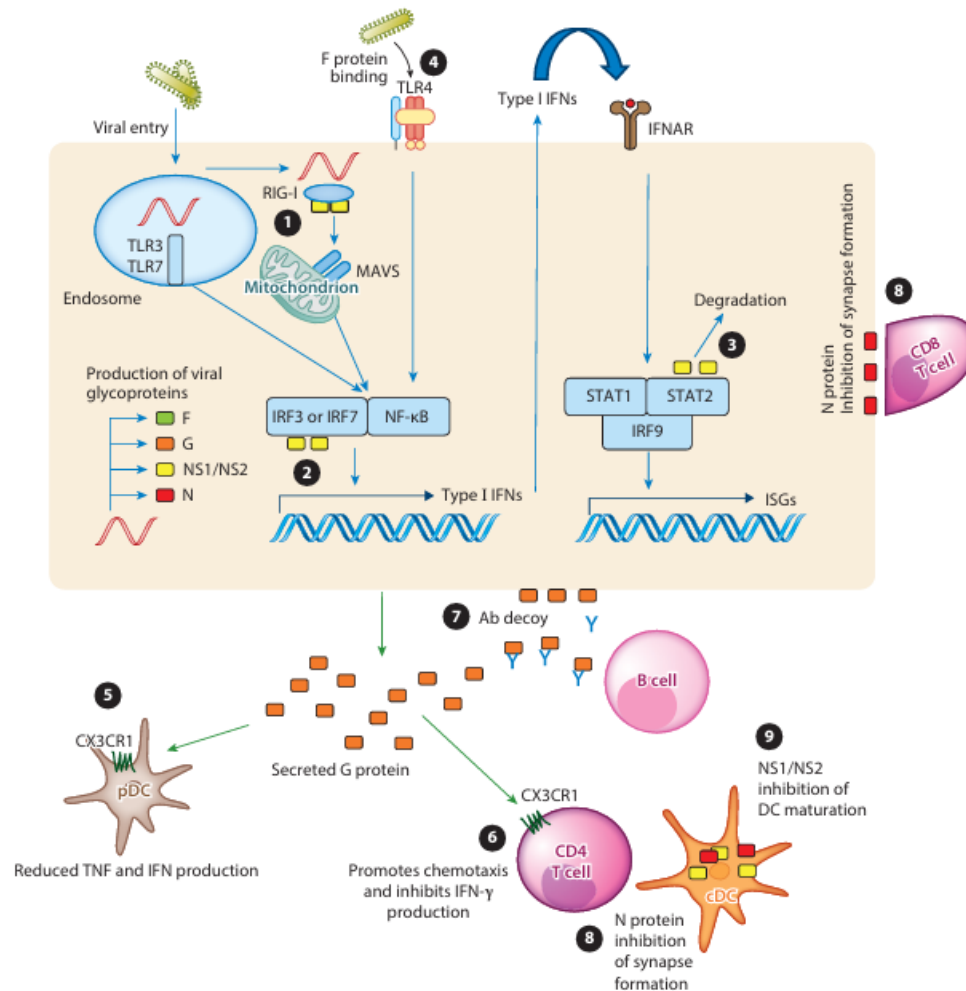
F protein: Responsible for RSV entry

undergoes a conformational change and fuses the viral envelope with the host cell membrane

G protein: responsible for **viral attachment to host cells** and **immune modulation** by RSV

RSV interferes with host immunity

Multiple “weapons” against defense



NS1: disrupts IFN response

NS2: impairs innate signaling via binding to RIG-I

NS1/NS2: - reduces maturation of cDCs
- degrades STAT2

F protein: binds to TLR4 – desensitization of TLR pathway

G protein: acts as a decoy for neutralizing abs

Respiratory Syncytial Virus

Transmission and Survival

⇒ How RSV Spreads

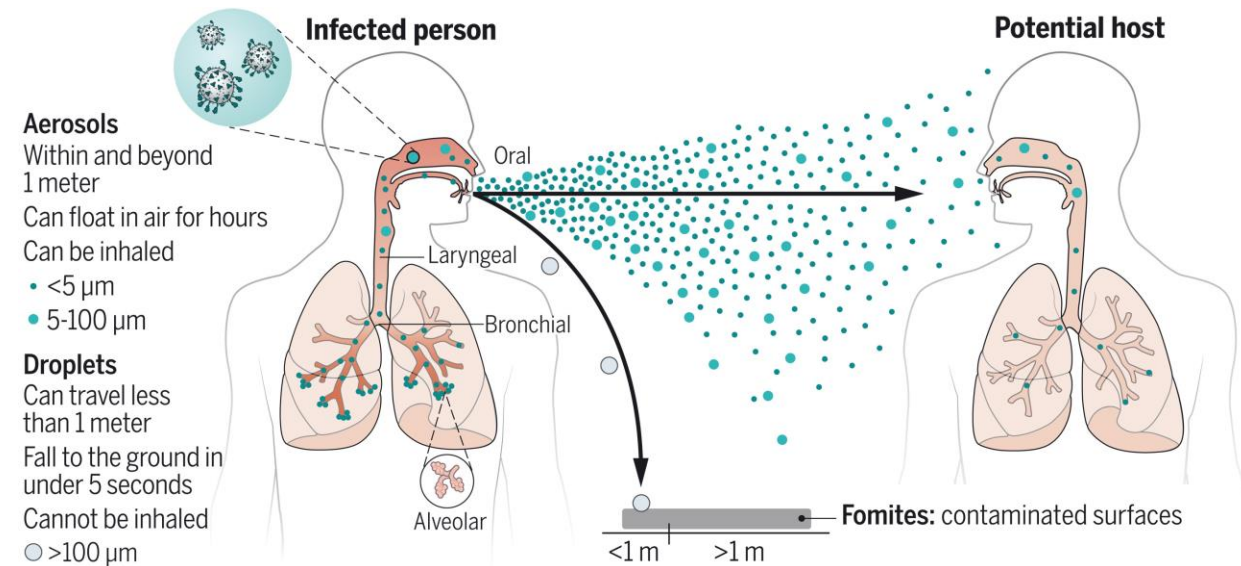
The virus travels through the air in **respiratory droplets** from coughs and sneezes.

- **In the Air:** Survives in **tiny droplets (aerosols)** for up to **7 hours**.
- **On Surfaces:** Remains infectious on skin & clothes for about **2 hours**.

□ How Long RSV Lasts on Surfaces

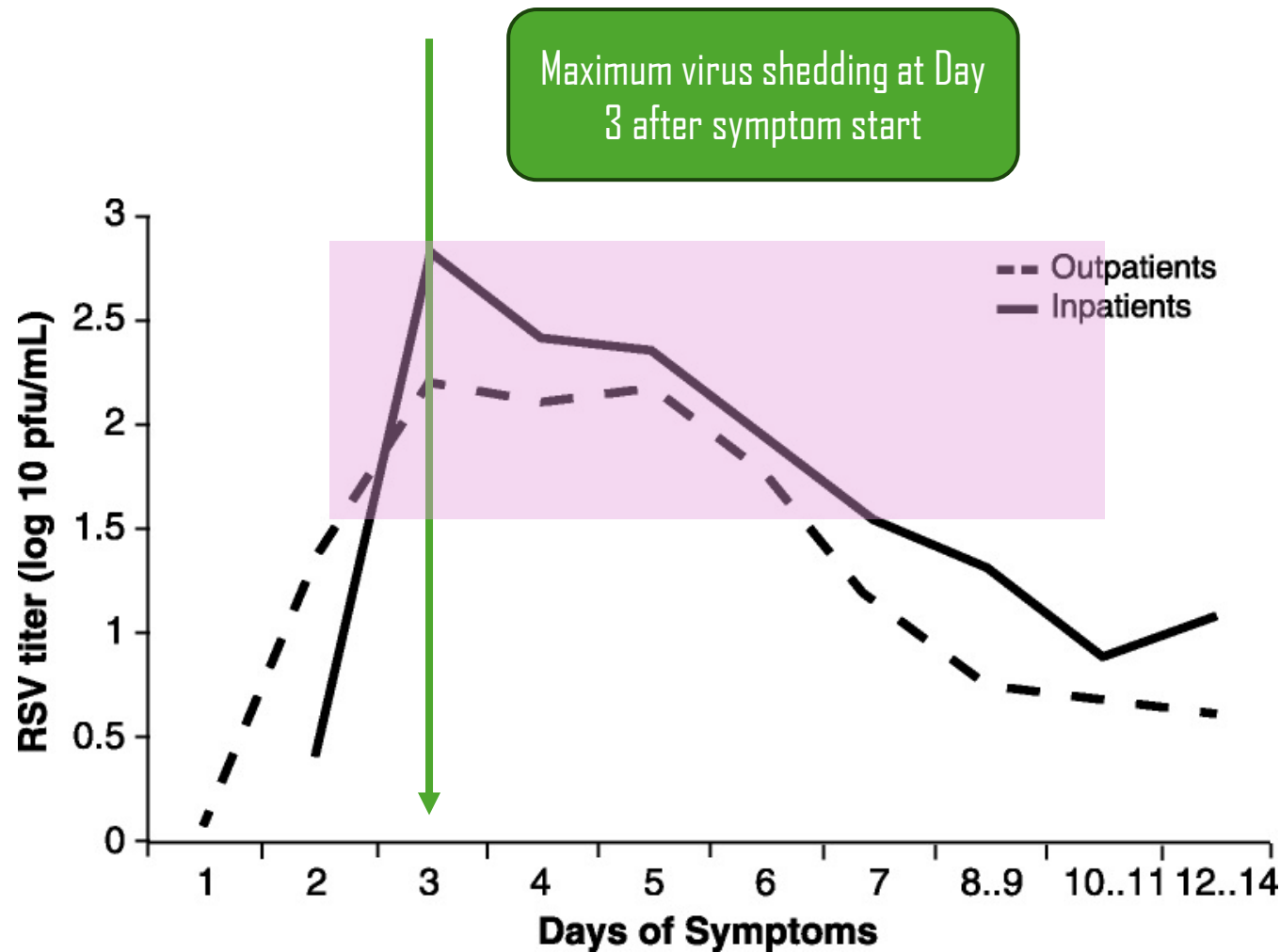
RSV is resilient and can survive on hard surfaces for extended periods, making hand hygiene critical.

- **Hard Surfaces** (e.g., tables, toys): Up to **30 hours**
- **Softer Surfaces** (e.g., fabric, gloves): Around **5 hours**



Respiratory Syncytial Virus

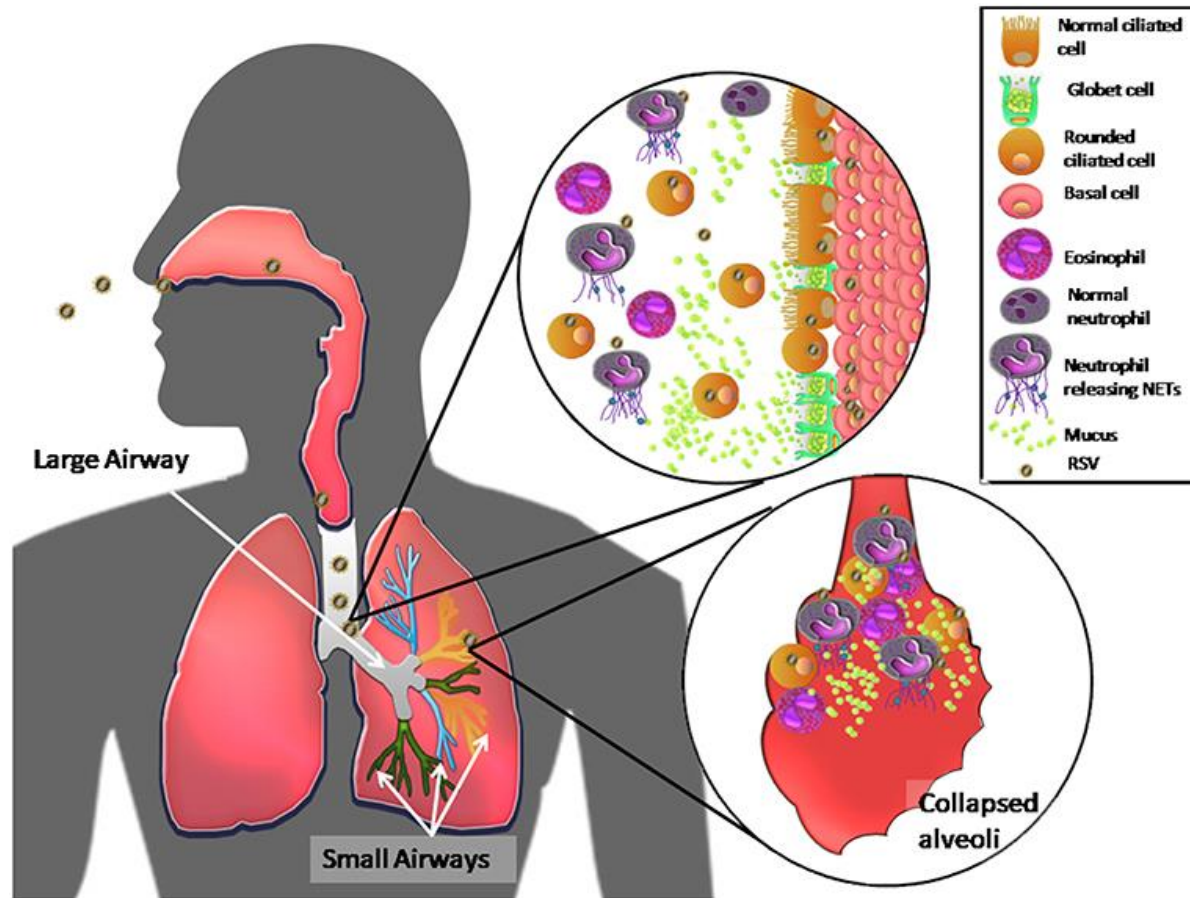
Transmission and Survival



Transmission for a total of up to 8-10 days post symptoms start

RSV infection

Entry and virulence

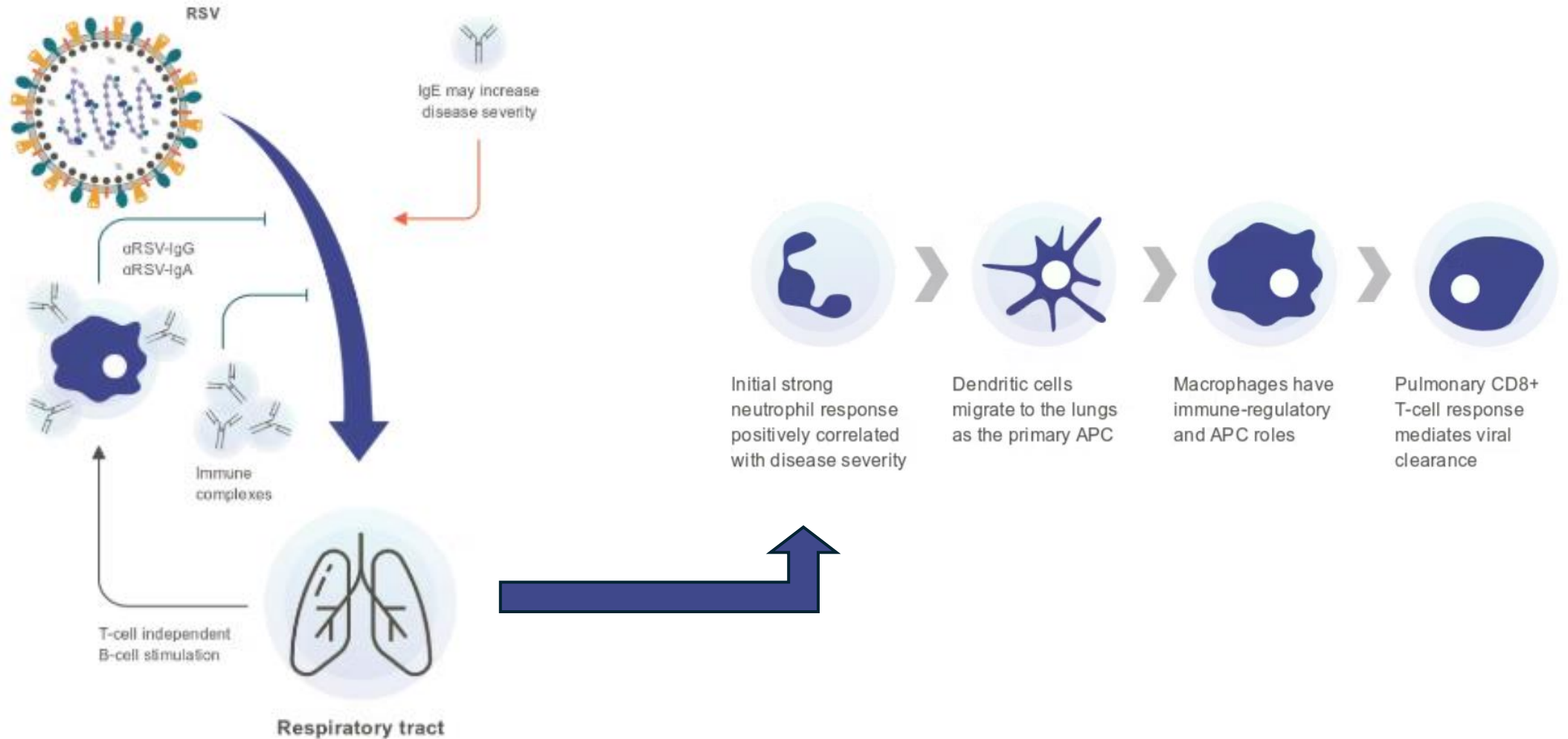


- Primarily infects **ciliated cells** in the large airways
- Accumulation of **apical zone cells** in the lumen of the airway ducts
- Proliferation of goblet cells = high **mucus** production, recruitment of **eosinophils** and massive numbers of **neutrophils** & release NETs
- These products accumulate and move to the distal airways, leading to **bronchial obstruction** of the narrow ducts, and **collapse of alveoli**

Immune responses to RSV

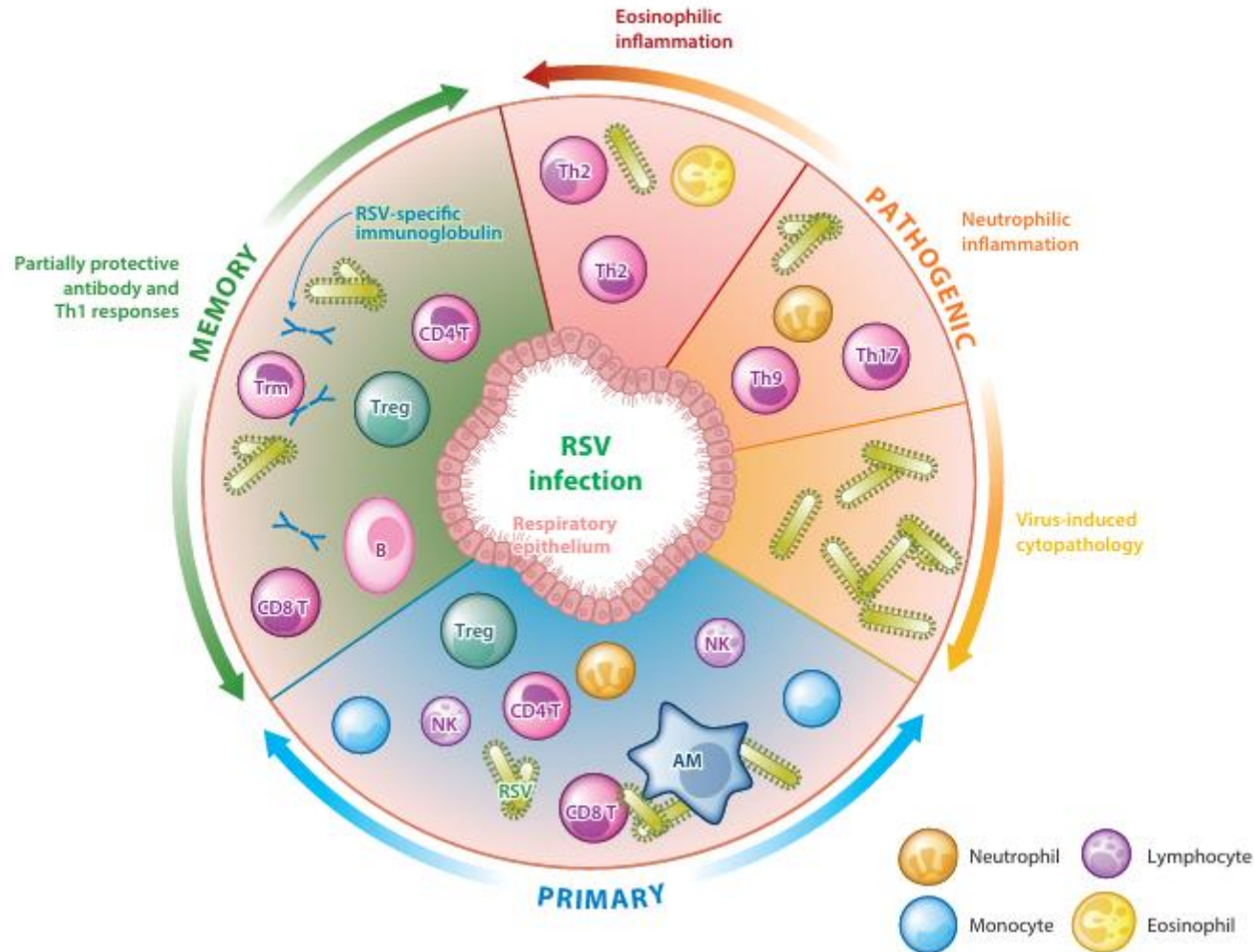
Both humoral and cell-mediated

Humoral and cell-mediated immune responses are necessary to clear RSV infection²⁰⁻²²



RSV immune responses

Neutrophilic +/- eosinophilic inflammation



Immunopathogenic responses are probably associated with

- Th17-
- Th2-
- Th9-polarized (possibly)

adaptive immunity

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RSV infection & immune responses

Age is a major determinant for RSV disease

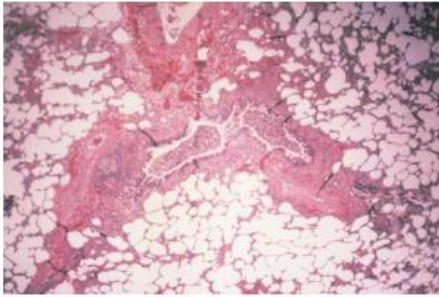
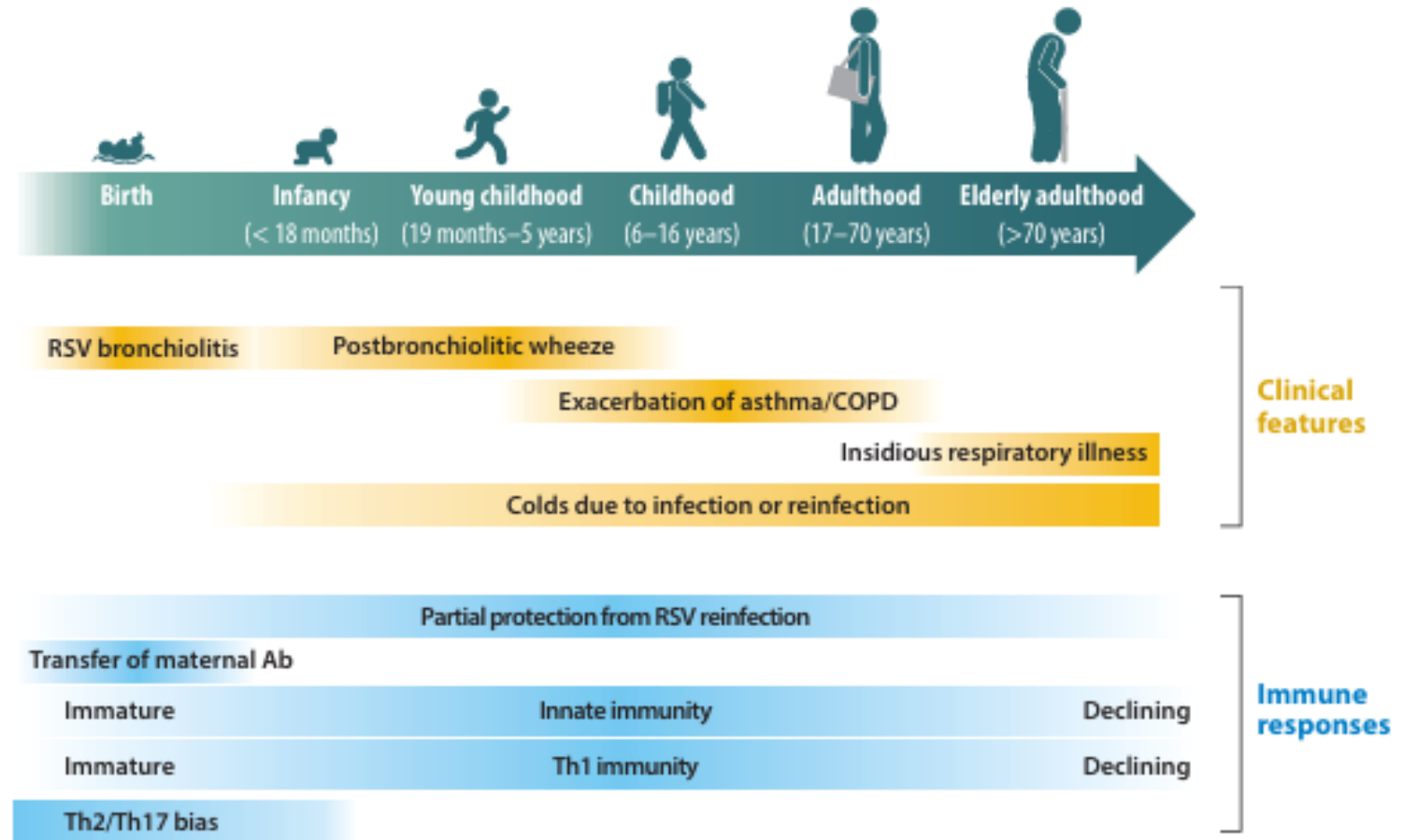
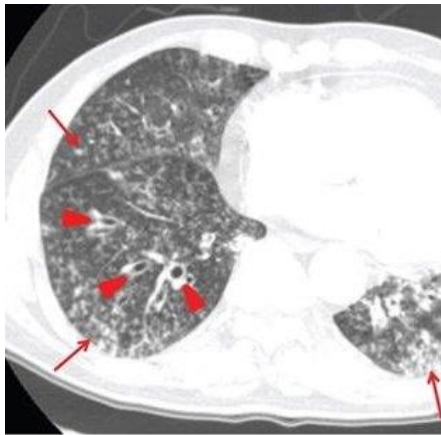


Figure 3. Bronchiolitis in an Infant with Respiratory Syncytial Virus Infection (Hematoxylin and Eosin, $\times 40$).



RSV infection

Clinical syndrome in adults



Initially symptoms from the upper respiratory tract

- Rhinitis
- Congestion
- Sneezing



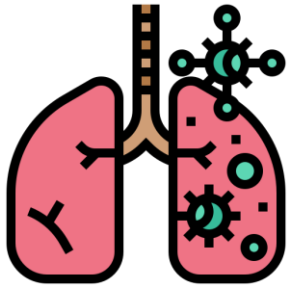
Maybe several days later:
Symptoms from the lower respiratory tract

- Cough
- Wheeze
- Sputum
- Respiratory distress
- Respiratory failure

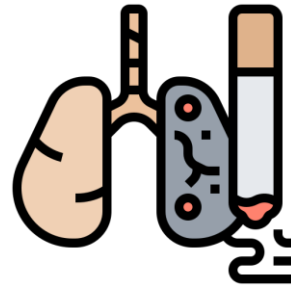


RSV infection

Increased risk for hospitalization in adults



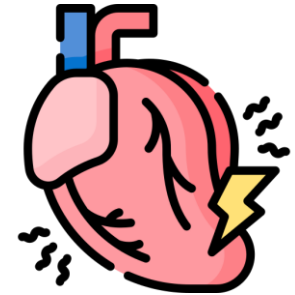
10.6%
of hospitalizations for
pneumonia.



11.4%
of hospitalizations for chronic
obstructive pulmonary disease
(COPD).



7.2%
of hospitalizations for
asthma



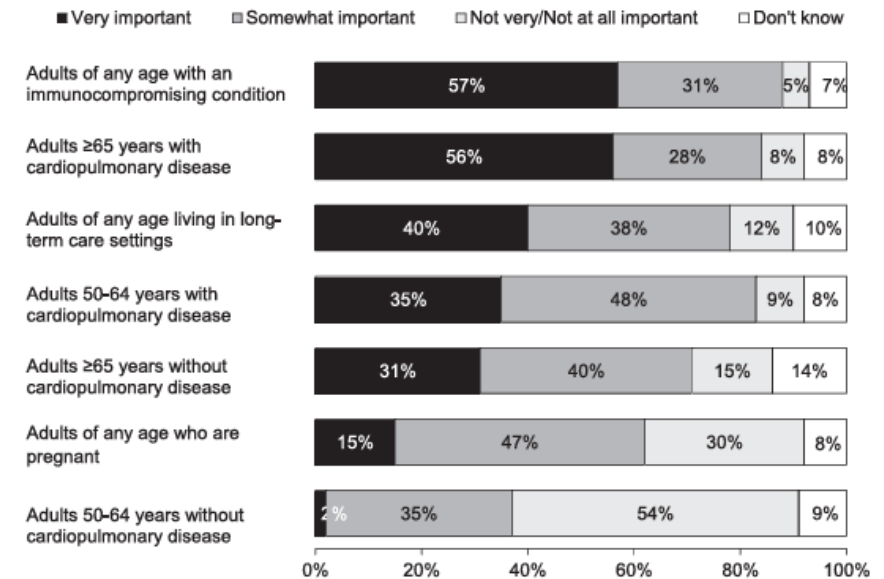
5.4%
of hospitalizations for
congestive heart failure
(CHF).

RSV infection

Underestimated in the general population



- Initial symptoms do not lead patients to their doctors
- Difficult to DDx – non-specific symptoms
- Not routinely checked in samples
- Not “famous” enough among doctors of primary care



RSV infection

Increased morbidity and mortality

RSV mortality

- Among all adults hospitalised with RTI: 0.2–0.6%
- Among all adults hospitalised with RSV RTI: 1–12% (older adults 6–9%)

RSV admission to ICU

- Among all adults hospitalised with RSV RTI: 6–15% (older adults 11–18%)

RSV admission to hospital

- Among all adults hospitalised with RTI: 4–11% (older adults 2.6–6.7%)
- Among medically attended older adults with RSV infection: 12%

Medically attended RSV infection

- Among older adults with RSV infection: 17–28%

Symptomatic RSV infection (community)

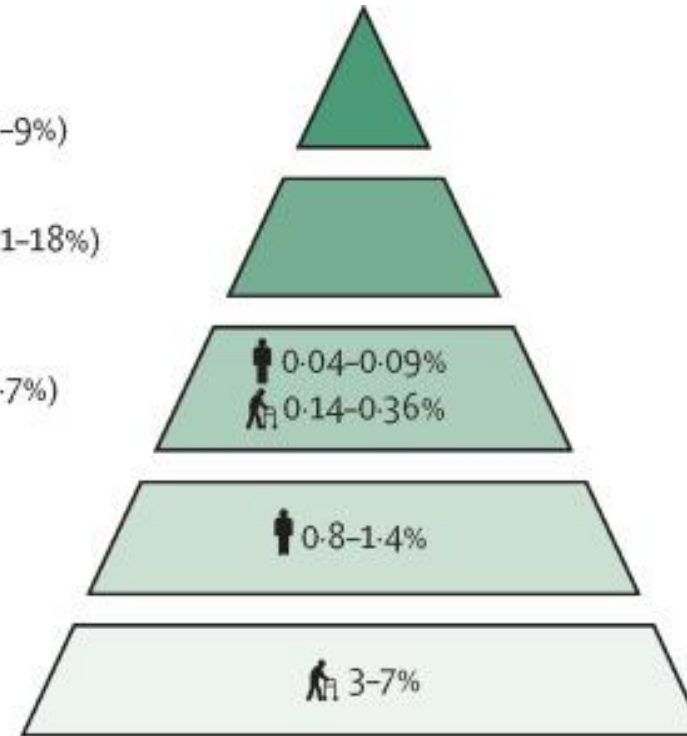
- Among all adults at high risk for severe RSV infection: 4–10%



Adults (≥ 18 years)

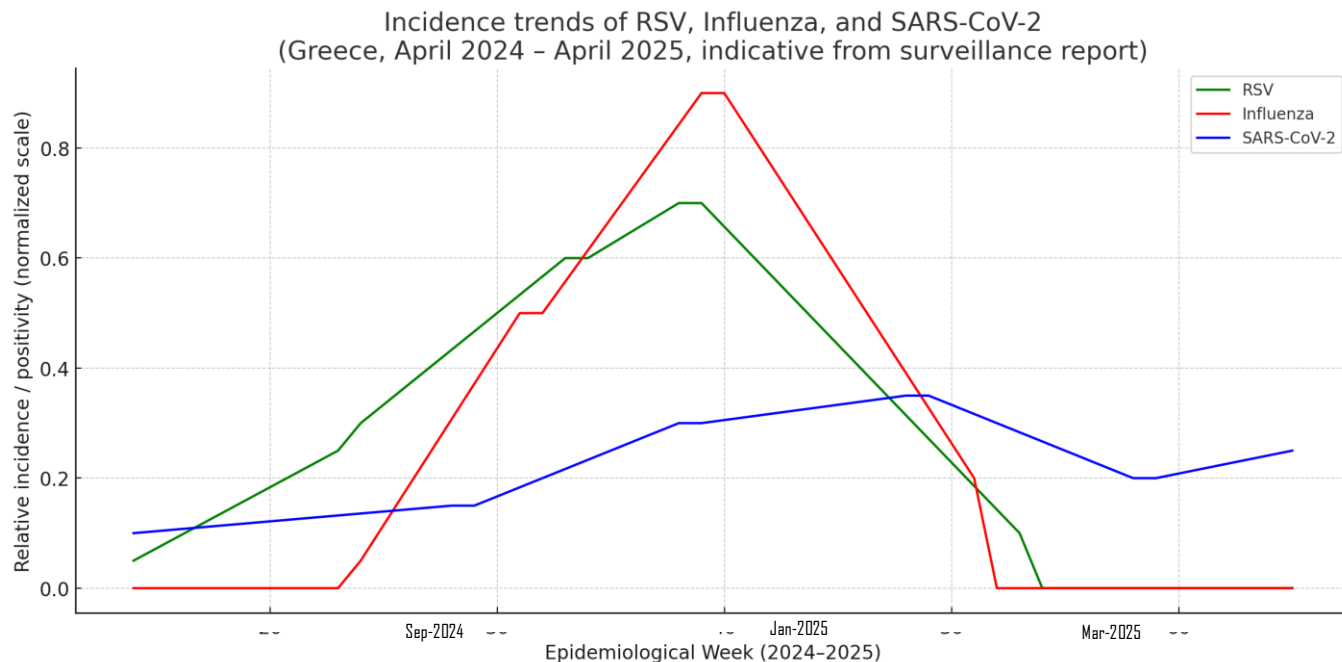


Older adults (≥ 60 years or ≥ 65 years, depending on study)



Burden of RSV in Greece

Incidence trends April 2024 - April 2025



RSV: Rose in autumn 2024, peaked in early winter, then dropped to very low/sporadic detections after week 20/2025.

Influenza: Showed a classic winter peak (Dec-Jan), with cases declining sharply by spring 2025.

SARS-CoV-2: Maintained low but persistent activity throughout the year, with a mild increase in winter, then stabilizing at low levels.

Respiratory Syncytial Virus

More severe outcomes compared to influenza

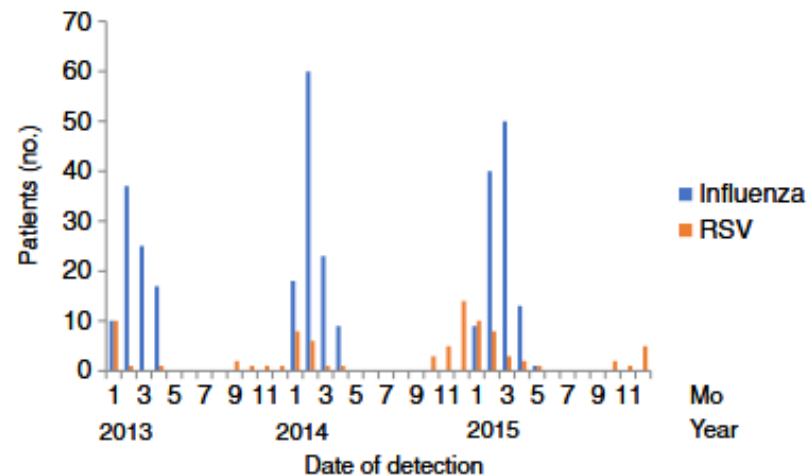


Fig. 2 Time of hospital admission of 87 adult patients with virologically confirmed respiratory syncytial virus (RSV) infection, and 312 adult patients with influenza infection, Daegu, Korea, 2013–2015. RSV seasonal peaks occurred during January in 2013, December in 2014, and January in 2015; the percentage test positivity rates during these periods were 11.4% and 40.8% for RSV and influenza, respectively among virus identified patients. Abbreviation: RSV, respiratory syncytial virus

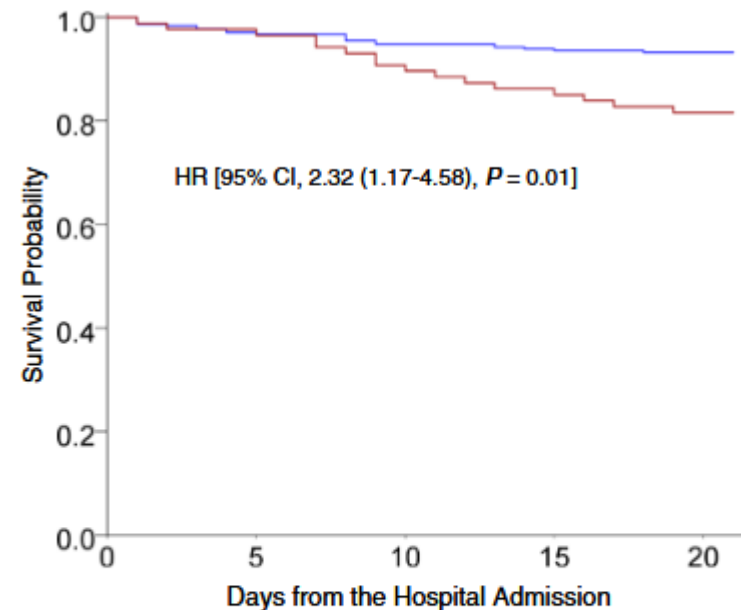
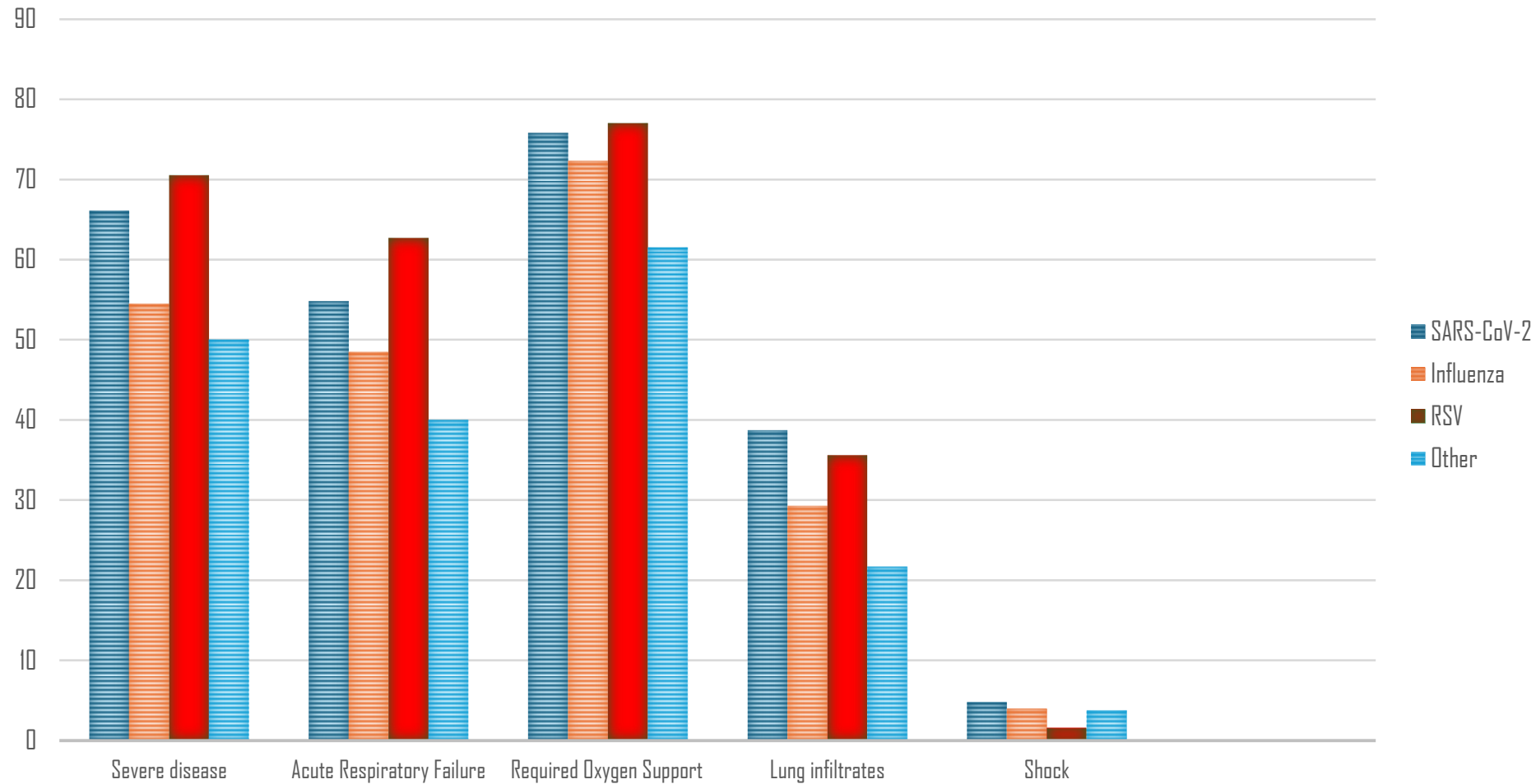


Fig. 3 Kaplan-Meier survival curves of 399 adults hospitalized with respiratory syncytial virus (RSV) and influenza infection (blue line). Patients with RSV infection were shown to have lower survival rates. Between RSV and influenza infected patients, the crude 20-day all-cause mortality rate among RSV and influenza infected patients was 18.4% and 6.7%, respectively

2.32 times
higher risk of death with
RSV vs Flu

RSV infection

Outcomes compared to other respiratory viruses

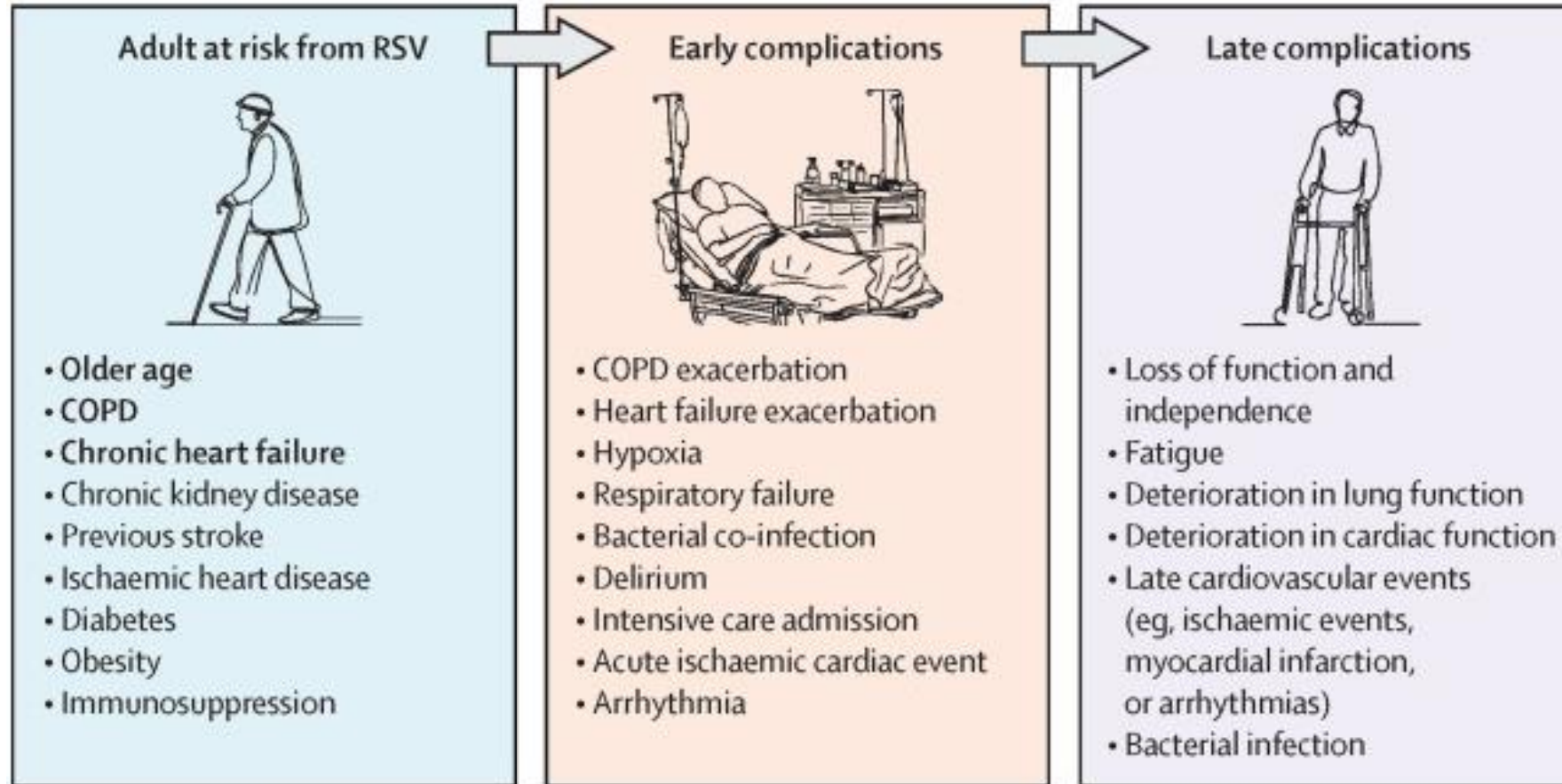


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RSV infection

Who is at risk for worse outcomes?



Who is at risk for severe RSV infection

Chronic medical conditions and other factors

Table. Underlying Medical Conditions and Other Factors Associated With Increased Risk for Severe RSV Disease*

Conditions and Other Factors

Chronic underlying medical conditions associated with increased risk

Lung disease (such as chronic obstructive pulmonary disease and asthma)

Cardiovascular diseases (such as congestive heart failure and coronary artery disease)

Moderate or severe immune compromise†

Diabetes mellitus

Neurologic or neuromuscular conditions

Kidney disorders

Liver disorders

Hematologic disorders

Other underlying conditions a health care provider determines might increase the risk for severe respiratory disease

Other factors associated with increased risk

Frailty

Advanced age (75 y and older)

Residence in a nursing home or other long-term care facility

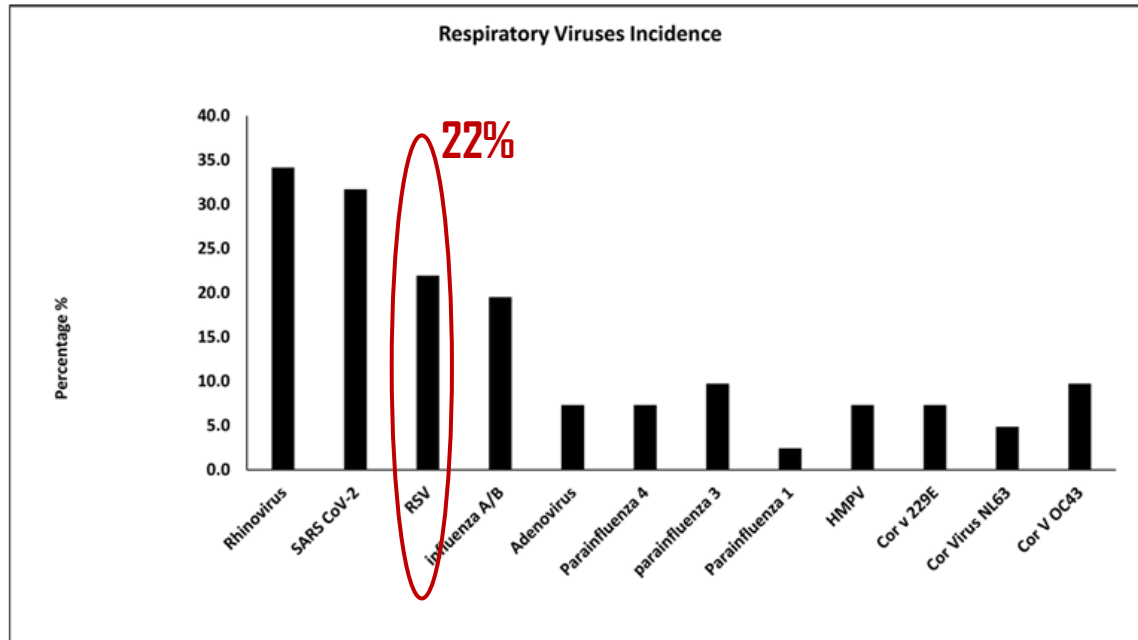
Undomiciled status or living in shelters (2)

Other underlying factors a health care provider determines might increase the risk for severe respiratory disease

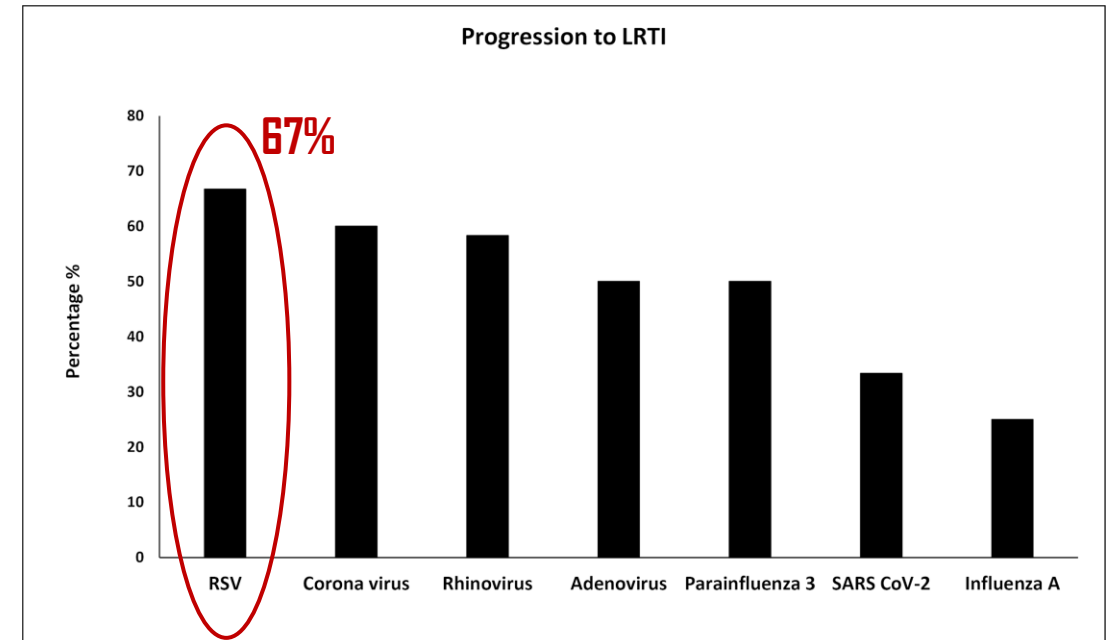
Active treatment with high-dose corticosteroids (i.e., 20 or more mg of prednisone or equivalent per day when administered for 2 or more weeks), alkylating agents, antimetabolites, transplant-related immunosuppressive drugs, cancer chemotherapeutic agents classified as severely immunosuppressive, tumor necrosis factor (TNF) blockers, and other therapies that suppress or change the immune system

Burden of RSV in immunocompromised patients

Viral respiratory infection in HSCT recipients



3rd more common viral pathogen isolated from patients with viral infections (URTI)



2 out of 3 patients progressed to LRTI

RSV in immunocompromised adults

Risk factors for progression from upper to lower RTI

The burden of RSV infections is well described in adult HSCT recipients in whom **progression** is frequent (**40 to 60%**) with **mortality** rates approaching **80%**.

TABLE 1

Risk stratification of HSCT recipients for progression from upper to lower RTI: MD Anderson Cancer Center Immunodeficiency Scoring Index

Risk factor at RSV diagnosis	Hazard ratio for progression	Score ^a
Absolute neutrophil count < 500/ μ L	4.1 (1.4–11.6)	3
Absolute lymphocyte count < 200/ μ L	2.6 (1.0–6.4)	3
Age > 40 years	2.5 (1.1–5.6)	2
Myeloablative conditioning	1.2 (0.6–2.3)	1
Graft-versus-host disease	1.0 (0.5–2.2)	1
Corticosteroids within 30 days (> 20 mg prednisone)	0.89 (0.4–1.8)	1
Allogeneic HSCT within 30 days (or pre-engraftment)	0.68 (0.2–2.3)	1

^aMaximum score = 12: Low risk: 0–2, moderate risk 3–6, high risk 7–12

RSV in immunocompromised adults

Data from haematological diseases

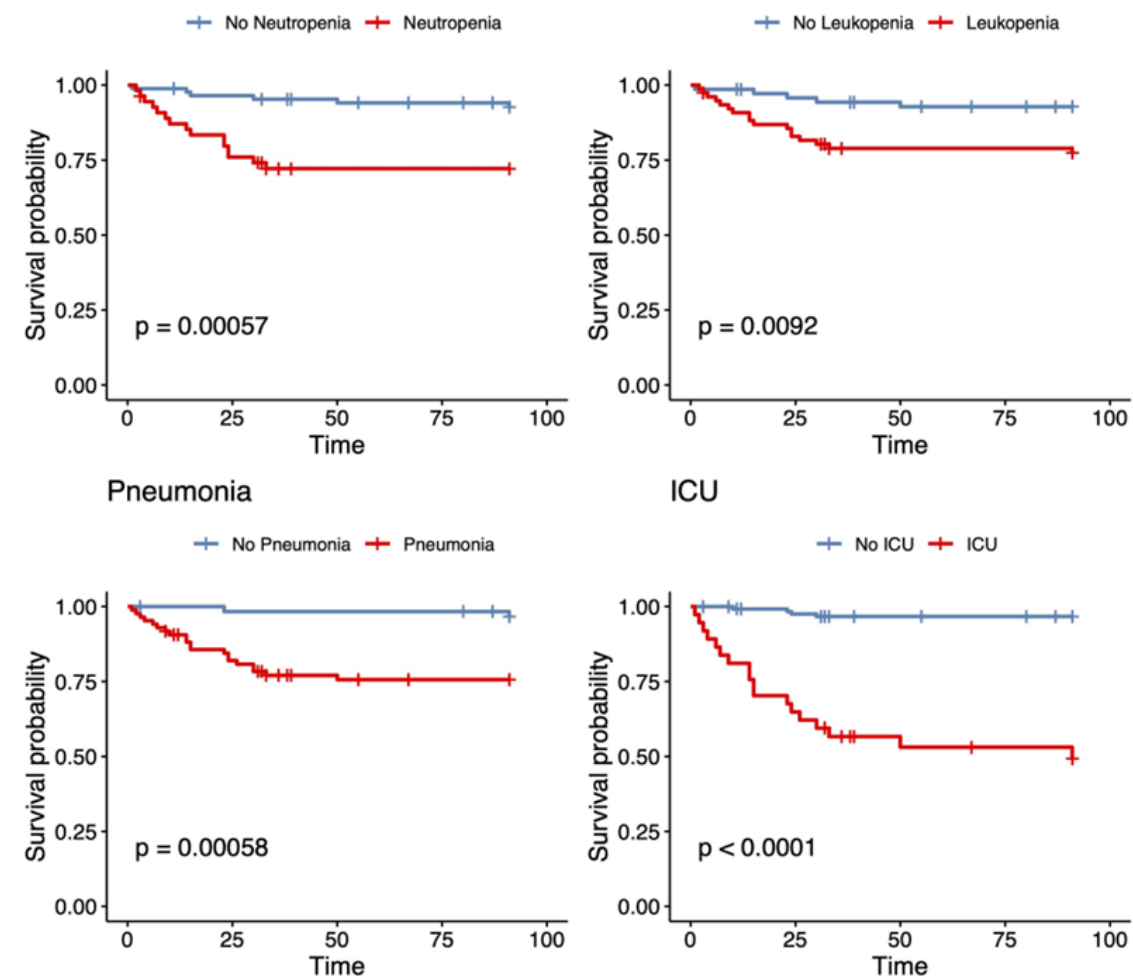


Table 3 Outcome

	Count/Median (range, IQR)	% of <i>n</i> = 166
Hospitalization		
Initially hospitalized due to RSV	52	31.3
Non-hospitalized	16	9.6
Days of Hospitalization	16 (0, 97; IQR: 25)	
ICU		
Admission	37	22.3
Pat. with Pneumonia	32	86.5 ¹
Pat. with Neutropenia	21	56.8 ¹
30-day mortality	18	48.6 ¹
90-day mortality	23	62.5 ¹
Mechanical Ventilation		
Mechanically Ventilated	20	12.0
Days of Mechanical Ventilation	11 (1, 33; IQR: 18)	
Outcome		
Day 30	22	13.3
Day 90	29	17.5

¹ of patients admitted to ICU

RSV infection symptoms

Are there differences in immunocompromised adults?

Table 2

Clinical presentation among population subgroups diagnosed with RSV infection.

	Patient Subgroup		
	Transplant (n = 69)	Immunocompromised nontransplant (n = 24)	Immunocompetent adult (n = 36)
Cough (%)	89.9	83.3	86.1
SOB (%)	60.9	66.7	77.8
Sputum (%)	66.7	58.3	36.1
Rhinorrhea (%)	50.7	25	50
Fever (%)	47.8	50	44.4
Length of symptoms prior to admission (days)	4.58	6.13	5.39

COPD, chronic obstructive pulmonary disease; SOB, shortness of breath.

Compared to immunocompetent adults

- **less** commonly **dyspnea & rhinorrhea**
- **more** commonly **sputum & fever**

Table 3

Morbidity and mortality among patient subgroups.

	Patient Subgroup		
	Transplant (n = 69)	Immunocompromised Nontransplant (n = 24)	Immunocompetent Adult (n = 36)
Any Respiratory Complications (%)	43.5	62.5	50
Pneumonia (%)	36.2	58.3	33.3
Cardiovascular Complications (%)	4.3	16.7	19.4
Other Complications (%)	27.5	50	16.7
Inhaled Oxygen (%)	37.7	45.8	44.4
Mechanical Ventilation (%)	13	4.2	13.9
Required Admission (%)	71	91.7	72.2
Average Hospital Stay (days)	8.2	6.9	3.8
30 Day Mortality (%)	5.8	4.2	0
60 Day Mortality (%)	7.2	8.3	0

Compared to immunocompetent adults

- ↑ **pneumonia, requiring admission**
- ↑ **mortality rate**

Predictors of hospitalization in RSV patients

Data for rheumatic disease



Table 3 Predictors for ARTI-attributable hospital admission among all immunocompromised patients and stratified by age-groups (adults vs children)

N = 215 (152 adults, 63 children) ^a		Univariable analyses	Multivariable analyses	
		OR (95% CI)	OR (95% CI)	P value
Increasing age (by 10Y range)	All	1.0 (0.9;1.1)	1.0 (0.9;1.2)	0.558
	Adults	1.6 (1.3;2.1)	1.4 (1.0;1.8)	0.027
	Children	0.6 (0.2;1.8)	–	–
Bacterial co-infection	All	1.6 (0.8;3.4)	1.5 (0.7;3.3)	0.340
	Adults	2.2 (0.9;5.2)	1.7 (0.6;4.5)	0.286
	Children	0.8 (0.2;3.3)	1.0 (0.2;4.6)	0.995
ALC	All	1.0 (1.0;1.2)	1.0 (1.0;1.2)	0.420
	Adults	1.0 (1.0;1.2)	1.0 (1.0;1.2)	0.436
	Children	0.8 (0.5;1.2)	0.8 (0.5;1.2)	0.309
SOT	All	2.1 (0.9;5.1)	1.9 (0.8;4.6)	0.166
	Adults	2.1 (0.9;5.4)	1.6 (0.6;4.4)	0.312
	Children	1.7 (0.1;53.3)	–	–
Leukemia/lymphoma	All	4.0 (1.7;9.5)	3.9 (1.7;9.7)	0.002
	Adults	3.0 (1.0;9.3)	1.5 (0.4;5.2)	0.556
	Children	7.5 (1.1;149.7)	–	–
Solid tumor	All	7.2 (2.6;21.2)	7.4 (2.7;21.9)	< 0.001
	Adults	7.4 (2.1;28.4)	5.2 (1.4;20.9)	0.015
	Children	10.5 (1.2;240.1)	–	–
Chronic immunosuppressive medication	All	10.5 (3.7;32.9)	9.5 (3.3;30.2)	< 0.001
	Adults	8.2 (2.6;28.4)	4.1 (1.1;16.0)	0.034
	Children	35.0 (2.6;1450.5)	–	–
PID	All	4.3 (0.7–26.1)	4.5 (0.7;29.0)	0.097
	Children	10.5 (0.8–298.2)	–	–

Adult patients with

- **solid tumors**
- **leukaemia and**
- those requiring **chronic immunosuppression for vasculitis**

were significantly more likely to be admitted to hospital for RSV disease compared to HSCT recipients

Outcomes of RSV infection

Data from systemic autoimmune rheumatic disease



Retrospective study, n=188

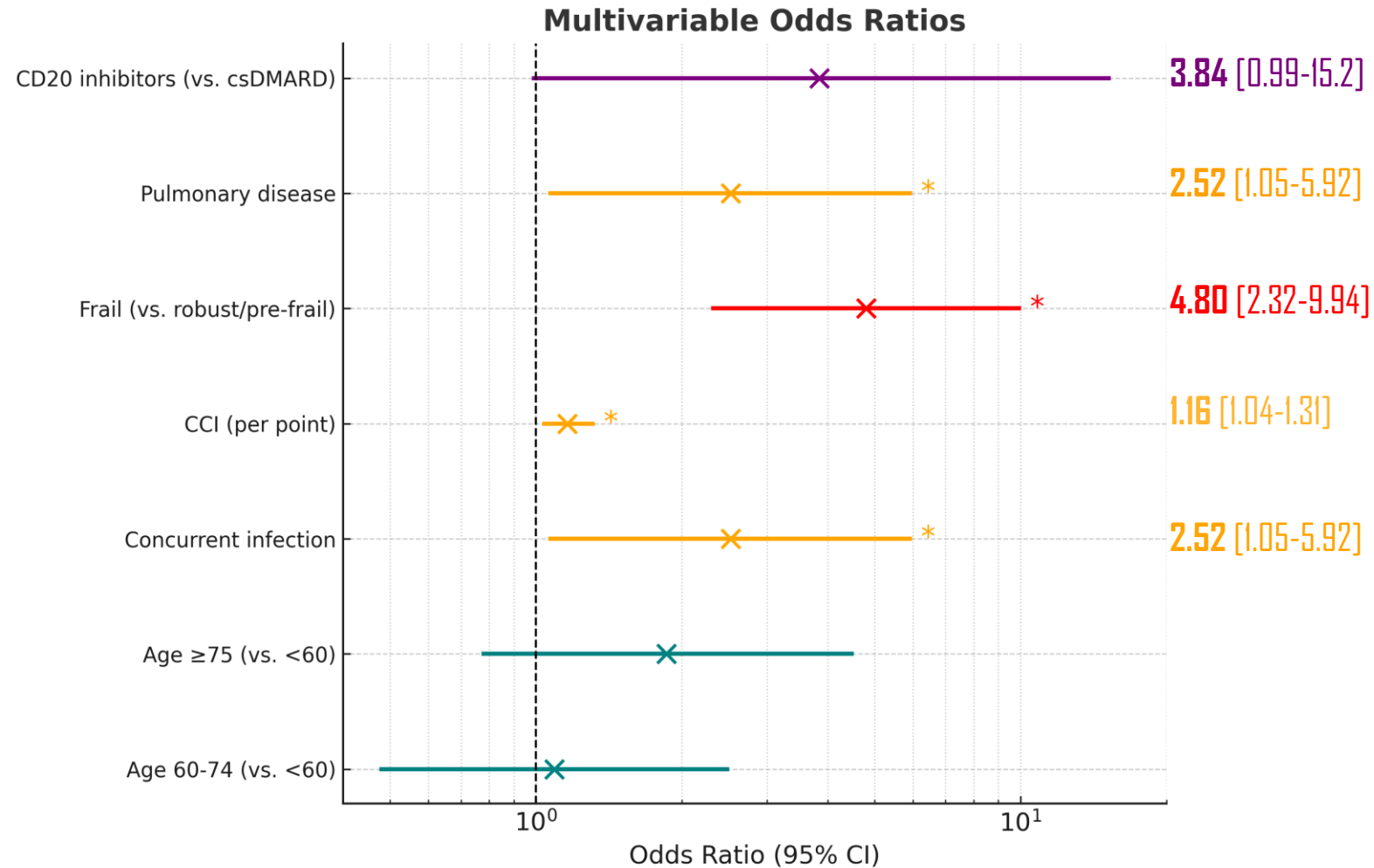
Mean age 68,5 yrs, 75% female

- Rate of hospitalization **51%**
- Among hospitalized individuals, **56%** required **oxygen**.
- There were **12 deaths within 90 days** (12.5% of those hospitalized; 6% of all with RSV).

SARD diagnosis, n (%)				
RA or other inflammatory arthritis*	98 (52.1)	47 (49)	51 (55.4)	0.37
SLE or other CTD†	35 (18.6)	19 (19.8)	16 (17.4)	0.67
Vasculitis (excluding GCA)	13 (6.9)	7 (7.29)	6 (6.52)	0.84
PMR and/or GCA	19 (10.1)	13 (13.5)	6 (6.52)	0.11
Sarcoidosis	11 (5.9)	6 (6.25)	5 (5.43)	0.81
Undifferentiated or other rheumatologic disease	19 (10.1)	7 (7.29)	12 (13)	0.19

Outcomes of RSV infection

Data from systemic autoimmune rheumatic disease



Response to RSV vaccination

Attenuated responses in patients with IMIDs

Table. Characteristics of Immunocompromised Persons Receiving Respiratory Syncytial Virus (RSV) Vaccination, by Level of Antibody Response

	Seroconversion, No. (%) ^{a,b}				High-titer neutralization, No. (%) ^{c,b}		
Characteristic	All (N = 38)	Yes (n = 23)	No (n = 15)	P value	Yes (n = 22)	No (n = 16)	P value
Demographics							
Age, median (IQR), y ^d	66 (64-72)	66 (64-70)	68 (63-75)	.34	66 (64-69)	68 (62-75)	.32
Female	19 (50)	13 (57)	6 (40)	.51	11 (50)	8 (50)	.99
Male	19 (50)	10 (43)	9 (60)		11 (50)	8 (50)	
Nontransplant condition ^f							
Rheumatoid arthritis	7 (18)	5 (22)	2 (13)	.68	4 (18)	3 (19)	.99
Lupus	2 (5)	2 (9)	0	.51	2 (9)	0	.50
Other condition ^g	3 (9)	2 (9)	1 (7)	.99	1 (4)	2 (13)	.56
	3 (9)	2 (9)	1 (7)	.99	2 (9)	1 (6)	.99
Immunosuppressants							
Anti-CD20 [*]	2 (5)	0	2 (13)	.15	0	2 (12)	.17
Calcineurin inhibitor	29 (76)	16 (70)	13 (87)	.27	16 (73)	13 (81)	.71
Glucocorticoid	15 (39)	9 (39)	6 (40)	.99	7 (32)	8 (50)	.32
Methotrexate	1 (3)	1 (4)	0	.99	1 (5)	0	.99
Mycophenolate	18 (47)	8 (35)	10 (67)	.10	8 (36)	10 (62)	.19
mTOR inhibitor	6 (16)	5 (22)	1 (7)	.37	6 (27)	0	.03
Biologic ^h	4 (11)	4 (17)	0	.14	3 (14)	1 (6)	.62

Outline

- Introduction: Virology and morbidity
- RSV infection
- RSV burden in high risk groups (epidemiology + outcomes)
- Specific risks in rheumatic diseases (autoimmunity + DMARDs)
- **Current & emerging therapies** (vaccines, monoclonals, prospective studies, surveillance)



"An ounce of prevention
is worth a pound of cure."
Benjamin Franklin

Respiratory Syncytial Virus

Prevention

□ Key Prevention Tips

1. **Wash Hands** frequently with soap and water.
2. **Disinfect** high-touch hard surfaces.
3. **Avoid** touching your face with unwashed hands.
4. **Cover** your coughs and sneezes.
5. **Encourage** individuals with cold-like symptoms to **remain at home**



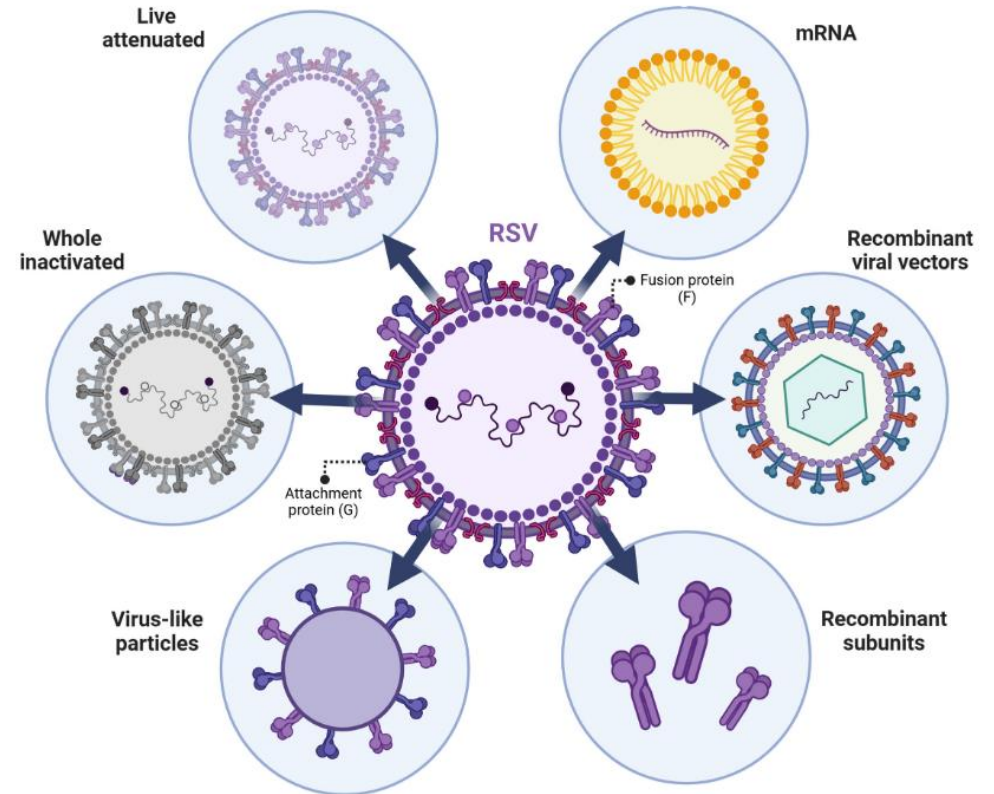
RSV vaccination

Multiple failures, but at last light at the end of the tunnel

The first RSV vaccine [1966] was inactivated virus vaccine

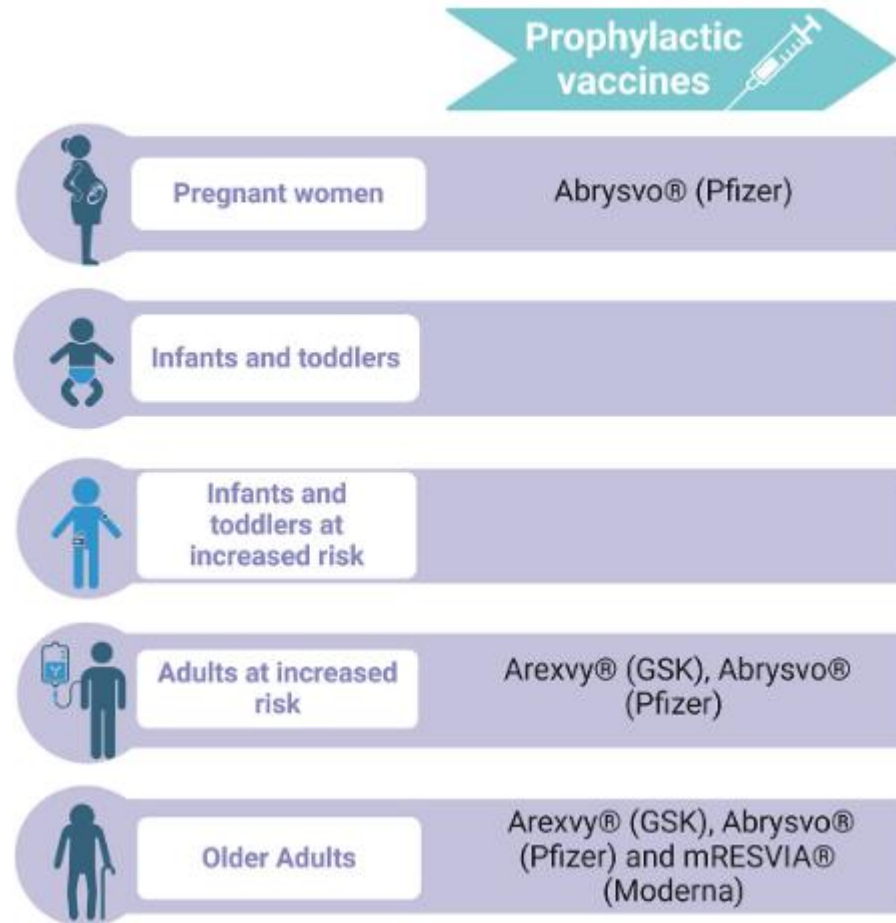
Led to **enhanced respiratory infection**, because it mainly present a post-F protein on virion surface

The **pre-F conformation** induces a much more protective immune response



RSV management

Prophylaxis and treatment



RSV vaccination

Three EMA authorized vaccines



Arexvy (GSK): stabilized pre-F protein adjuvanted with AS01E



Abrysvo (Pfizer): bivalent subunit-based vaccine containing the stabilized pre-F proteins (RSV-A and RSV-B)



mRESVIA (Moderna): mRNA sequence encoding a stabilized RSV pre-F glycoprotein encapsulated in lipid NPs (LNPs)

RSV vaccination

Guidelines from Greek Ministry of Health

Πίνακας 1. Εθνικό Πρόγραμμα Εμβολιασμών Ενηλίκων, ανά ηλικιακή ομάδα, 2025

Εμβόλιο ▼	Ηλικία ►	18 έως 26 ετών	27 έως 59 ετών	60 έως 64 ετών	65 έως 75 ετών	άνω των 75 ετών
^[14] Αναπνευστικού συγκυτιακού ιού (RSV)				1 δόση βλέπε σχόλιο		1 δόση

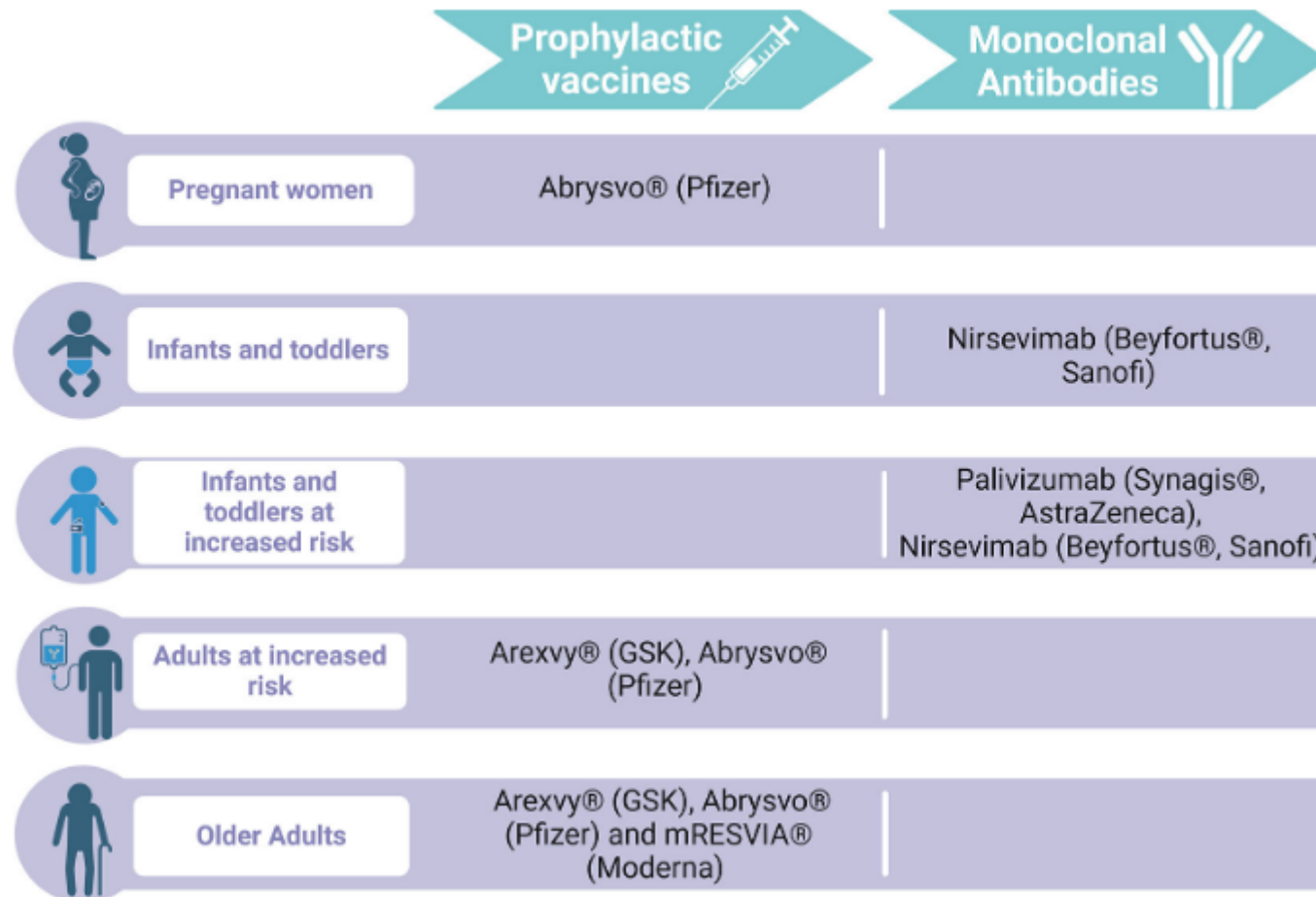
14. Εμβόλιο έναντι του αναπνευστικού συγκυτιακού ιού (RSV)

Χορηγείται μια δόση του εμβολίου σε άτομα που ανήκουν στις παρακάτω ομάδες **αυξημένου κινδύνου**:

- Άτομα ηλικίας 75 ετών και άνω.
- Άτομα ηλικίας 60 ως 74 ετών με έναν ή περισσότερους από τους παρακάτω επιβαρυντικούς παράγοντες ή χρόνια νοσήματα:
 - Καταστάσεις μέτριας ή σοβαρής ανοσοκαταστολής (φαρμακευτική ή λόγω νόσου).
 - Μειωμένη ή απουσία φυσικής άμυνας που οφείλεται σε οποιαδήποτε αιτία.

RSV management

Prophylaxis and treatment

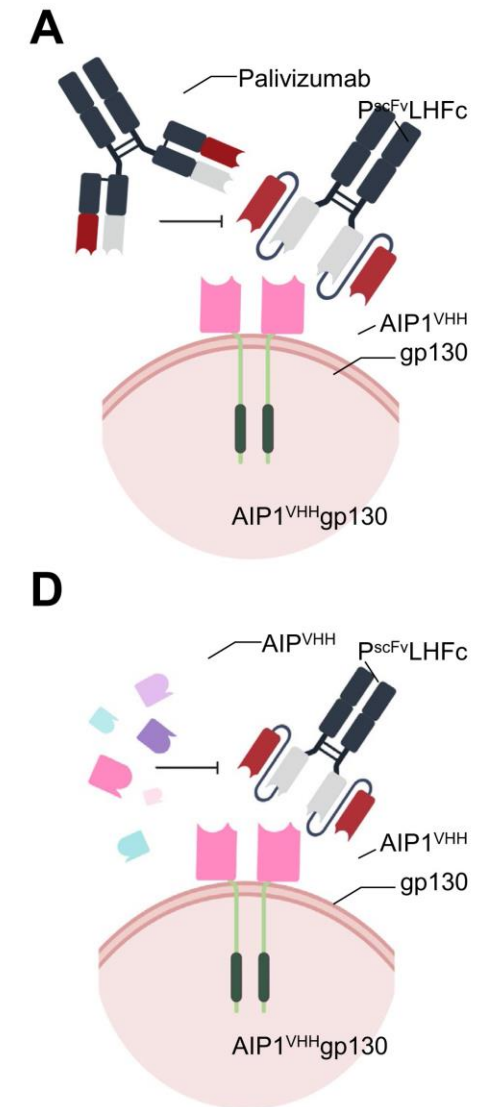


RSV prophylaxis

Monoclonal antibodies

Palivizumab

- Short acting monoclonal antibody providing passive immunity
- Inhibits viral entry
- Prophylactic use in high-risk groups
- Children < 24 months old
- Monthly injections in very high-risk infants [November through April]
 - Premature birth
 - Congenital heart disease
 - Chronic lung disease
 - Severe congenital immunodeficiency

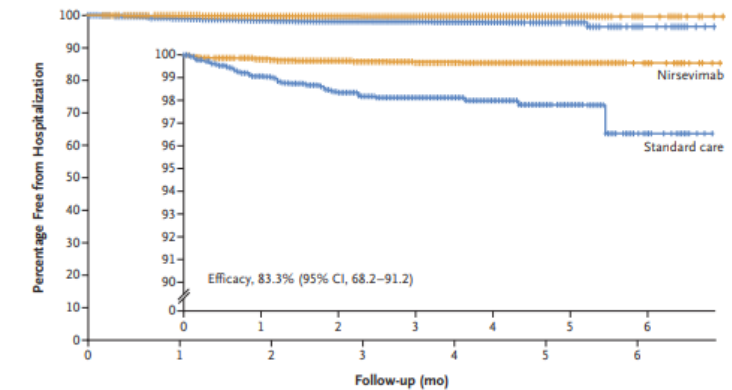
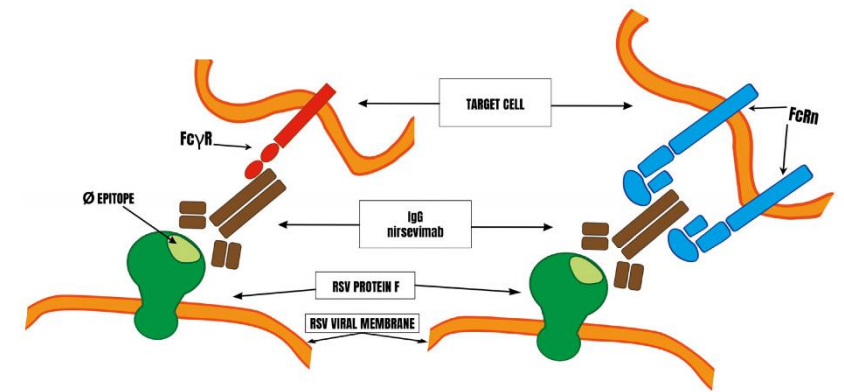


RSV prophylaxis

Monoclonal antibodies

Nirsevimab

- Newer long-acting monoclonal antibody
- directed against the Ø antigenic site of the F prefusion protein
- Newborns, infants and young children
- Reduces hospitalisations
- Immediate action



Clesrovimab

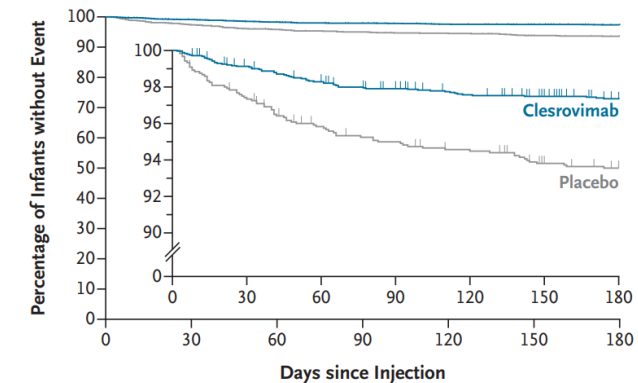
Approved by the FDA in June 2025

Newborns and infants during their first RSV season

Extended half-life

Targeting F protein

RSV-Associated Medically Attended LRI with ≥ 1 Indicator of LRI or Disease Severity



RSV management

Prophylaxis and treatment

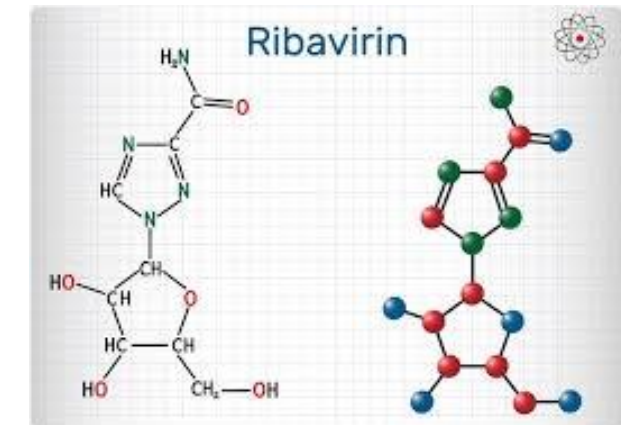
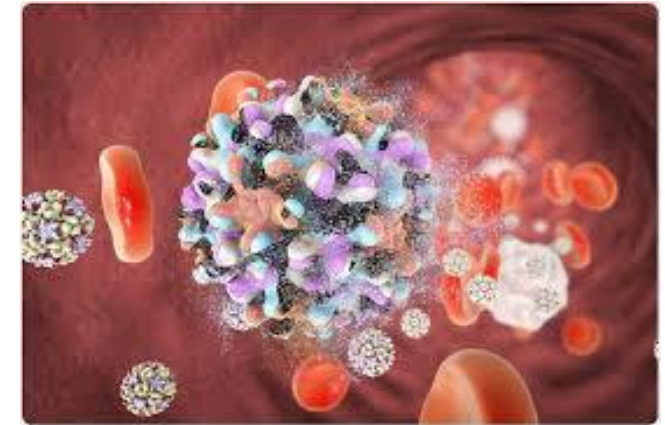
	Prophylactic vaccines 	Monoclonal Antibodies 	Antivirals 
 Pregnant women	Abrysvo® (Pfizer)		
 Infants and toddlers		Nirsevimab (Beyfortus®, Sanofi)	Ribavirin
 Infants and toddlers at increased risk		Palivizumab (Synagis®, AstraZeneca), Nirsevimab (Beyfortus®, Sanofi)	Ribavirin
 Adults at increased risk	Arexvy® (GSK), Abrysvo® (Pfizer)		Ribavirin
 Older Adults	Arexvy® (GSK), Abrysvo® (Pfizer) and mRESVIA® (Moderna)		Ribavirin

RSV treatment

Antivirals

Ribavirin

- Purine nucleoside analogue
- Hepatitis C (other: HEV, Hanta, Lassa, etc)
- Increases the mutation rate of RSV, which is associated with decreased RSV virus production
- The only antiviral available for the treatment of RSV-LRTI
- Nebulised for children 1-23 months and for immunocompromised children
- ?IV

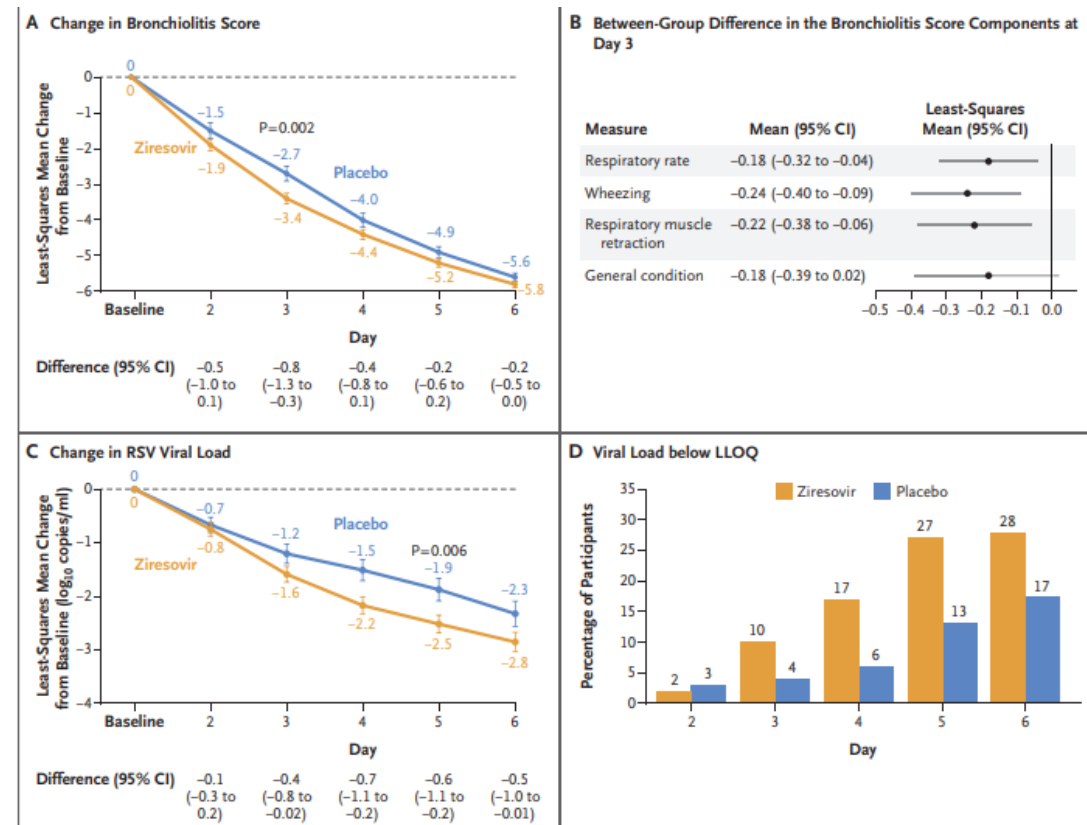
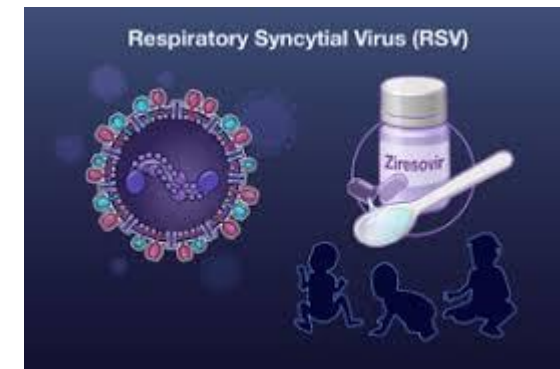


RSV treatment

Antivirals

Ziresovir (AK0529, ArkBio)

- oral RSV fusion protein inhibitor
- For children 1-23 months
- **30% reduction in signs and symptom scores in children admitted to the hospital with RSV disease compared with placebo**



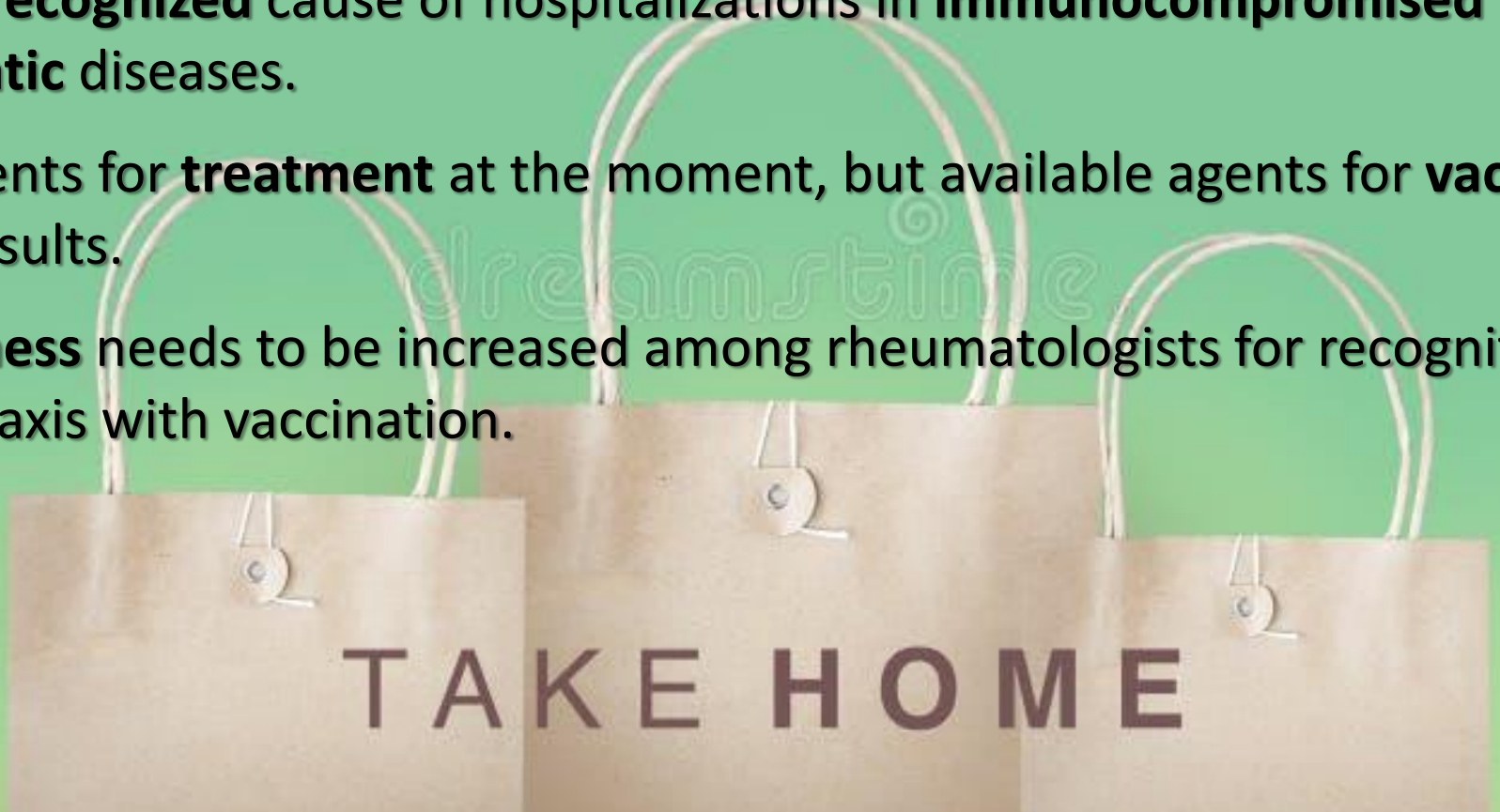
RSV treatment

Future developments

Product	Phase	Target	Mechanism	Route
LiveSpo Navax (<i>Bacillus subtilis</i> and <i>Bacillus clausii</i>)	NA	Respiratory microbiome	Impact on respiratory microbiome	Nasal spray
Wharton's Jelly umbilical cord mesenchymal stromal cells (ProTrans)	1	'Tissue resident and bloodborne immune cell'	'Anti-inflammatory and anti-apoptotic'	Intravenous
ALVR106	1/2	Polyclonal CD4/8 virus-specific T-cells	Multi-virus specific T-cell therapy	Intravenous
XW001	1b/2a	Interferon pathway	'based on human interferon lambda 1'	Inhaled
EDP-323	2	L protein inhibitor	Inhibits viral replication	Oral
Obeldesivir (ODV; GS-5245)	2	Nucleoside inhibitor (remdesivir derivative)	Inhibits viral replication	Oral
Ribavirin, molnupiravir and favipiravir	2	Varied	Varied	Oral
Zelicapavir (EDP-938)	2b	Non-fusion replication inhibitor	Modulates the viral N protein	Oral
Deuterium hydrobromide (VV116)	2/3	Nucleoside inhibitor (remdesivir derivative)	Inhibits viral replication	Oral
Interferon α1b (GB05)	3	Interferon pathway	'To supplement endogenous Interferon α1b'	Nebulized
Azithromycin	3	MMP-9 pathway	MMP-9 pathway	Oral

Conclusions – Take home messages

- ⬡ **Respiratory Syncytial Virus [RSV]:** frequent **viral pathogen**.
- ⬡ **Significant morbidity and mortality:** mainly in infants and children, but also older adults
- ⬡ **Under-recognized** cause of hospitalizations in **immunocompromised** patients with **rheumatic** diseases.
- ⬡ Few agents for **treatment** at the moment, but available agents for **vaccination** with good results.
- ⬡ **Awareness** needs to be increased among rheumatologists for recognition and prophylaxis with vaccination.



TAKE HOME