Pneumopathie à Mycoplasme

Dr Thomas Perpoint

21 novembre 2024

Hospices Civils de Lyon

votre santé, notre engagement

AER ACTUALITÉS EN RÉANIMATION

LYON · CROIX ROUSSE · MALADIES INFECTIEUSES ET TROPICALES

Pneumopathie à Mycoplasme de l'adulte

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LYON · CROIX ROUSSE · MALADIES INFECTIEUSES ET TROPICALES

Liens d’intérêt

25 ans
SAOS
IMC 31
Dyspnée
Fébrile

25 ans
SAOS
IMC 31
Dyspnée
Fébrile

SpO2 AA 85%

J0 **J3**

25 ans
SAOS
IMC 31
Dyspnée
Fébrile

SpO2 AA 84%
SpO2 6L/min 97%
38,6°
FR 26
TA 132/82
π 125
PCR COVID Grippe (-)
PNN 10,5
Lymphocytes 1,81
Hg 149
CRP 196



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SAOS
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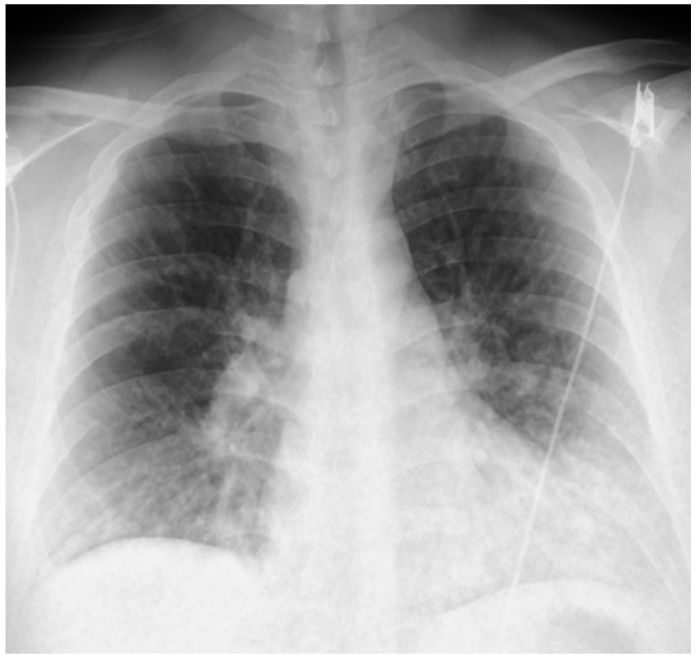



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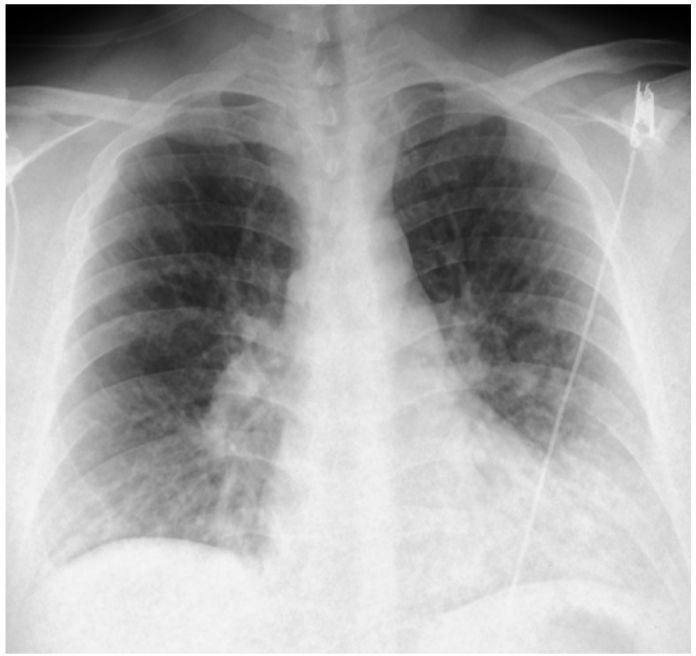

Spiramycine

Cefotaxime

J0 **J3** **J4**

25 ans
SAOS
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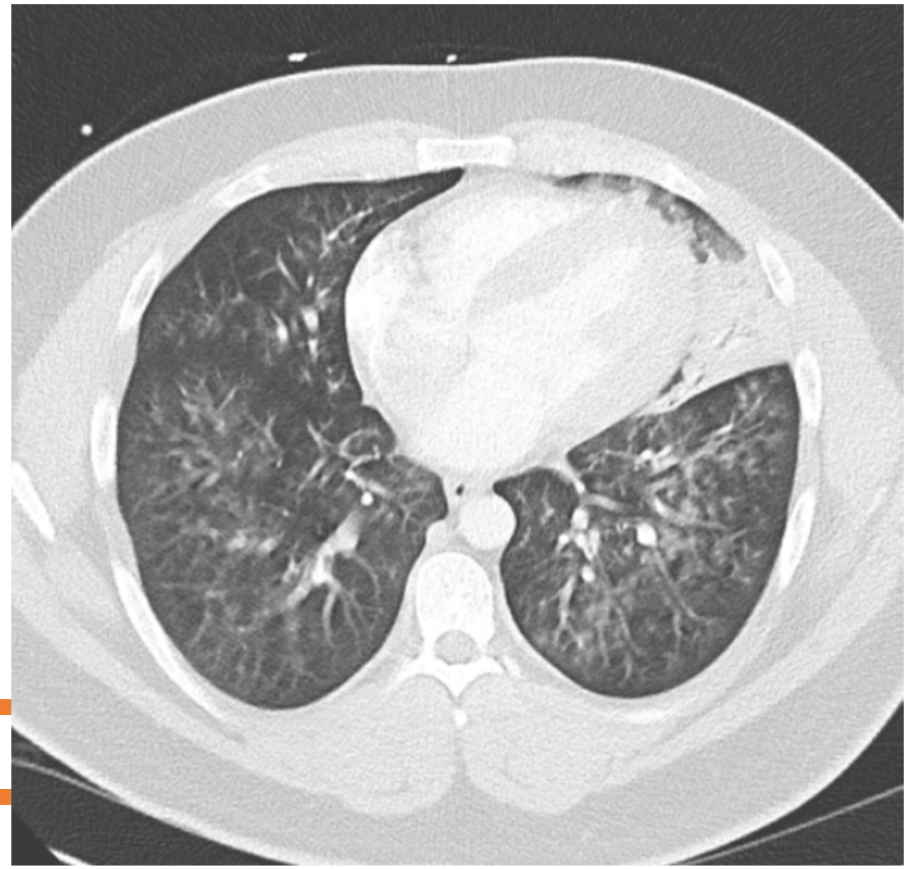
Spiramycine

Cefotaxime



J0 — **J3** — **J4**

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HC Ag LégioU (-)
PCR MP NP (+)

Spiramycine →

Cefotaxime ⊗

J0 J3 J4 J7 J9 J12 J13

25 ans
SAOS
IMC 31
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HC Ag LégioU (-)
PCR MP NP (+)

Test résistance (-)

Sevrage O2

Spiramycine

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Test résistance (-)

Sevrage O2

EPIDÉMIO | BACTÉRIO | PHYSIOPATH | FORMES GRAVES | DIAGNOSTIC | TRAITEMENT | CONCLUSION

JN 25es Journées Nationales d'Infectiologie
DEAUVILLE et la région Normandie
du mercredi 12 au vendredi 14 juin 2024

D. Viriot[1], Y. Gallien[1], V. Enouf[2], J. Durand[1], C. Laurier[3], C. François[1], B. Verrat[1], S. Morinet[1], C. Bébéar[3], I. Parent du Châtelet[1]

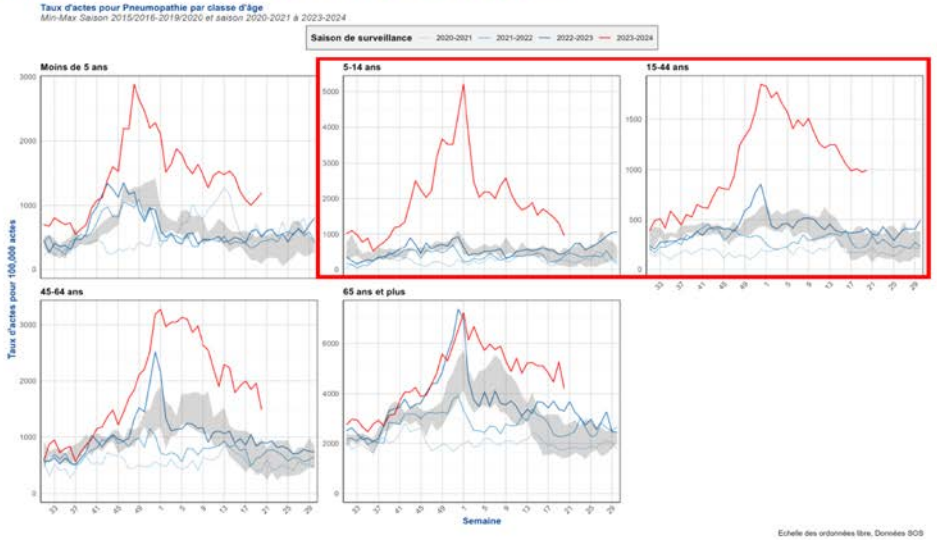
[1] Sante publique France, Saint-Maurice, France,

[2] Centre national de référence virus des infections respiratoires, Institut Pasteur, Paris, France

[3] Laboratoire de bactériologie, CHU Bordeaux, France

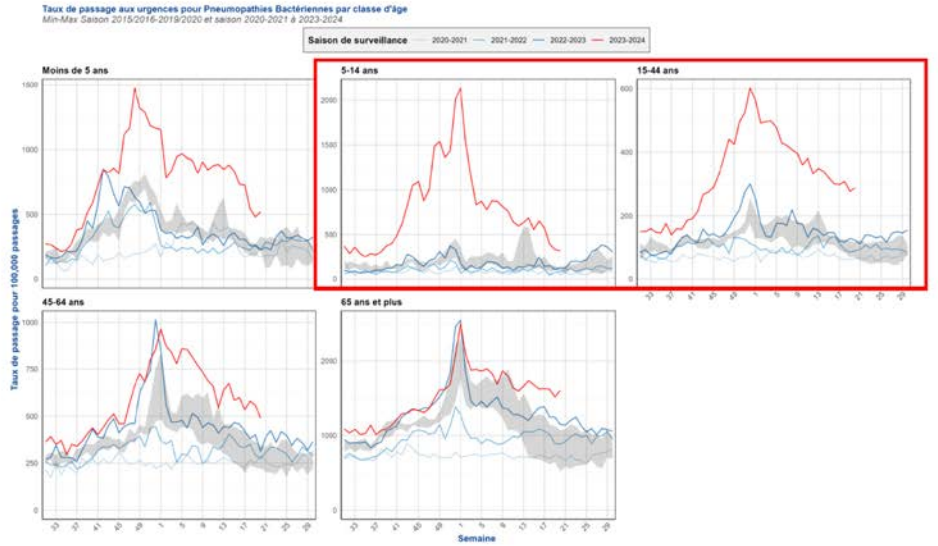
Surveillance syndromique SurSaUD® en ville (réseau SOS Médecins)

Part hebdomadaire des actes pour toutes pneumopathies pour 100 000 actes chez SOS Médecins, d'âge, semaines 26/2015 à S20/2024, réseau SOS Médecins



Surveillance syndromique SurSaUD® à l'hôpital (réseau Oscour®)

Part hebdomadaire des passages pour pneumopathie bactérienne pour 100 000 passages aux urgences par classe d'âge, semaines 26/2015 à S20/2024, réseau Oscour®



Santé publique France / Bulletin / Situation des infections à *Mycoplasma pneumoniae* en France au 24 mars 2024

Poussée épidémique mondiale

Le Monde

PLANÈTE • CHINE

Dans le nord de la Chine, les hôpitaux débordés par une flambée de cas de maladies respiratoires

Alors que les services d'urgence sont pris d'assaut, notamment pour des cas de pneumonie, la Chine indique qu'« aucun pathogène nouveau » n'a été détecté.

Par Julien Lemaignen et Simon Leplâtre (Shanghaï, correspondance)

Publié le 24 novembre 2023 à 10h26, modifié le 24 novembre 2023 à 10h37 · Lecture 4 min. · Read in English

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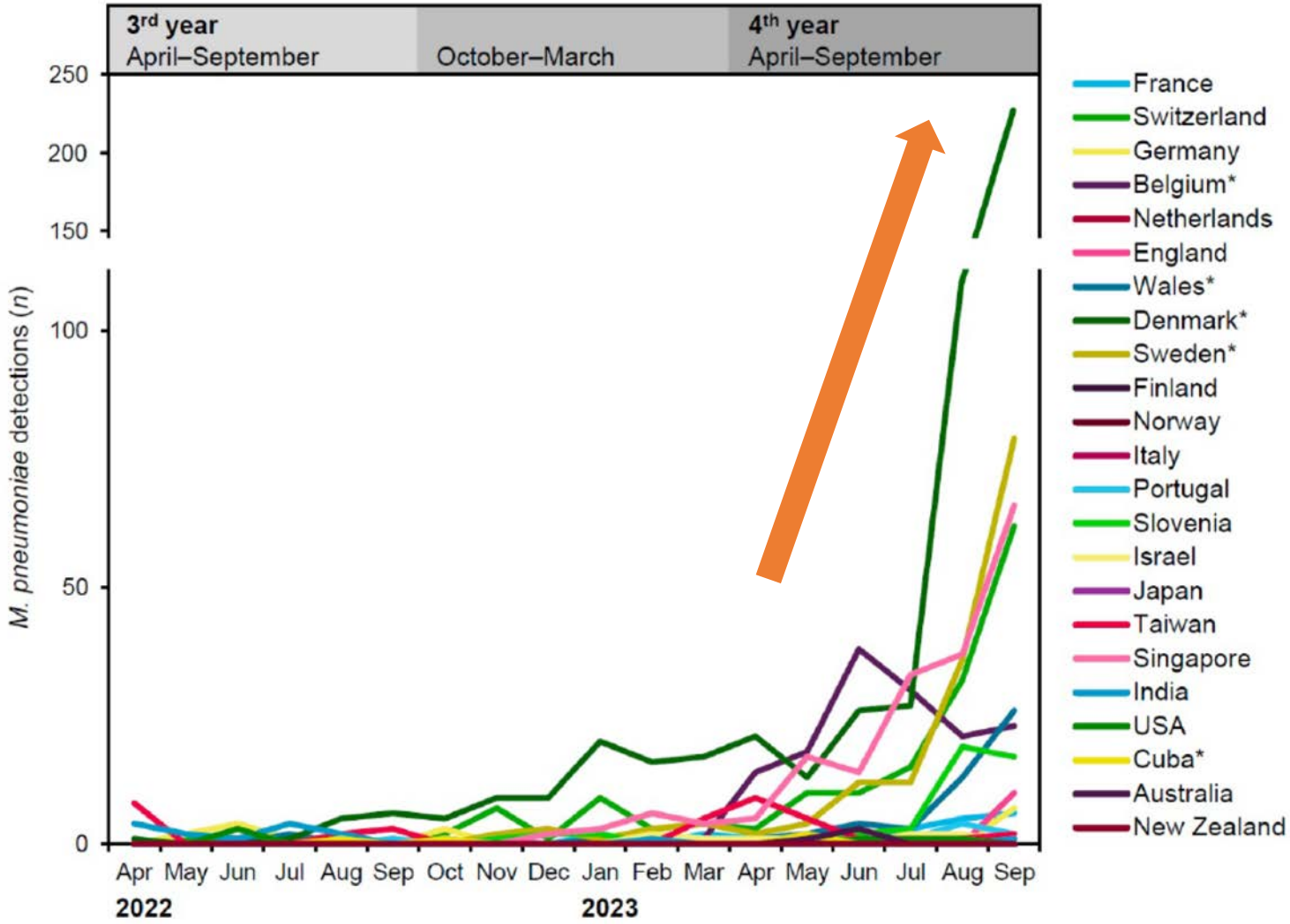
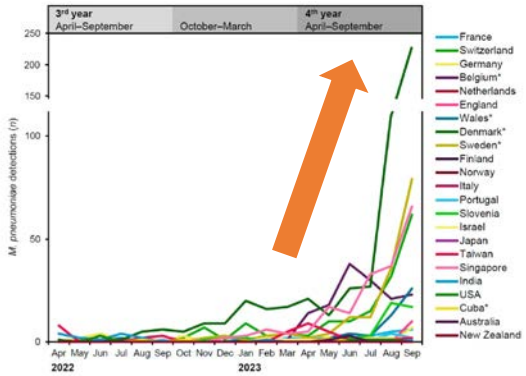


Meyer Sauteur *et al.*, *Lancet Microbe* 2024

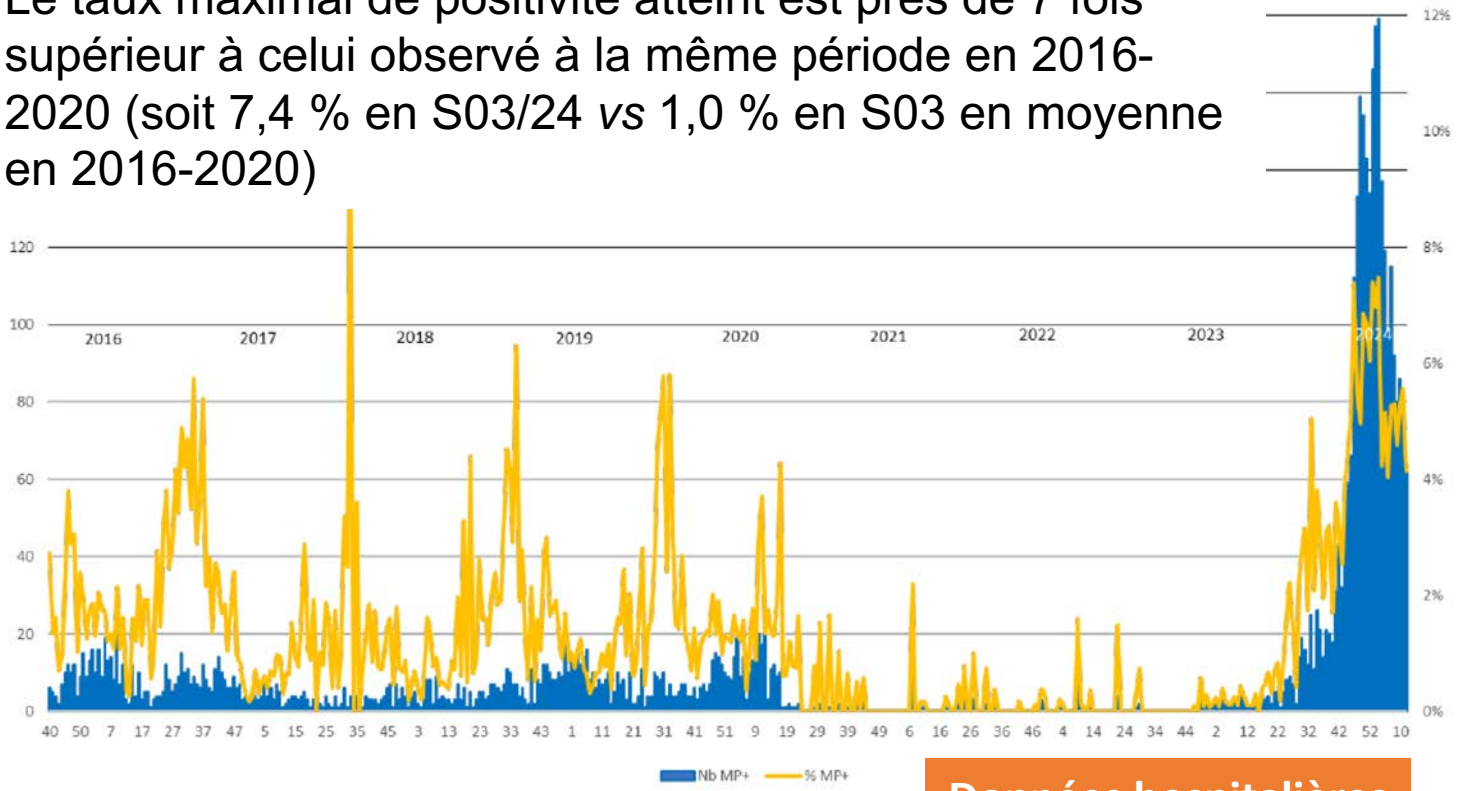
Poussée épidémique mondiale



Poussée épidémique française

Figure 4. Nombre et taux hebdomadaire de détection par PCR de *Mycoplasma pneumoniae* tous âges confondus, semaines 40/2015 à 12/2024, réseau de laboratoires hospitaliers RENAL

Le taux maximal de positivité atteint est près de 7 fois supérieur à celui observé à la même période en 2016-2020 (soit 7,4 % en S03/24 *vs* 1,0 % en S03 en moyenne en 2016-2020)

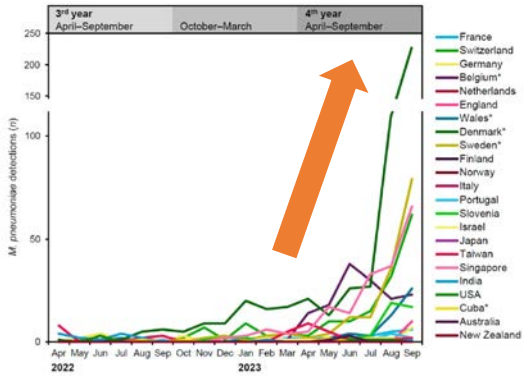


Données hospitalières

Meyer Sauteur *et al.*, *Lancet Microbe* 2023

Santé publique France / Bulletin / Situation des infections à *Mycoplasma pneumoniae* en France au 24 mars 2024

Poussée épidémique mondiale



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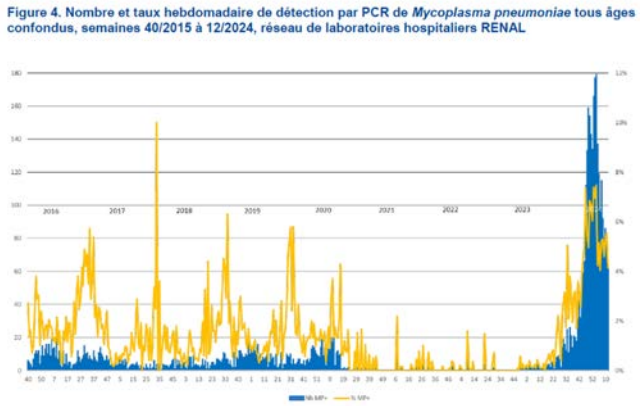
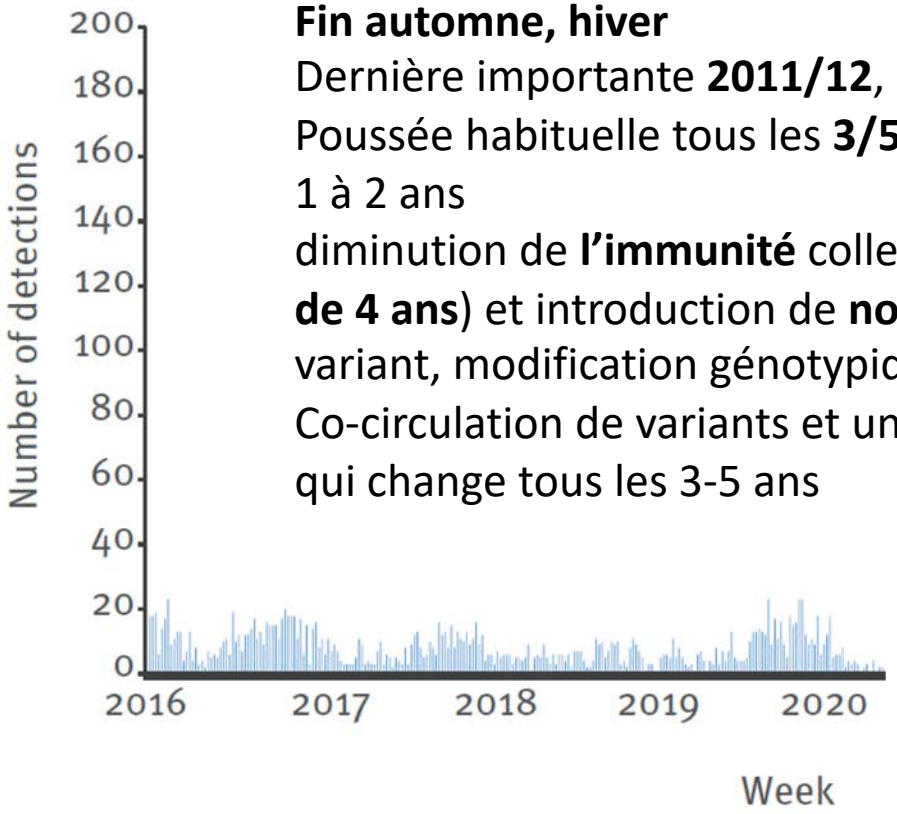


Mycoplasma pneumoniae detections, the Netherlands, 2016–2023 (n = 3,857)



Fin automne, hiver

Dernière importante **2011/12**, **2017/18**

Poussée habituelle tous les **3/5 ans**, durée 1 à 2 ans

diminution de **l'immunité** collective (durée **de 4 ans**) et introduction de **nouveau** variant, modification génotypique

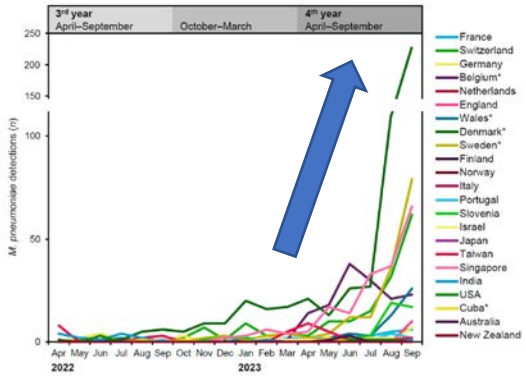
Co-circulation de variants et un dominant qui change tous les 3-5 ans

Meyer Sauteur *et al.*, *Lancet Microbe* 2023

Santé publique France / Bulletin / Situation des infections à *Mycoplasma pneumoniae* en France au 24 mars 2024

Bolluyt, *Eurosurveillance*, 2024

Poussée épidémique mondiale



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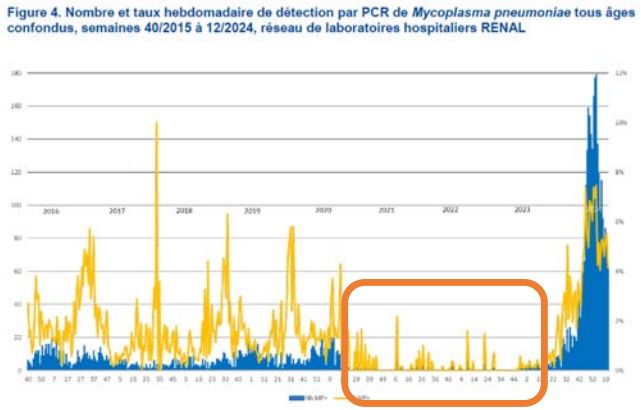

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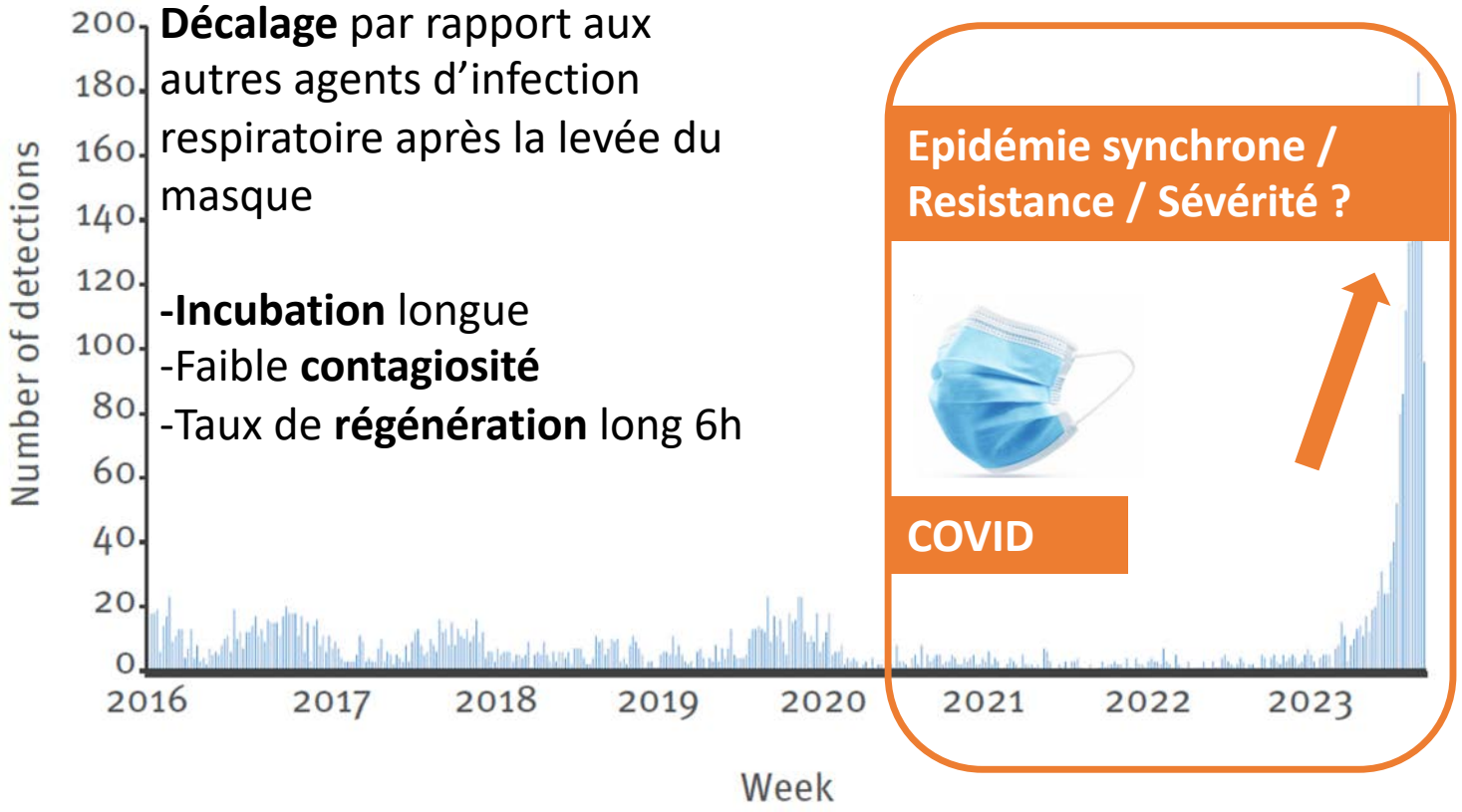


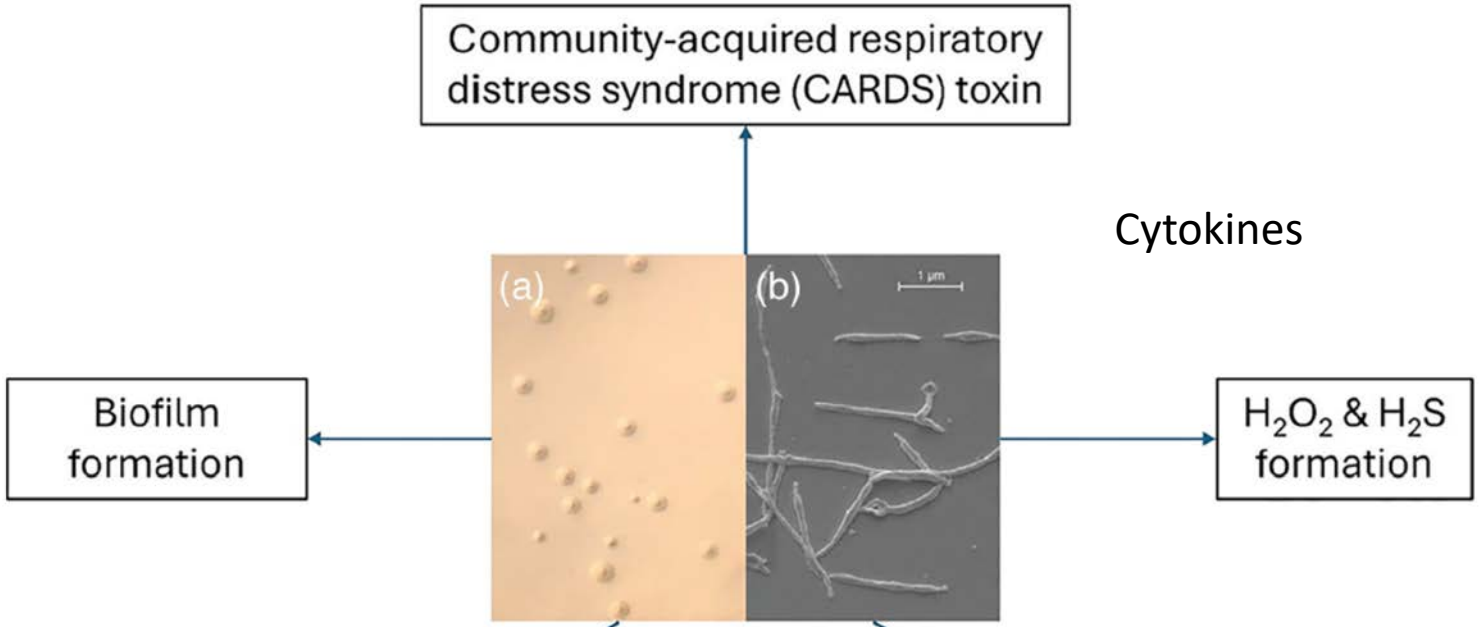
Décalage par rapport aux autres agents d'infection respiratoire après la levée du masque

-Incubation longue
-Faible **contagiosité**
-Taux de **régénération** long 6h

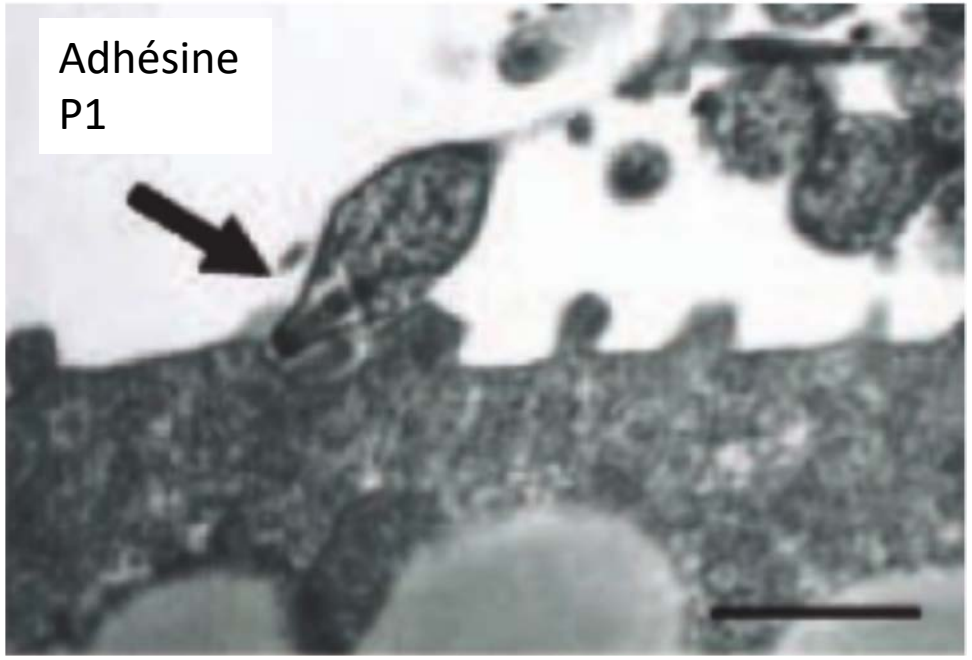
Epidémie synchrone / Resistance / Sévérité ?

COVID

Meyer Sauteur *et al.*, *Lancet Microbe* 2023
Santé publique France / Bulletin / Situation des infections à *Mycoplasma pneumoniae* en France au 24 mars 2024
Bolluyt, Eurosurveillance, 2024

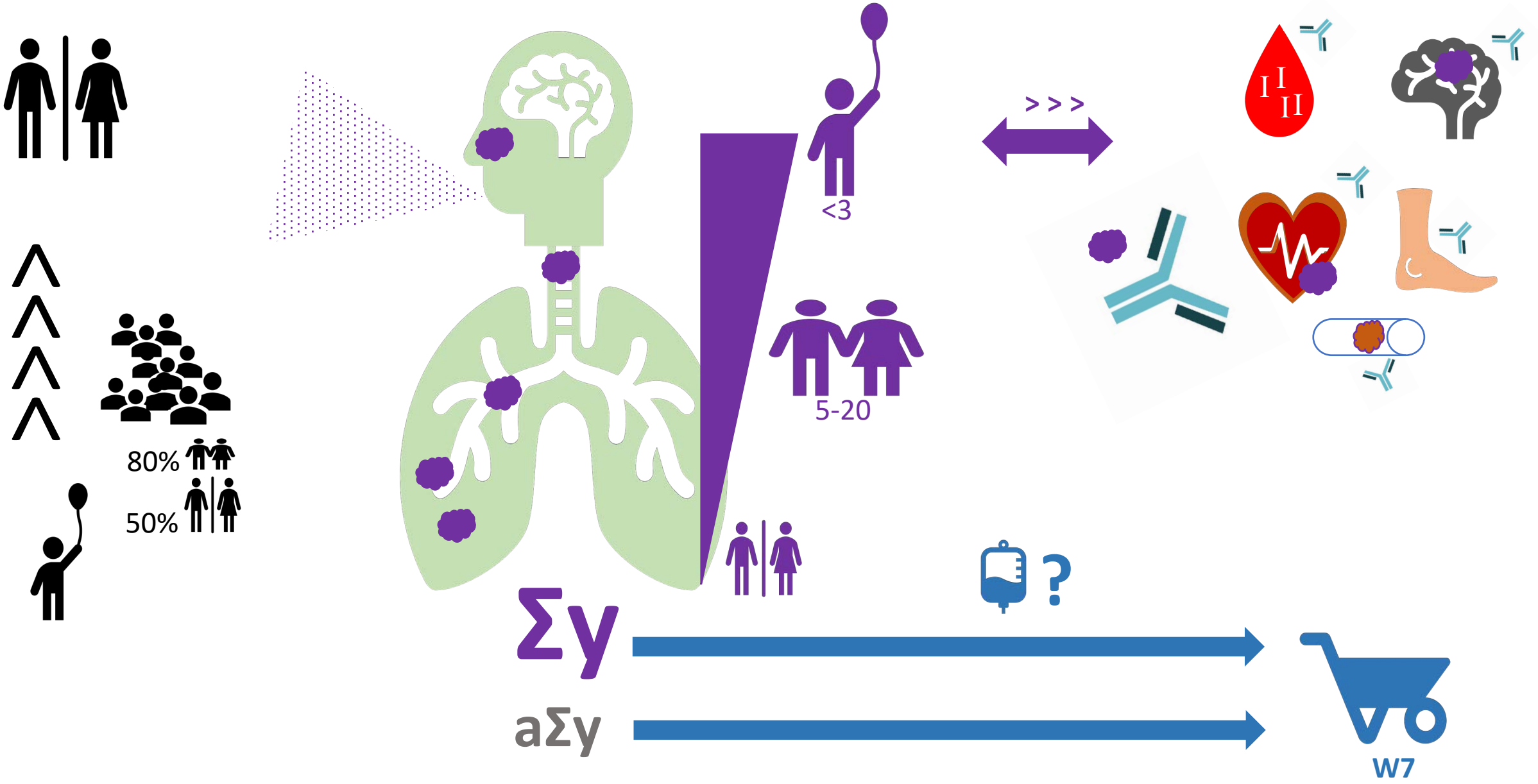


Adhésine P1 / acide sialique



« Parasitisme »
Détérioration cellulaire et flagelle

Rowlands *et al.*, *Journal of Medical Microbiology* 2024
Krause et al. Molecular Microbiol. 2004, 51, 917-24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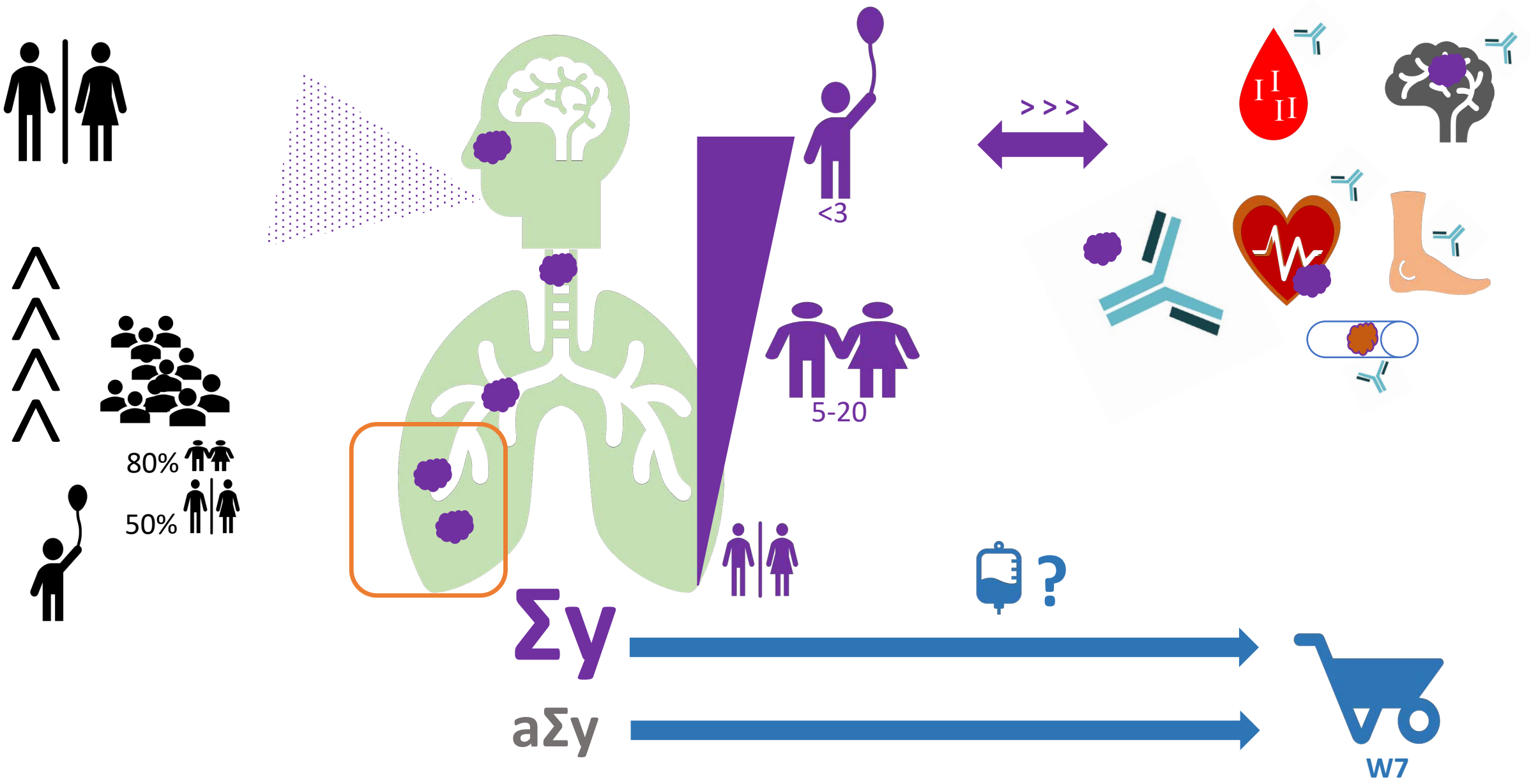
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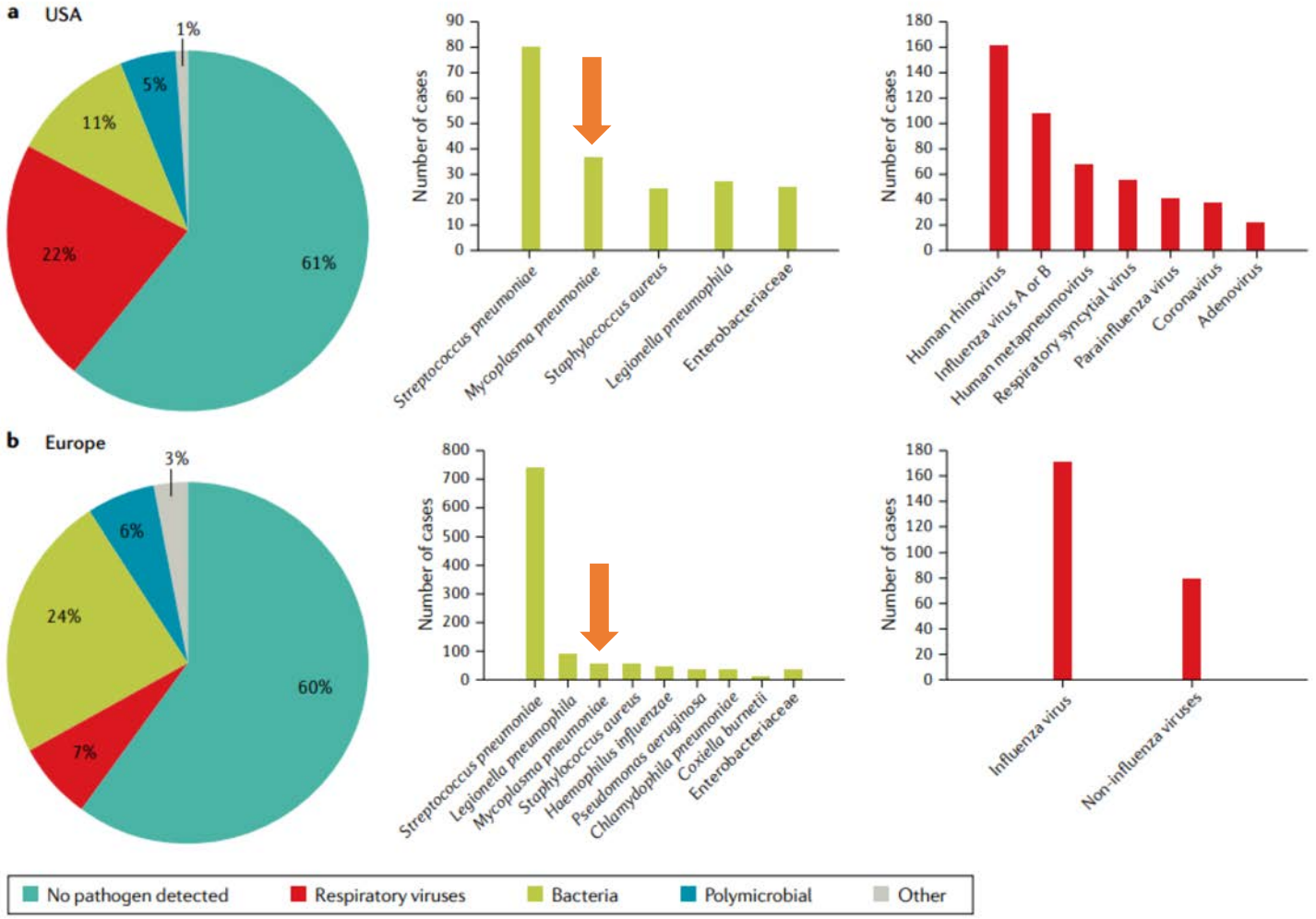
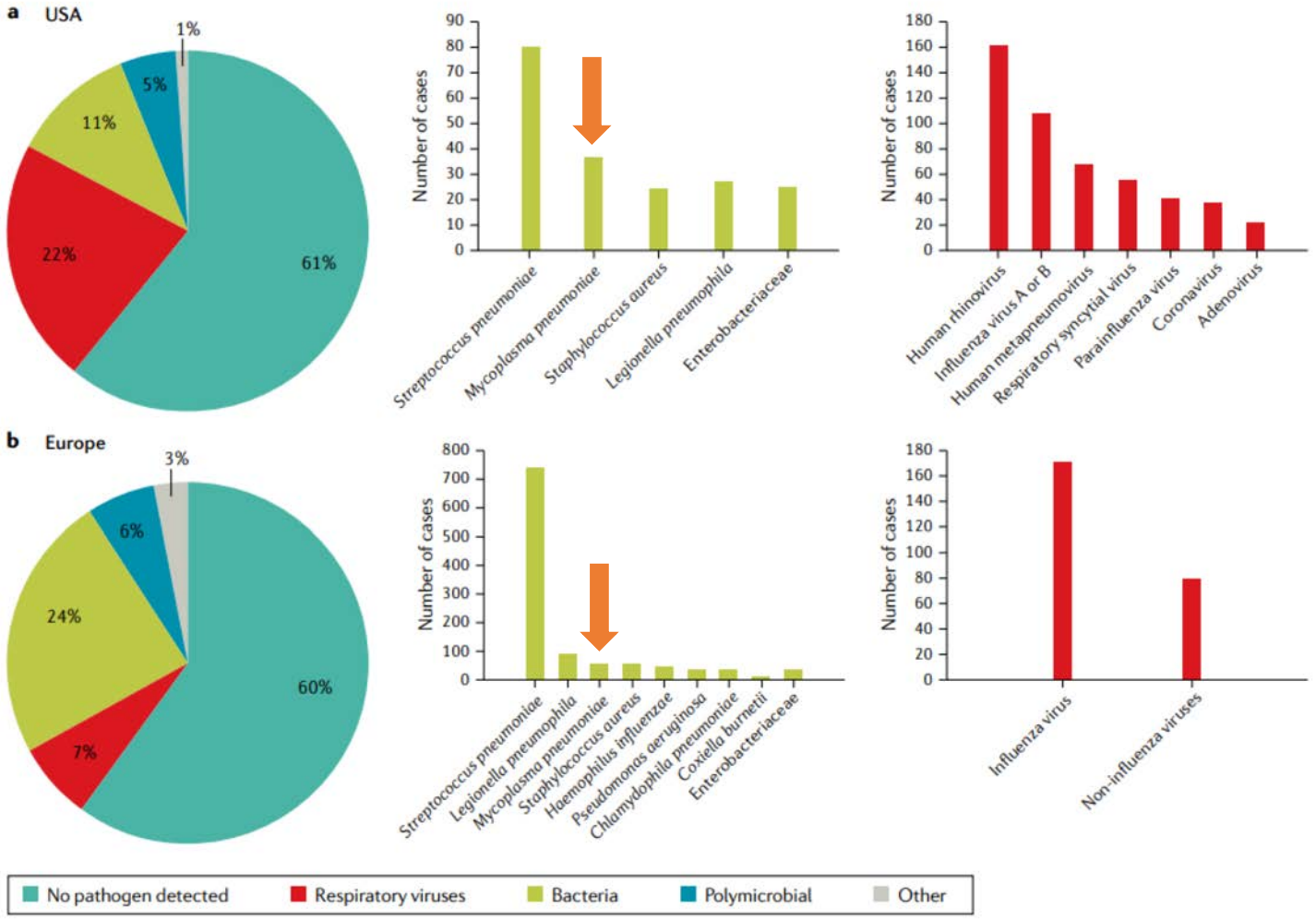


Fig. 1 | **Prevalence of microbial aetiologies of CAP in the USA and Europe. a** | Aetiology of community-acquired pneumonia (CAP) in the adult population in the USA from 2010 to 2012 (from 2,488 cases)[9]. **b** | Aetiology of CAP in the adult population in Europe from 2003 to 2014 (from 3,854 cases)[6]. Possible reasons that may explain the challenge in identifying the aetiology of pneumonia include difficulty in obtaining samples from the lower respiratory tract, the effect of antibiotic use prior to sample collection and low sensitivity of some diagnostic tests.

CAP > 15 ans 10 à 39% = MP
CAP hospitalisée 5-10% MP
Sévère ARDS 0,5-2% CAP MP
Transfert ICU CAP MP Hosp 10 à 16%
Plus important chez > 65 ans 38,8%

Danemark, entre Octobre et Décembre 2023, fichier national MP
19% des adultes MP+ de 18 à 75 ans sont hospitalisés

Torres, *Nature Reviews*, 2021
Ding et al. *BMC Infectious Diseases*, 2020
Nordholm, *Eurosurveillance*, 2024



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Décrire CAP MP Hospitalisées de l'adulte
ETUDE MYCADO, *in press*

Torres, *Nature Reviews*, 2021
Ding et al. *BMC Infectious Diseases*, 2020
Nordholm, *Eurosurveillance*, 2024

Formes hospitalières Etude **MYCADO**

- Etude observationnelle de cohorte retro et prospective
- 1/09/2023 au 29/02/2024
- Patients > 15 ans et 3 mois
- Hospitalisation > 24h
- **Diagnostic positif de MP**

  - PCR MP +
  - IgM MP +
  - séroconversion IgG

- Sévère ICU ou mort

Figure 1. Flow-chart.

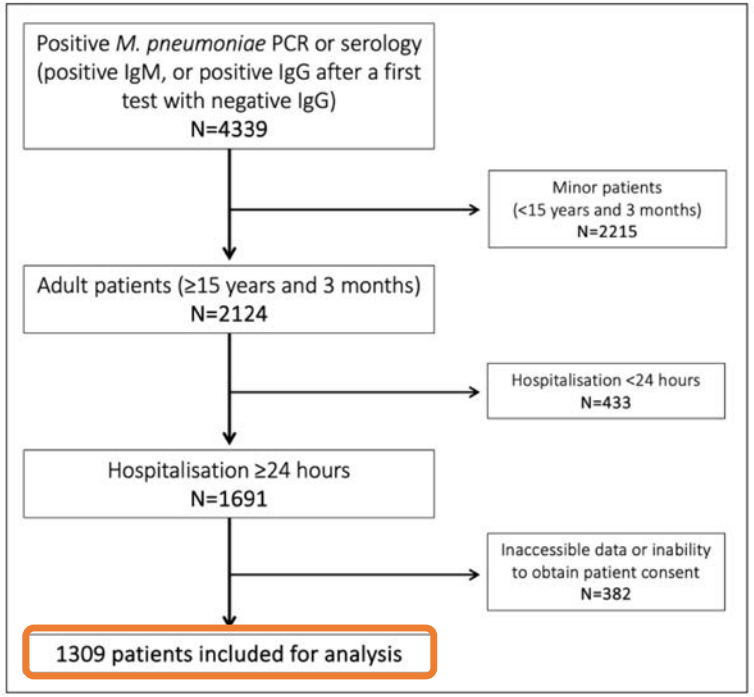


Figure S1. Geographical distribution of patients included in the 76 French centres participating in the MYCADO study. The greater the number of patients included per region, the darker the color.

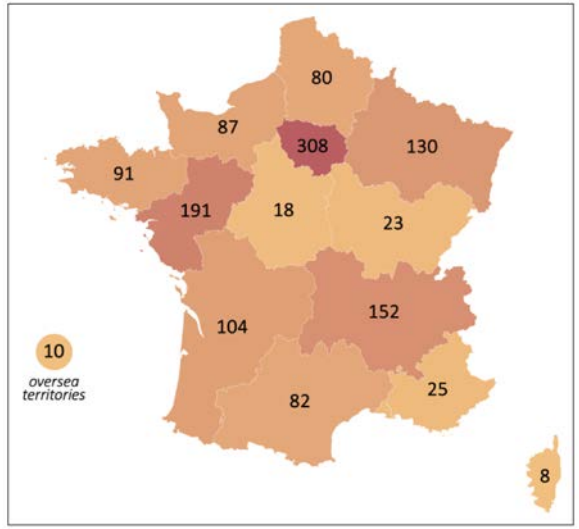
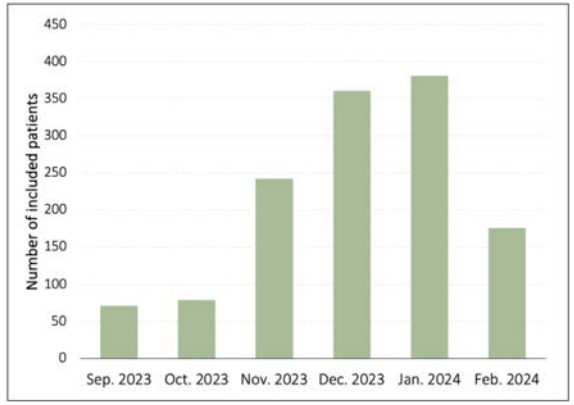


Figure S2. Monthly number of patients included in the MYCADO study during the 6-month inclusion period (September 2023-February 2024).



Palich R, *in press*, 2024

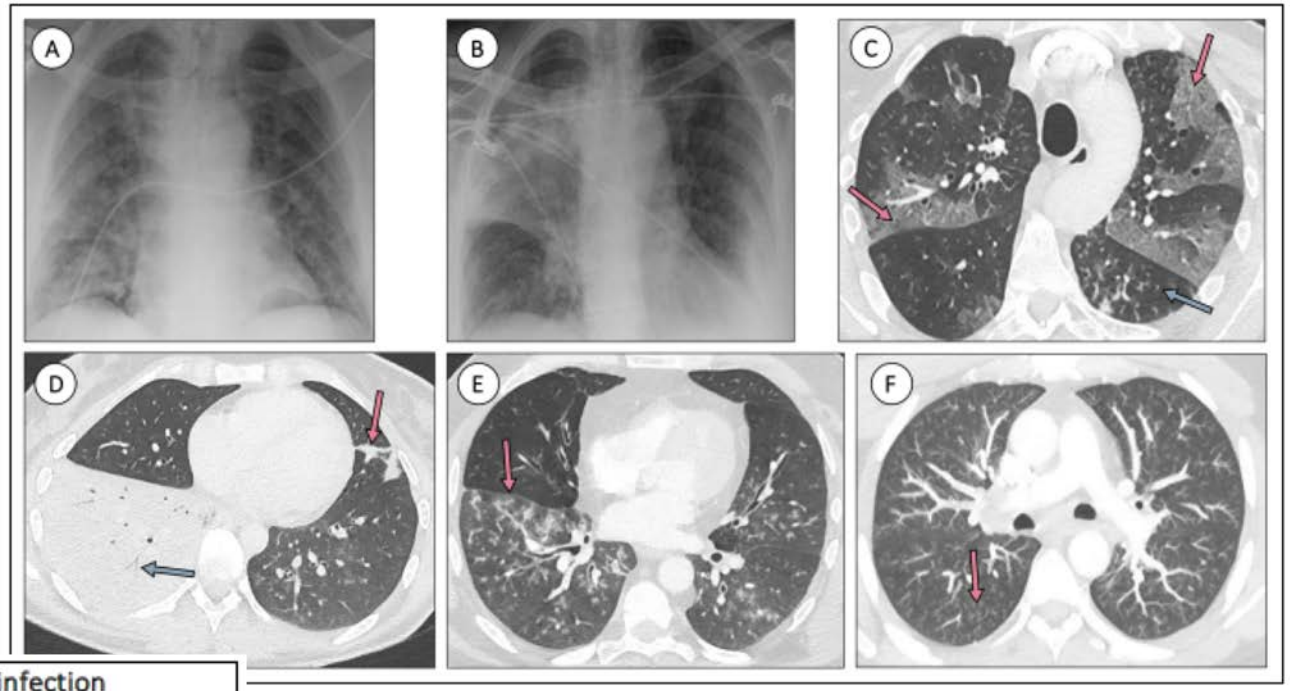
Mycado **Patients**

	Total (N=1309)	Severity of infection	
		Severe form (N=424)	Non-severe form (N=885)
Age, median (IQR)	43 (31-63)	46 (32-65)	42 (31-61)
Gender, n (%)			
Male	718 (54.9)	254 (59.9)	464 (52.4)
Female	591 (45.1)	170 (40.1)	421 (47.6)
Current smoking, n (%)	261 (19.9)	97 (22.9)	164 (18.5)
Respiratory diseases, n (%)			
COPD / emphysema	90 (6.9)	39 (9.2)	51 (5.8)
Asthma	141 (10.8)	49 (11.6)	92 (10.4)
Chronic interstitial pneumonia	12 (0.9)	4 (0.9)	8 (0.9)
All kind of chronic respiratory failure[a]	288 (22.0)	113 (26.7)	175 (19.8)
Cardiovascular risk factors, n (%)			
Diabetes	108 (8.3)	44 (10.4)	64 (7.2)
High blood pressure	264 (20.2)	111 (26.2)	153 (17.3)
Dyslipidaemia	106 (8.1)	61 (6.9)	45 (10.6)
Obesity (BMI ≥30 kg/m²)	182 (13.9)	81 (19.1)	101 (11.4)
Other chronic diseases, n (%)			
Chronic liver failure	23 (1.8)	16 (3.8)	7 (0.8)
Chronic renal failure	21 (1.6)	9 (2.1)	12 (1.4)
Auto-inflammatory diseases	80 (6.1)	26 (6.1)	54 (6.1)
Immunosuppression, n (%)			
Active solid cancer	38 (2.9)	13 (3.1)	25 (2.8)
Active hemopathy	50 (3.8)	15 (3.5)	35 (4.0)
Solid organ transplant	11 (0.8)	3 (0.7)	8 (0.9)
HIV infection[b]	6 (0.5)	6 (0.7)	0 (0.0)

	Total (N=1309)	Severity of infection	
		Severe form (N=424)	Non-severe form (N=885)
Symptoms before and at hospital admission, n (%)			
Fever	1023 (78.2)	322 (75.9)	701 (79.2)
Deep asthenia	550 (42.0)	173 (40.8)	377 (42.6)
Headaches	211 (16.1)	48 (11.3)	163 (18.4)
Confusion / altered level of consciousness	52 (4.0)	26 (6.1)	26 (2.9)
Cough	1098 (83.9)	336 (79.3)	762 (86.1)
Dyspnoea	948 (72.4)	356 (84.0)	592 (66.9)
Expectorations	473 (36.1)	156 (36.8)	317 (35.8)
Rhinitis / pharyngitis / tonsillitis / otitis	202 (15.4)	53 (12.5)	149 (16.8)
Diarrhoea	138 (10.5)	50 (11.8)	88 (9.9)
Vomiting	132 (10.1)	42 (9.9)	90 (10.2)
Arthro-myalgias	253 (19.3)	81 (19.1)	172 (19.4)
Mucosal involvement	47 (3.6)	10 (2.4)	37 (4.2)
All kind of cutaneous lesions[c]	66 (5.0)	19 (4.5)	47 (5.3)
Vital parameters at admission, n (%)			
Temperature >38°C	590 (45.1)	190 (44.8)	400 (45.2)
Peripheral oxygen saturation <95% (ambient air)	961 (73.4)	365 (86.1)	596 (67.3)
Respiratory rate >22 breaths/min	545 (41.6)	256 (60.4)	289 (32.7)
Heart rate >100 beats/min	660 (50.4)	222 (52.4)	438 (49.5)
Systolic blood pressure <100 mmHg	111 (8.5)	47 (11.1)	64 (7.2)
Glasgow Coma Scale score <15	135 (10.3)	51 (12.0)	84 (9.5)
Biology at admission			
Haemoglobin <10 g/dL, n (%)	98 (7.5)	42 (10.0)	56 (6.4)
Neutrophil count >7 G/L, n(%)	764 (62.2)	292 (74.7)	472 (56.4)
Lymphocyte count <1.5 G/L, n (%)	789 (64.6)	266 (68.2)	523 (62.9)
Alanine aminotransférase >1.5 normal value, n (%)	267 (24.1)	112 (29.5)	155 (21.3)
Creatine phosphokinase > 1.5 normal value, n (%)	137 (39.6)	71 (44.1)	66 (35.7)
C-reactive protein, median (IQR)	131 (69-201)	163 (97-240)	120 (63-184)
Procalcitonin, median (IQR)	0.17 (0.09-0.47)	0.19 (0.10-0.65)	0.14 (0.08-0.32)

Palich R, *in press*, 2024

Mycado **Radio**



	Total (N=1309)	Severity of infection	
		Severe form (N=424)	Non-severe form (N=885)
Pulmonary X-ray, n (%)			
Interstitial opacities	461 (35.2)	180 (42.5)	281 (31.8)
Alveolar opacities	523 (40.0)	188 (44.3)	335 (37.9)
Pleural effusion	54 (4.1)	24 (5.7)	30 (3.4)
Bilateral abnormalities	366 (28.0)	153 (36.1)	213 (24.1)
Not performed	348 (26.6)	98 (23.2)	250 (28.3)
Pulmonary CT-scan, n (%)			
Bronchial wall thickening	334 (25.5)	127 (30.0)	207 (23.4)
Bronchiolar micronodules	585 (44.7)	202 (47.6)	383 (43.3)
Interstitial syndrome / ground-glass opacities	285 (21.8)	109 (25.7)	176 (19.9)
Alveolar consolidation	581 (44.4)	227 (53.5)	354 (40.0)
Pulmonary embolism	24 (1.8)	13 (3.1)	11 (1.2)
Bilateral abnormalities	309 (23.6)	119 (28.1)	190 (21.5)
Not performed	409 (31.3)	93 (21.9)	316 (35.8)

A. Opacités alvéolo-interstitielles diffuses bilatérales
B. Opacité systématisée
C. Verre dépoli et micronodules bronchiolaires
D. Condensation bronchogramme
E. Micronodules centrolobulaires
F. Micronodules bronchiolaires en arbre en bourgeon

Palich R, *in press*, 2024

Mycado **Extra Pulmonaire**

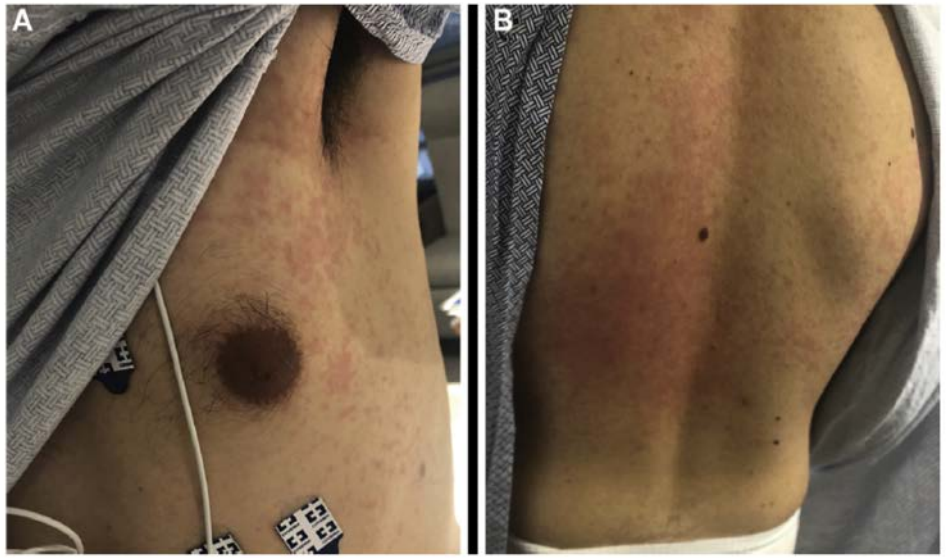
- **Rareté 12%**
- Etudes ancillaires
- Qd Forme ExtraP **89%** ont des symptômes respiratoires
- Plus fqt chez **jeunes** et porteurs de maladies **autoinflammatoires**

	Total (N=1309)	Severity of infection	
		Severe form (N=424)	Non-severe form (N=885)
Cutaneous and mucosal extrapulmonary manifestations, n (%)			
Multiforme erythema	36 (2.8)	8 (1.9)	28 (3.2)
Urticaria	14 (1.1)	2 (0.5)	12 (1.4)
Rheumatoid arthritis	6 (0.5)	2 (0.5)	4 (0.5)
Stevens-Johnson syndrome	3 (0.2)	1 (0.2)	2 (0.2)
Neurological extrapulmonary manifestations, n (%)			
Meningoencephalitis	19 (1.5)	9 (2.1)	10 (1.1)
Guillain-Barré syndrome	6 (0.5)	5 (1.2)	1 (0.1)
Myelitis	2 (0.1)	2 (0.5)	0 (0.2)
Autoimmune haemolytic anaemia, n (%)	44 (3.4)	23 (5.4)	21 (2.4)
Cardiological extrapulmonary manifestations, n (%)			
Myocarditis	17 (1.3)	11 (2.6)	6 (0.7)
Pericarditis	3 (0.2)	2 (0.5)	1 (0.1)
Endocarditis	1 (0.1)	1 (0.2)	0 (0.0)
Arthritis, n (%)	6 (0.5)	2 (0.5)	4 (0.5)
Glomerulonephritis, n (%)	1 (0.1)	0 (0.0)	1 (0.1)

Palich R, *in press*, 2024

- **Rash simple**, 17% infection respiratoire MP

  Akhtar, *Chest*, 2020

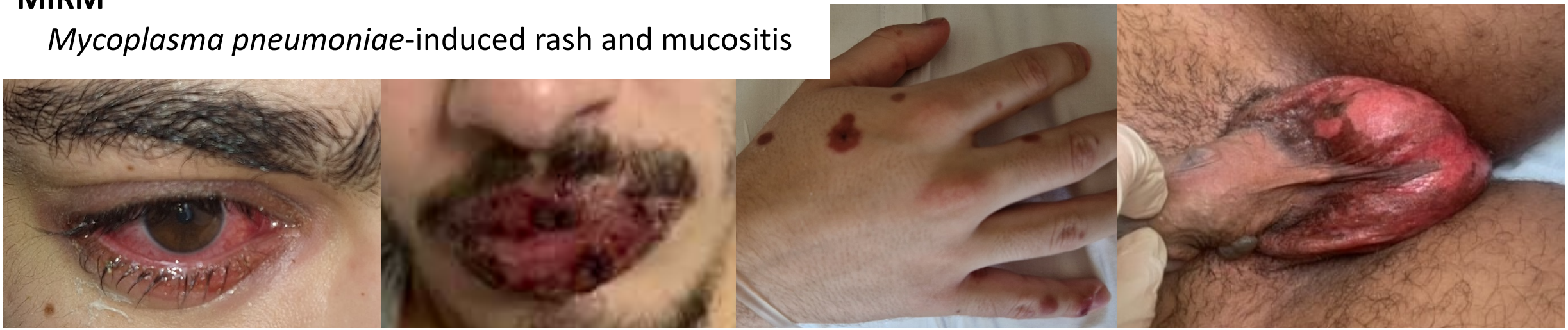


- **RIME**

  Reactive infectious mucocutaneous eruption

- **MIRM**

  Mycoplasma pneumoniae-induced rash and mucositis



Mycado ICU / Décès

81% requièrent O2 durée médiane 5j (IQR 2-17)

32% formes sévères (415 patients +++)

- 98% admis en ICU
  - FDR HTA, Insuffisance hépatique, obésité
  - Condensation et/ou atteinte bilatérale
- 28 décès, **mortalité globale 2,1%,** mortalité intra ICU 4,6% / plus âgés et plus immunodéprimés, mortalité attribué à MP dans 71%
- 82% sont transférés dans les 48 premières heures d'hospitalisation
- **49% HFNO / 31% NIV / 15% VM** (durée médiane 9 jours)
- 7% Amines / 1,2% Dialyse
- Si ATB spé MP avant hospitalisation, moins de formes sévères

Palich R, *in press*, 2024

Littérature ICU / Décès

Conferences and Reviews

Fulminant *Mycoplasma pneumoniae* Pneumonia

EDWARD D. CHAN, MD, *and* CAROLYN H. WELSH, MD, *Denver, Colorado*

The frequency of fulminant pneumonia due to *Mycoplasma pneumoniae* is relatively rare despite the high prevalence of *Mycoplasma* species infection in the general population. We recently encountered such a case and have reviewed the English-language literature on cases of *M pneumoniae* pneumonia that have resulted in respiratory failure or death. Due to host factors or on epidemiologic grounds, fulminant cases seem to be more common in young healthy adults, in males, and possibly in smokers among the 46 patients we found. An enhanced host cellular immune response may be responsible for the development of severe cases. A spectrum of small airways disease is characteristic, including cellular bronchiolitis and bronchiolitis obliterans with and without organizing pneumonia. Based largely on anecdotal experience, corticosteroid use may be salutary in patients with respiratory failure. For reasons that are not well known, the incidence of pulmonary thromboembolism is increased in fatal cases.

(Chan ED, Welsh CH: Fulminant *Mycoplasma pneumoniae* pneumonia. West J Med 1995; 162:133-142)

1966-1991 46 patients

CASE RECORDS
OF THE
MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

ROBERT E. SCULLY, M.D., *Editor*
EUGENE J. MARK, M.D., *Associate Editor*
WILLIAM F. MCNEELY, M.D., *Associate Editor*
BETTY U. MCNEELY, *Assistant Editor*

CASE 5-1992

PRESENTATION OF CASE

A 20-year-old man was admitted to the hospital because of diffuse pulmonary infiltrates, respiratory failure, and disseminated intravascular coagulation.

Chan ED, *West J Med*, 1995
Scully RE, *NEJM*, 1992

RESEARCH Open Access

Severe atypical pneumonia in critically ill patients: a retrospective multicenter study

S. Valade[1,2*], L. Biard[2,3], V. Lemiale[1,2], L. Argaud[4], F. Pène[5], L. Papazian[6], F. Bruneel[7], A. Seguin[8], A. Kouatchet[9], J. Oziel[10], S. Rouleau[11], N. Bele[12], K. Razazi[13], O. Lesieur[14], F. Boissier[15], B. Megarbane[16], N. Bigé[17], N. Brulé[18], A. S. Moreau[19], A. Lautrette[20], O. Peyrony[21], P. Perez[22], J. Mayaux[23] and E. Azoulay[1,2]

Abstract

Background: *Chlamydophila pneumoniae* (CP) and *Mycoplasma pneumoniae* (MP) patients could require intensive care unit (ICU) admission for acute respiratory failure.

Methods: Adults admitted between 2000 and 2015 to 20 French ICUs with proven atypical pneumonia were retrospectively described. Patients with MP were compared to *Streptococcus pneumoniae* (SP) pneumonia patients admitted to ICUs.

Results: A total of 104 patients were included, 71 men and 33 women, with a median age of 56 [44–67] years. MP was the causative agent for 76 (73%) patients and CP for 28 (27%) patients. Co-infection was documented for 18 patients (viruses for 8 [47%] patients). Median number of involved quadrants on chest X-ray was 2 [1–4], with alveolar opacities ($n = 61$, 75%), interstitial opacities ($n = 32$, 40%). Extra-pulmonary manifestations were present in 34 (33%) patients. Mechanical ventilation was required for 75 (72%) patients and vasopressors for 41 (39%) patients. ICU length of stay was 16.5 [9.5–30.5] days, and 11 (11%) patients died in the ICU. Compared with SP patients, MP patients had more extensive interstitial pneumonia, fewer pleural effusion, and a lower mortality rate [6 (8%) vs. 17 (22%), $p = 0.013$]. According MCA analysis, some characteristics at admission could discriminate MP and SP. MP was more often associated with hemolytic anemia, abdominal manifestations, and extensive chest radiograph abnormalities. SP-P was associated with shock, confusion, focal crackles, and focal consolidation.

Conclusion: In this descriptive study of atypical bacterial pneumonia requiring ICU admission, mortality was 11%. The comparison with SP pneumonia identified clinical, laboratory, and radiographic features that may suggest MP or CP pneumonia.

Keywords: Pneumonia, Outcome, ICU, *Mycoplasma pneumoniae*, *Chlamydophila pneumoniae*

CAP MP

Treatments in the ICU	
Mechanical ventilation	50 (66%)
Duration of ventilation	12.5 [8–22.5]
Vasopressors	26 (34%)
Renal replacement therapy	7 (9%)
Outcomes	
Death in the ICU	6 (8%)
Length of ICU stay (days)	
Discharged alive	15 [8–27]
ICU death	37 [26–47]

Valade S, *Ann. Intensive Care*, 2018

Table 1 Clinical characteristics and diagnostics for the patients with severe *M. pneumoniae* pneumonia

Case No.	Male	Age	Month of admission	Tmax (°C)	Cough	Dyspnea	Diarrhea	Length of onset to dyspnea (days)	Length of onset to ICU admission (days)	Ig G	IgM	PCR of sputum	PCR of BALF	PCR of pleural effusion	NGS from BALF	Combined Bacteria or virus	Length of ICU stay (days)	Length of hospital stay (days)
Case 1	Female	34	June	40.6	Dry cough	Yes	Yes	13	15	–	–	Positive	Positive	NA	Positive	Adenovirus	14	14
Case 2	Female	26	May	40.6	Dry cough	Yes	Yes	12	14	+	+	Positive	NA	NA	Positive	Rhinovirus Streptococcus	7	20
Case 3	Female	15	Dec.	40.5	Productive cough	Yes	Yes	15	15	+	+	Positive	NA	NA	NA	None	6	15
Case 4	Male	42	May	42	Dry cough	Yes	No	6	9	–	–	Positive	NA	NA	NA	Rhinovirus Epstein-Barr virus	12	12
Case 5	Male	32	Apr.	39.6	Dry cough	Yes	No	12	14	+	–	Positive	NA	NA	NA	Rhinovirus	13	13
Case 6	Male	44	Mar.	40	Dry cough	Yes	No	6	14	+	–	Positive	NA	NA	NA	Rhinovirus	3	13
Case 7	Male	53	Nov.	39.5	Productive cough	Yes	No	9	10	+	–	Positive	NA	NA	NA	None	4	17
Case 8	Female	17	Aug.	41.2	Dry cough	Yes	No	5	12	+	+	Positive	Positive	Positive	Positive	Acinetobacter baumannii	33	33
Case 9	Male	34	Oct.	39.6	Dry cough	Yes	No	9	11	+	+	Positive	Positive	NA	Positive	None	4	14
Case 10	Male	17	Nov	39.8	Dry cough	Yes	Yes	3	3	–	+	NA	NA	NA	Positive	Acinetobacter baumannii	9	18
Mean (±SD)	6/10 (60%)	31 (13)		40.4 (0.8)		10/10 (100%)	4/10 (40%)	9 (4)	11 (4)	+ (70%)	+ (50%)	9	3	1	5		11 (9)	17 (6.2)

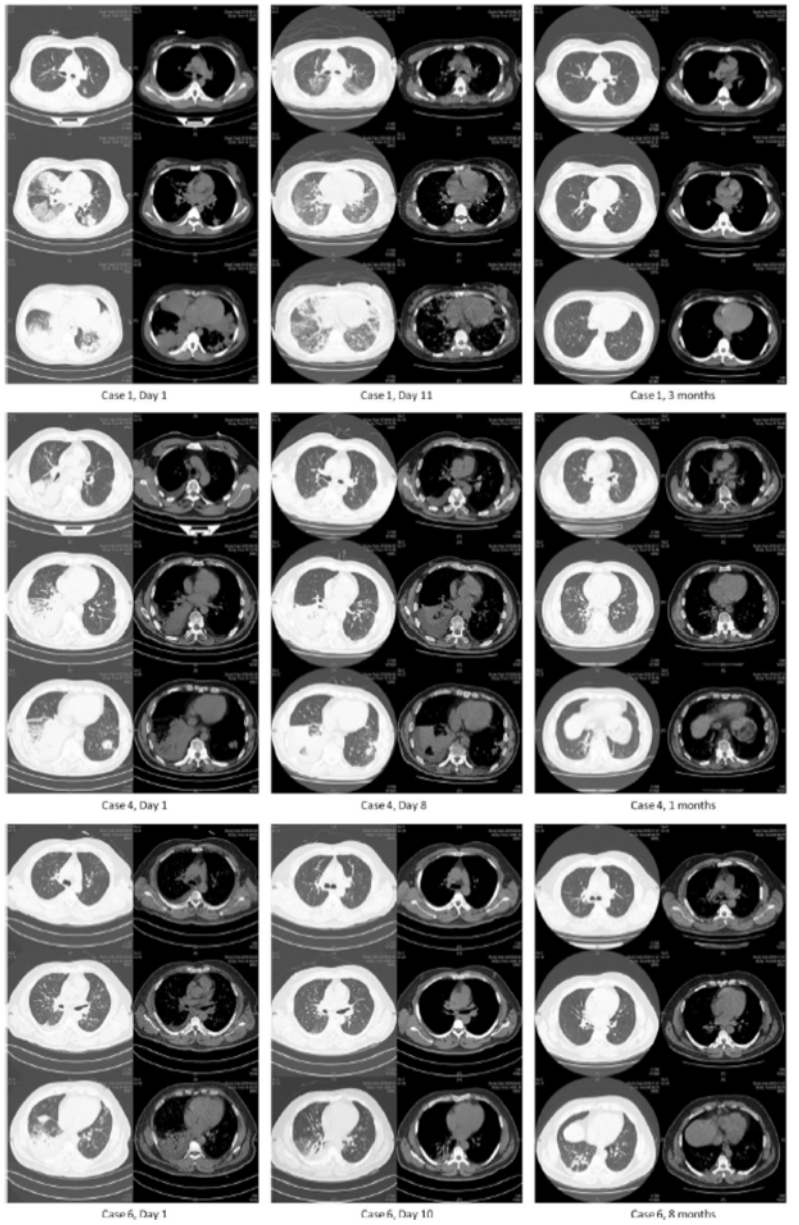
Tmax Maximum temperature, *NGS* Next-generation sequencing detection, *BALF* Bronchoalveolar lavage fluid, *NA* Not available, *PCR* Polymerase chain reaction

Table 2 The setting of respiratory support and the characteristics of respiratory mechanics

Case No	Breathing rate (breaths/min)	PaO_2/FiO_2	HFNC (hours)	Setting of HFNC	NIV (hours)	Setting of NIV	IMV (days)	The mode and the inital parameter setting of IMV	SPO_2 before RM	SPO_2 after RM	Prone position	ECMO (days)	Resistance (L/cm H_2O/S)	Compliance (ml/cm H_2O)
Case 1	27	198	63	Oxygen flow 40 L/Min FiO_2 0.60	11	CPAP 5cmH_2O FiO_2 0.7	10	P-A/C, PI 12 cmH_2O PEEPmax 16 cmH_2O, FiO_2 1.0	73%	97%	Yes	0	20	34
Case 2	25	162	85	Oxygen flow 50 L/Min FiO_2 0.50	33	S/T 10/ 5cmH_2O FiO_2 0.45	–	NA	NA	NA	NO	0	NA	NA
Case 3	21	118	20	Oxygen flow 60 L/Min FiO_2 0.50	–	NA	3	P-A/C, PI 12 cmH_2O PEEPmax 16 cmH_2O, FiO_2 1.0	90%	98%	Yes	0	14	41
Case 4	33	155	158	Oxygen flow 50 L/Min FiO_2 0.45	–	NA	–	NA	NA	NA	Yes	0	NA	NA
Case 5	24	56	43	Oxygen flow 60 L/Min FiO_2 0.45	–	NA	8	P-A/C, PI 10 cmH_2O PEEPmax 14 cmH_2O, FiO_2 1.0	92%	99%	Yes	0	15	54
Case 6	29	230	35	Oxygen flow 45 L/Min FiO_2 0.35	–	NA	–	NA	NA	NA	NA	0	NA	NA
Case 7	24	263	39	Oxygen flow 45 L/Min FiO_2 0.35	20	CPAP 6cmH_2O FiO_2 0.28	–	NA	NA	NA	NA	0	NA	N A
Case 8	30	47	17	Oxygen flow 45 L/Min FiO_2 0.26	–	NA	15	P-A/C, PI 10 cmH_2O PEEPmax10 cmH_2O, FiO_2 1.0	94%	94%	Yes	6	14	22
Case 9	27	260	54	Oxygen flow 50 L/Min FiO_2 0.5	28	S/T 10/ 6cmH_2O FiO_2 0.5	–	NA	NA	NA	NA	0	NA	NA
Case 10	30	96	30	Oxygen flow 50 L/Min FiO_2 0.5	–	NA	7	P-A/C, PI 10 cmH_2O PEEPmax12 cmH_2O, FiO_2 1.0	NA	NA	No	5	NA	NA
Total/median (IQR)	27 (21–33)	180 (47–263)	41 (28–69)	50 (45–53)L/min 0.48 (0.35–0.5)	24 (13–32)		8 (5–13)	PEEPmax 14 cm H_2O (11–16)	91% (77–94%)	98% (95–99%)	YES 4 (40%)	5.5 (5–6)	15 (14–19)	38 (25–51)

NIV Non-invasive ventilation, *HFNC* High flow nasal cannula, *IMV* Invasive mechanical ventilation, *ECMO* Extracorporeal membrane oxygenation support

Mortalité 0%
11/11 HFNO
4/11 VNI
5/11 VM
VM 8j IQR(5-13)
2 ECMO



Ding et al. *BMC Infectious Diseases*, 2020

Diagnostic

- **PCR** spécifique NAAT (P1 adhésine / 16S)
- PCR multiplex Biofire FilmArray Panel Pneumopathie
- **Mycado** 90% diag par PCR
- Sérologie IgM, Ascension IgG
- **Portage asymptomatique**
  - Etude suédoise 1990, en période épidémique 13,5% de 758 sujets sains sont positifs à MP au niveau de la gorge, et encore 4,6% à 11 mois Gnarpe, *SJID*, 1992

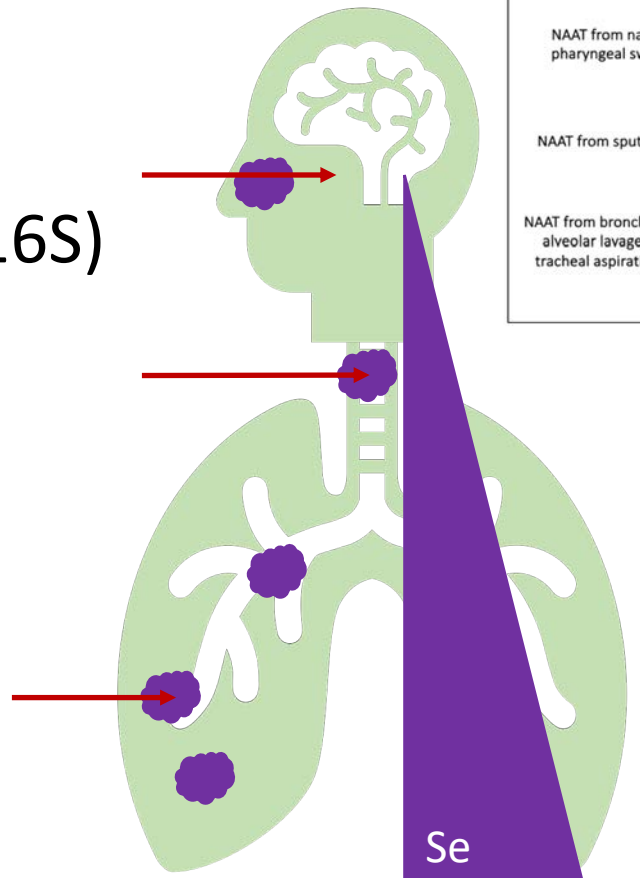
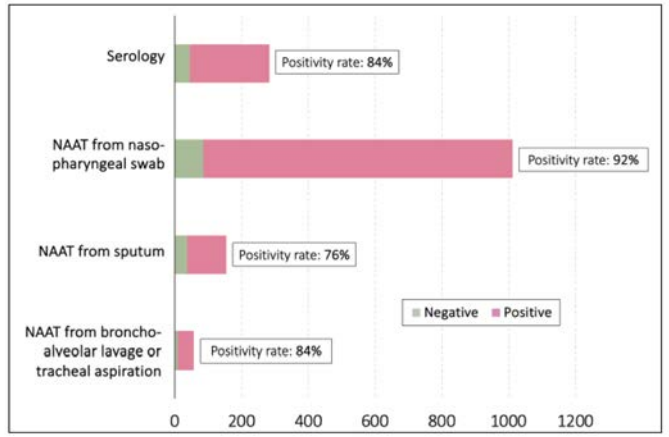


Figure S5. Positivity rates of *M. pneumoniae* serology and NAAT, according to the type of sampling.



PCR
Se 70 à 90% / culture
Sp 96 à 100%
Meilleure qu'IgM

Mandell, 2020
Palich R, *in press*, 2024

Diagnostic, notion pneumopathie « atypique »

- **Historique** début XXème siècle en opposition à Pneumocoque
  - Clinique "…*in the larger number of cases observed in the military camps the pneumonia was of an atypical nature. The onset tended to be* ***slower*** *than that of the lobar pneumonia of civil life; the course* ***more prolonged****. Crisis was relatively* ***rare****; physical signs were* ***slow*** *of development and of* ***patchy*** *distribution and scattered in several lobes*."
- Agents **ultra-filtrants** (Eaton Agent) mais sensibles cyclines

	Atypical	Typical
Pneumonia		
Clinical course	Subacute onset Protracted disease	Abrupt onset
Symptoms	Extrapulmonary and pulmonary (flu-like illness, myalgias, rhinorrhea, odynophagia, diarrhea, prominent headache) Dry cough; scant sputum	Confined to the lung Pleuretic chest pain Productive cough with coloured sputum
Leucocytosis	Absent	Present
Gram stain, blood and sputum cultures	No evidence of a pathogen	*Streptococcus pneumoniae* (or *Klebsiella pneumoniae*, *Staphylococcus aureus* . . .)
Chest X-ray	Patchy, ill-defined infiltrates, scattered on both lungs	Lobar pneumonia, pleural effusion
Prognosis	Often favourable, even without antibiotics	Significant mortality despite penicillin
Pathogens		
	Mycoplasma pneumoniae *Legionella pneumophila* and non-pneumophila *Chlamydia pneumoniae* and *psittaci* *Coxiella burnetii* (*Francisella tularensis*; *Bordetella pertussis*)	*Streptococcus pneumoniae* *Hemophilus influenzae* *Moraxella catarrhalis* *Klebsiella pneumoniae* *Staphylococcus aureus* *Streptococcus* sp. (*Pseudomonas aeruginosa*; other Gram-negative enterobacteriaceae)
Antibiotic coverage		
	Macrolides Tetracyclines Fluoroquinolones	Betalactams Aminoglycosides Respiratory Fluoroquinolones (Macrolides and Tetracyclines)

Mandell, 2020

Garin, *Microorganisms*, 2022

Prediction of microbial aetiology at admission to hospital for pneumonia from the presenting clinical features

Prepared on behalf of the British Thoracic Society Pneumonia Research Subcommittee by

B M FARR, D L KAISER, B D W HARRISON, C K CONNOLLY

These variables were **age**, **number of days** ill before admission, presence or absence of **bloody sputum** and of **lobar infiltration** on chest radiograph, and white blood cell count. The microbial aetiology was correctly predicted by this discriminant function analysis in only **42% of cases.**

Score Japonais patient **ambulatoire** Se 88%; Sp 77%

RESEARCH Open Access

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S. Valade[1,2*], L. Biard[2,3], V. Lemiale[1,2], L. Argaud[4], F. Pène[5], L. Papazian[6], F. Bruneel[7], A. Seguin[8], A. Kouatchet[9], J. Oziel[10], S. Rouleau[11], N. Bele[12], K. Razazi[13], O. Lesieur[14], F. Boissier[15], B. Megarbane[16], N. Bigé[17], N. Brulé[18], A. S. Moreau[19], A. Lautrette[20], O. Peyrony[21], P. Perez[22], J. Mayaux[23] and E. Azoulay[1,2]

Conclusion: In this descriptive study of atypical bacterial pneumonia requiring ICU admission, mortality was 11%. The comparison with SP pneumonia identified clinical, laboratory, and radiographic features that may suggest MP or CP pneumonia.

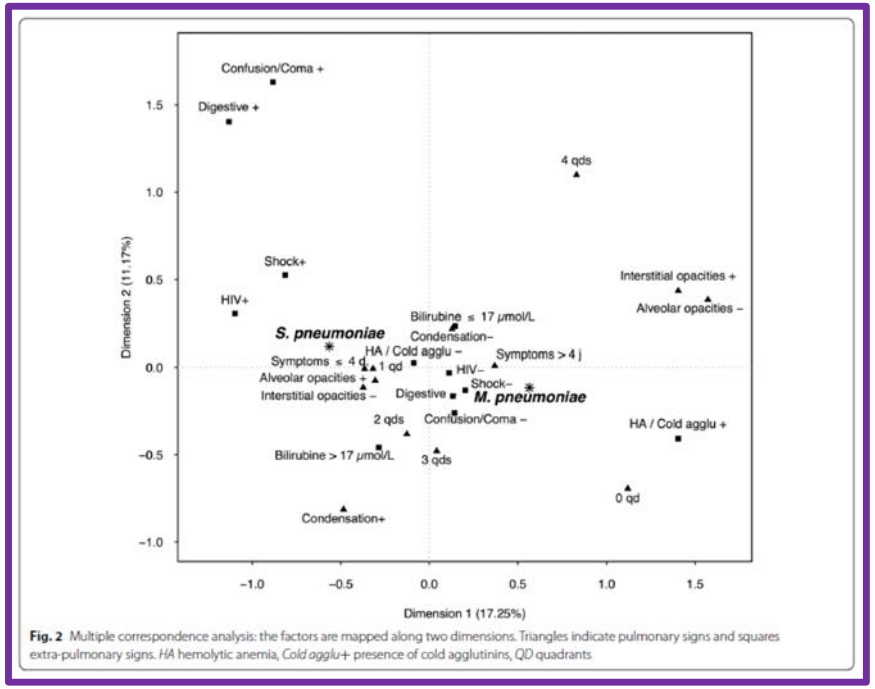

Fig. 2 Multiple correspondence analysis: the factors are mapped along two dimensions. Triangles indicate pulmonary signs and squares extra-pulmonary signs. *HA* hemolytic anemia, *Cold agglu+* presence of cold agglutinins, *QD* quadrants

Farr BM, *Thorax*, 1989
Valade S, *Ann. Intensive Care*, 2018
Yin, *Respir*, 2012

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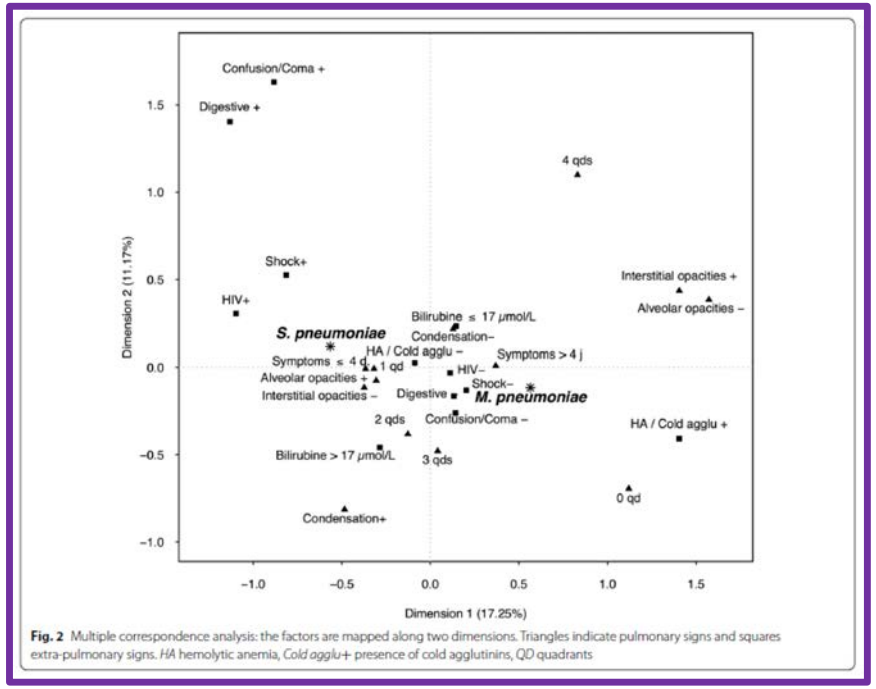

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LIMITATION DE L'APPROCHE SYNDROMIQUE POUR LES PATIENTS SEVERES

"From Atypical Pneumonia to Atypical Pathogens and Atypical Coverage" to nothing!

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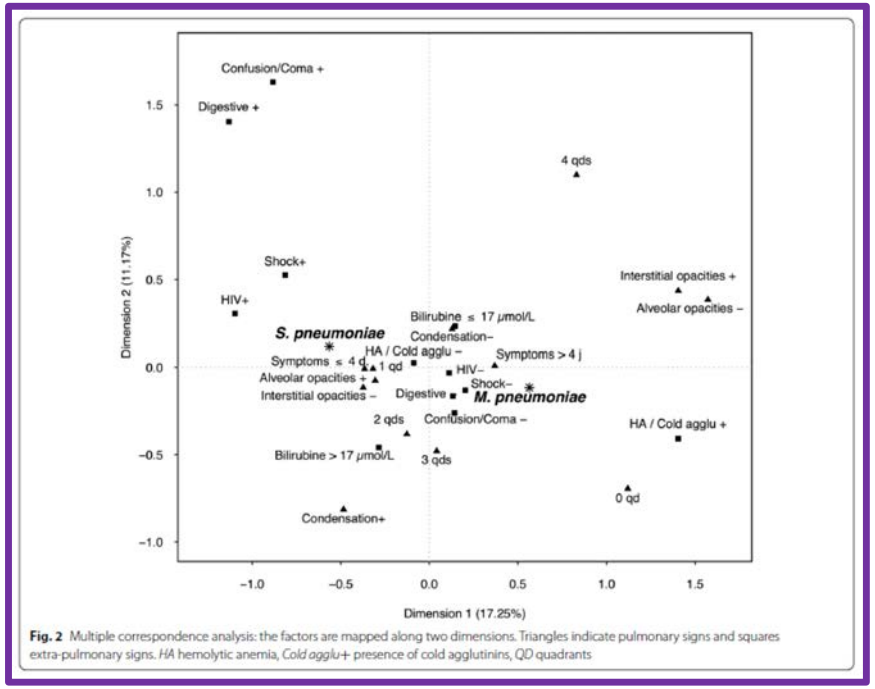

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LIMITATION DE L'APPROCHE SYNDROMIQUE

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DIAGNOSTIC MP

-ambulatoire

-Hôpital non sévère

-ICU

Farr BM, *Thorax*, 1989

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S. Valade[1,2*], L. Biard[2,3], V. Lemiale[1,2], L. Argaud[4], F. Pène[5], L. Papazian[6], F. Bruneel[7], A. Seguin[8], A. Kouatchet[9], J. Oziel[10], S. Rouleau[11], N. Bele[12], K. Razazi[13], O. Lesieur[14], F. Boissier[15], B. Megarbane[16], N. Bigé[17], N. Brulé[18], A. S. Moreau[19], A. Lautrette[20], O. Peyrony[21], P. Perez[22], J. Mayaux[23] and E. Azoulay[1,2]

Conclusion: In this descriptive study of atypical bacterial pneumonia requiring ICU admission, mortality was 11%. The comparison with SP pneumonia identified clinical, laboratory, and radiographic features that may suggest MP or CP pneumonia.

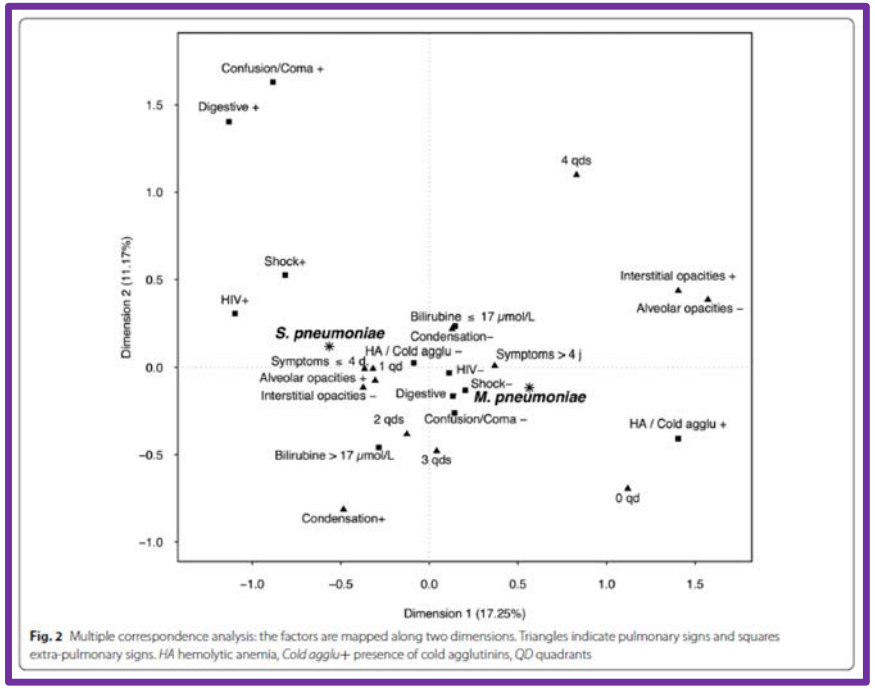


Fig. 2 Multiple correspondence analysis: the factors are mapped along two dimensions. Triangles indicate pulmonary signs and squares extra-pulmonary signs. *HA* hemolytic anemia, *Cold agglu+* presence of cold agglutinins, *QD* quadrants

LIMITATION DE L'APPROCHE SYNDROMIQUE

"From Atypical Pneumonia to Atypical Pathogens and Atypical Coverage" to nothing!

DIAGNOSTIC MP

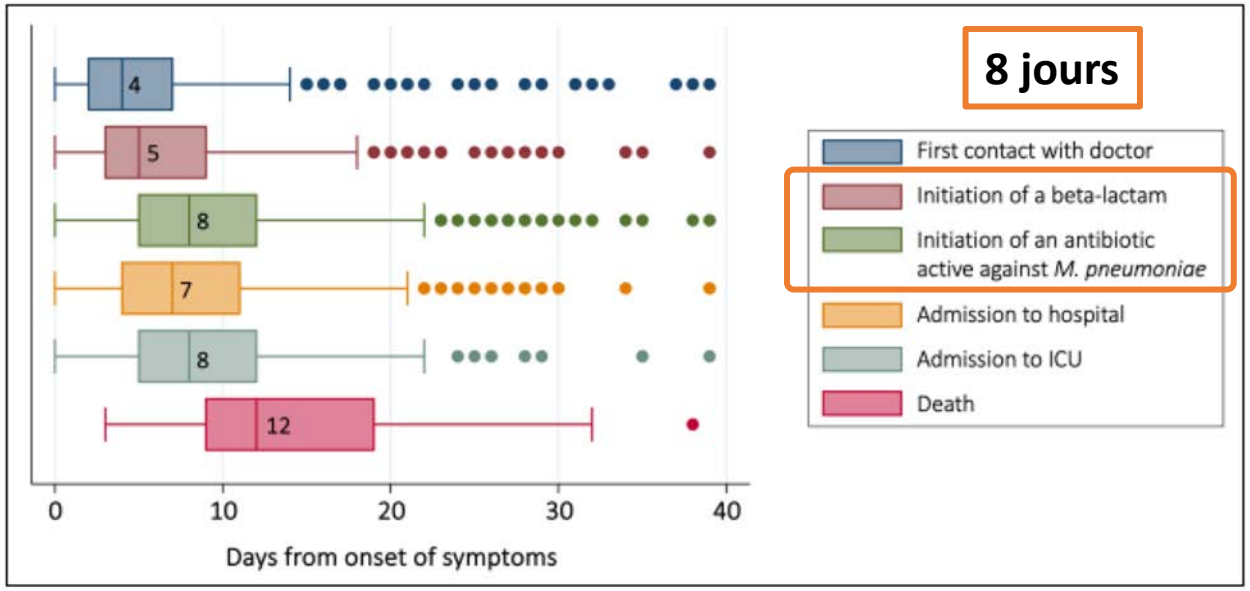
TRAITEMENT

Farr BM, *Thorax*, 1989

Valade S, *Ann. Intensive Care*, 2018

Mycado **Traitement**

Figure S3. Time from symptom onset to first physician contact, antibiotic initiation, hospital and ICU admission, and death.



1261 patients

Type ttt

*90% Macrolides

Spiramycine 61% / Azithro 29% / Clarithro 12%

*13% Fluoroquinolones

*5% Cyclines

*2,8% Pristinamycine

Tps moyen avant ttt efficace 8 jours

8,5% seulement ttt efficace avant hôpital

83% βlact avant ou durant

Tps moyen entre βlact et ttt efficace 4j (2-6)

Association ttt efficace 12% (>> ICU)

Corticoïdes systémiques 15% (>> MextraP)

IgG 0,9% (MextraP)

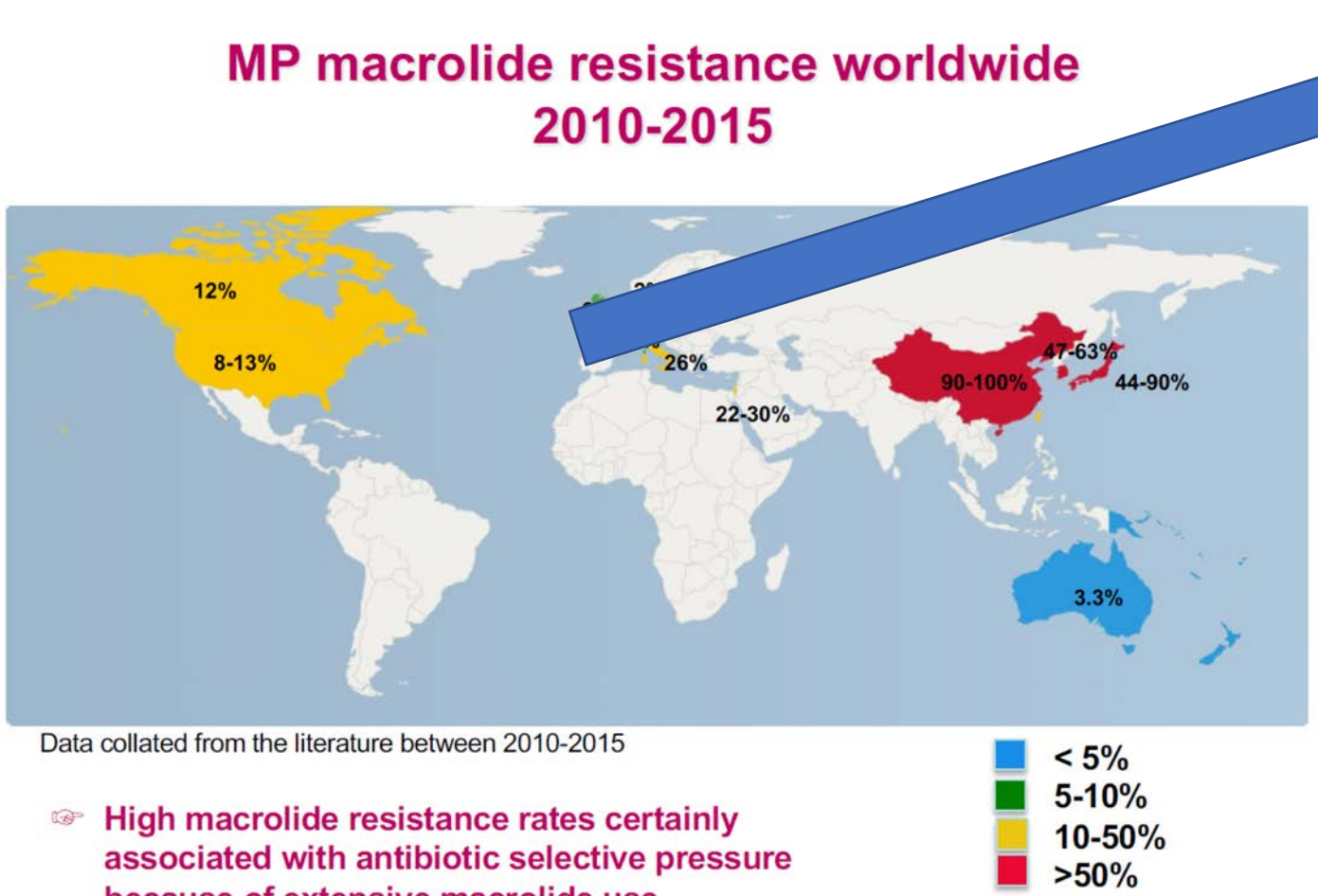
Test de résistance fait sur 102 patients

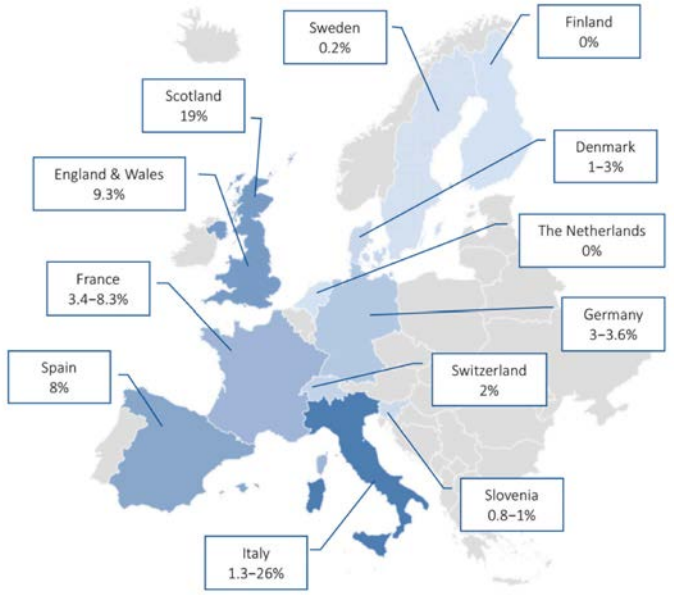
4 porteurs de résistance

Palich R, *in press*, 2024

Résistance

La résistance est médiée par des mutations ponctuelles dans le domaine V de **l'ARNr 23S en position 2063** ou 2064 qui réduit affinité Macrolide SU 50S





CNR BORDEAUX

- Au 31 mars 2024, 21 souches R par PCR parmi les 869 prélèvements amplifiés **(2,4 %)** S27/2023 et S13/2024
- < 15ans 19 %, 15-44ans 57 %, > 45ans et + 24 %
- 76,2 % mutation **A2063G** (Chine)

Pereyre S, *Frontiers Microbiol.*, 2016

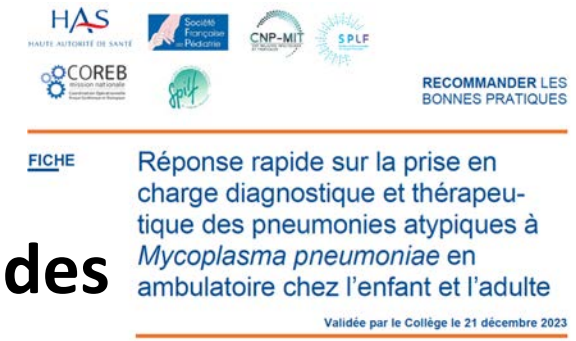
Loconsole D, *Infectious Disease reports*, 2021

Santé publique France / Bulletin / Situation des infections à *Mycoplasma pneumoniae* en France au 24 mars 2024

Propositions Traitement Adultes

- Efficacité **identique** Macrolide / Fluoroquinolone / Cycline
  - 1650 patients adultes japon 2010-2013 Tashiro, *CID*, 2023
- **Efficacité** des macrolides sur souches résistantes ?
  - Données chez l'enfant, immunomodulation, self limited diseases, clearance fièvre
    Suzuki, *AAC*, 2006 / Pereyre S, *Frontiers Microbiol.*, 2016

- **Macrolides première intention**
  - Clarithromycine 500 mg 1/0/1 5J
  - Azithromycine : 500 mg/j J1 250mg/j de J2-J5
  - Second choix Spiramycine 3 MUI 1/1/1 7J ou Roxithromycine 150 mg 1/0/1 10J
- **En cas d'allergie ou de contre-indication aux macrolides**
  - Pristinamycine 500 mg 2/2/2 7J
  - Doxycycline > 60 kg 200 mg/j 7J / < 60 kg 60 kg 200 mg J1 100mg J2-J7
  - En dernier recours Lévofloxacine 500 mg 1/0/0 7J


HAS
CNP-MIT
SPLF
COREB
RECOMMANDER LES BONNES PRATIQUES
FICHE
Réponse rapide sur la prise en charge diagnostique et thérapeutique des pneumonies atypiques à *Mycoplasma pneumoniae* en ambulatoire chez l'enfant et l'adulte
Validée par le Collège le 21 décembre 2023

HAS, 2023

Corticothérapie

Clinical Infectious Diseases

MAJOR ARTICLE

Outcomes of Adjunctive Corticosteroid Treatment in Hypoxemic Adults Hospitalized for *Mycoplasma pneumoniae* Pneumonia: A Retrospective Cohort Study

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Background. Corticosteroids appears to be beneficial for severe *Mycoplasma pneumoniae* pneumonia in children, but data in adults are limited. This study investigated effects of adjunctive corticosteroids in hypoxemic adults with *M. pneumoniae* pneumonia.

Methods. Adults admitted 2013–2017 with verified *M. pneumoniae* pneumonia and hypoxemia ($SpO_2 < 93\%$ or oxygen treatment) were included in a cohort. Treatment was defined as receipt of at least 1 glucocorticoid dose.

Primary outcome was time to regression of hypoxemia, analyzed with a multivariable Cox regression. Secondary outcomes included fever duration, length of stay, and complications.

Results. Corticosteroids were given to 31% (122/388) during hypoxemia. Median age was 44 (interquartile range [IQR] 34–57) years. Median time to start of corticosteroid treatment was 1.9 (IQR 0.6–3.6) days from admission. Median cumulative dose was equivalent to 15 (IQR 10–19) mg betamethasone. Treatment duration was 5 (IQR 3–6) days. Patients treated with corticosteroids had more severe respiratory disease, longer symptom duration, and were more often treated with fluoroquinolones.

Time to regression of hypoxemia (hazard ratio [HR] 0.92 [95% confidence interval {CI}: .72–1.19], $P = .53$) and length of stay (HR 0.91 [95% CI: .71–1.16], $P = .44$) were not significantly different between corticosteroid treated and controls. Corticosteroid treatment was associated to shorter fever duration (HR 1.44 [95% CI: 1.00–2.06], $P = .046$). Complications did not differ significantly between treatment groups.

Conclusions. Adjunctive corticosteroids were not associated with reduced time to regression of hypoxemia in adults with *M. pneumoniae* pneumonia. However, duration of fever was shorter and no increase in complications was seen.

Keywords. *Mycoplasma pneumoniae*; pneumonia; adults; corticosteroids; treatment.

Dr Pierre François DEQUIN

Hagman K, *CID*, 2024

Conclusion

- Intérêt d'une **épidémie**
  - Alerte et veille
  - Maladie peu grave, mais **nombre** = hospitalisation, mortalité basse
  - **Résistance** peu un problème
  - Compétence clinique CAP MP, **MIRM**
  - CAP MP hospitalisation = grave = **1/3 en ICU, Rx non discriminante condensation, HFNO**
  - **Dans la vraie vie, valses ATBttt, réévaluations tardives, coût sur pression ATB**
- Quelles **nouveautés** ?
  - Révision des **recommandations** SPILF, SFP, SRLF, SFMU, SFM 2024
  - PCT et MULTIPLEX: MULTI CAP, données MP
  - Nouveau ttt tigecycline, omadacycline
  - Corticoïdes