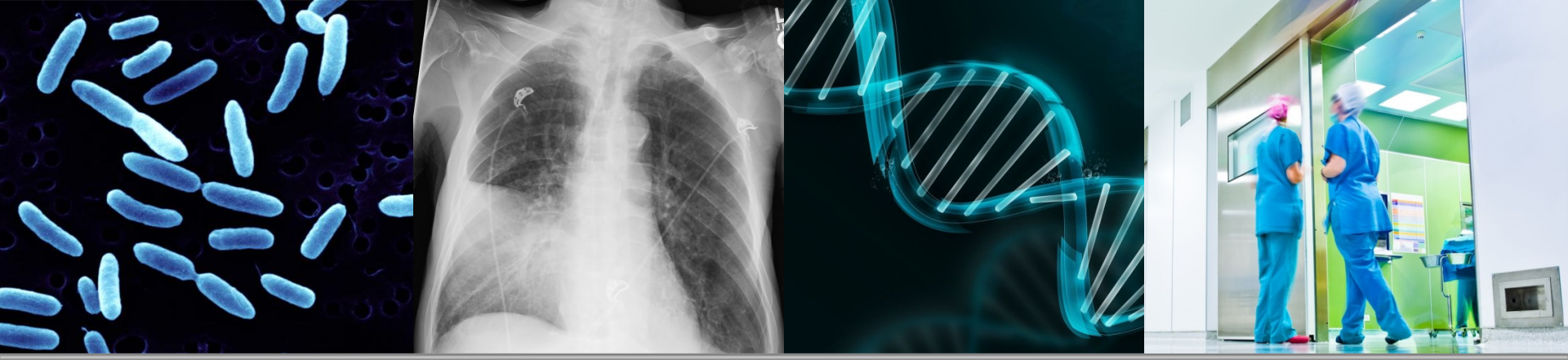

Journée de formation SRLF/SFMU « Infections graves au SAU »
Paris – Mercredi 21 novembre 2018

Diagnostic microbiologique au SAU : le présent et le futur

François Barbier, MD PhD
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CHR ORLÉANS

Pas de COI potentiel

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016

1. We recommend that administration of IV antimicrobials be initiated as soon as possible after recognition and within 1 h for both sepsis and septic shock (strong recommendation, moderate quality of evidence; grade applies to both conditions).

Intensive Care Med
DOI 10.1007/s00134-017-4683-6

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016

2. We recommend empiric broad-spectrum therapy with one or more antimicrobials for patients presenting with sepsis or septic shock to cover all likely pathogens (including bacterial and potentially fungal or viral coverage) (strong recommendation, moderate quality of evidence).
3. We recommend that empiric antimicrobial therapy be narrowed once pathogen identification and sensitivities are established and/or adequate clinical improvement is noted (BPS).

Surviving Sepsis Campaign

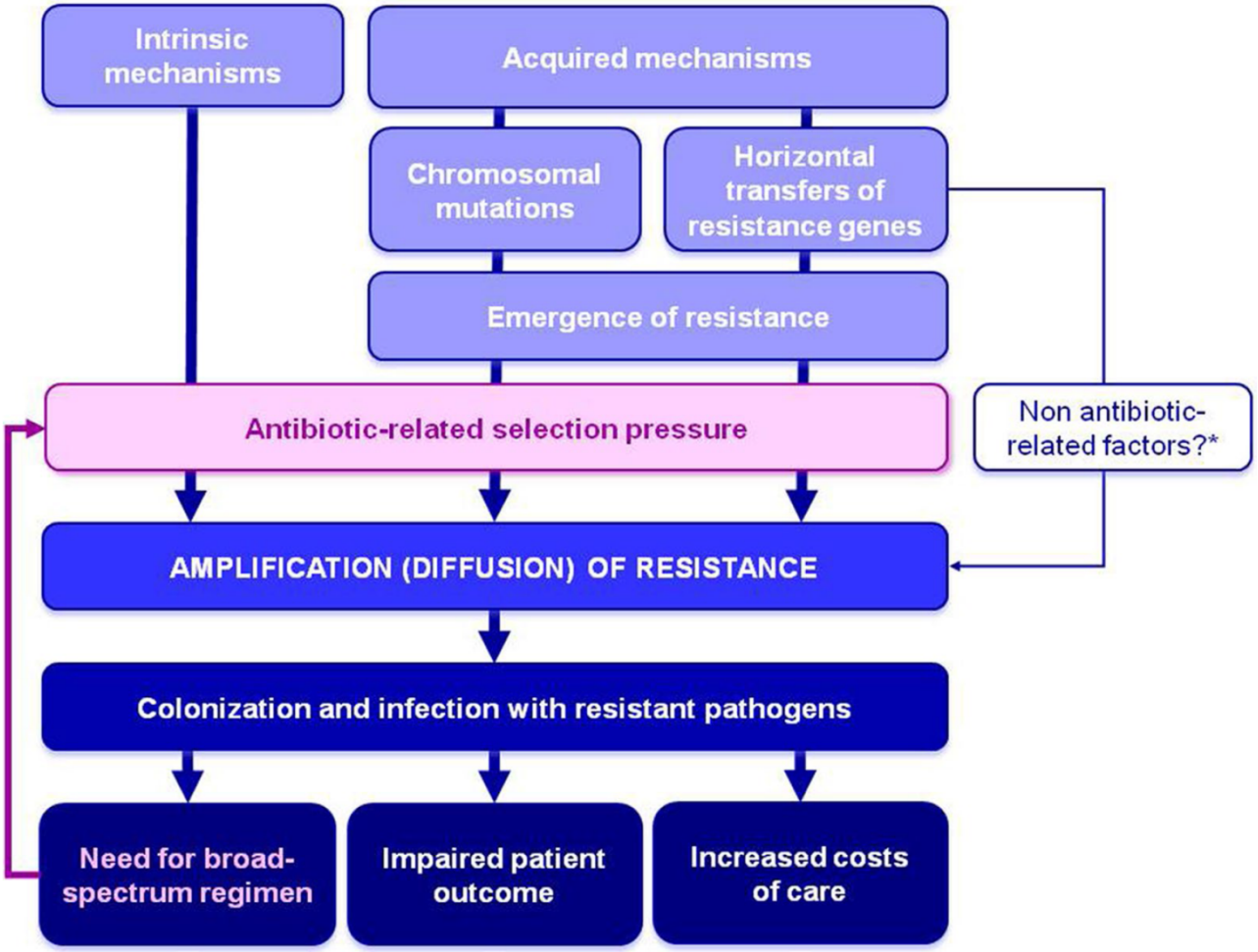
Intensive Care Med
DOI 10.1007/s00134-017-4683-6

Understanding resistance

François Barbier[1*] and Charles-Edouard Luyt[2,3]

Intensive Care Med (2016) 42:2080–2083

Le recours de plus en plus fréquent à des antibiothérapies probabilistes à large spectre amplifie le problème de la multi-résistance



Bactériologie conventionnelle : la « préhistoire » ?

Prélèvement

Culture positive

Identification et sensibilité aux antibiotiques (antibiogramme)

J0 **J1-J2** **J2-J4**

Techniques bactériologiques « classiques » : résultats nécessaires à la réévaluation de l'antibiothérapie initiale disponibles après ≥ 48h

Que faut-il attendre des outils de diagnostic microbiologique rapide au SAU?

1. **Augmenter la probabilité d'un traitement initial adéquate (actif sur le ou les germes en cause)**

2. **Corriger plus rapidement un traitement probabiliste inadéquate** (élargissement du spectre/adaptation plus précoce)

3. **Désescalader plus rapidement vers une antibiothérapie à spectre plus étroit en l'absence d'argument pour une BMR**

4. **Arrêter l'antibiothérapie (voire ne pas la débuter) si infection non-bactérienne ou SIRS non-infectieux?**

Que faut-il attendre des outils de diagnostic microbiologique rapide au SAU?

DEUX OBJECTIFS PRINCIPAUX :

Améliorer le pronostic des patients avec infection grave
(impact du retard à l'administration d'une antibiothérapie efficace)

Réduire la pression de sélection des antibiotiques
(impact écologique)

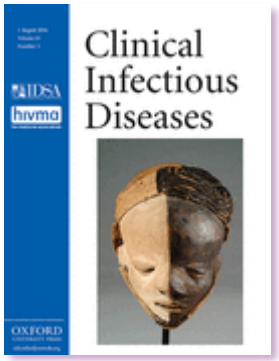
Apport des outils de diagnostic microbiologique rapide au SAU

Infections urinaires

Fecal Colonization With Extended-spectrum Beta-lactamase–Producing *Enterobacteriaceae* and Risk Factors Among Healthy Individuals: A Systematic Review and Metaanalysis

Styliani Karanika,[1,a] Theodoros Karantanos,[2,a] Marios Arvanitis,[2] Christos Grigoras,[1] and Eleftherios Mylonakis[1]

[1]Infectious Diseases Division, Warren Alpert Medical School of Brown University, Providence, Rhode Island; and [2]General Internal Medicine Section, Boston Medical Center, Boston University School of Medicine, Massachusetts



Clinical Infectious Diseases® 2016;63(3):310–8

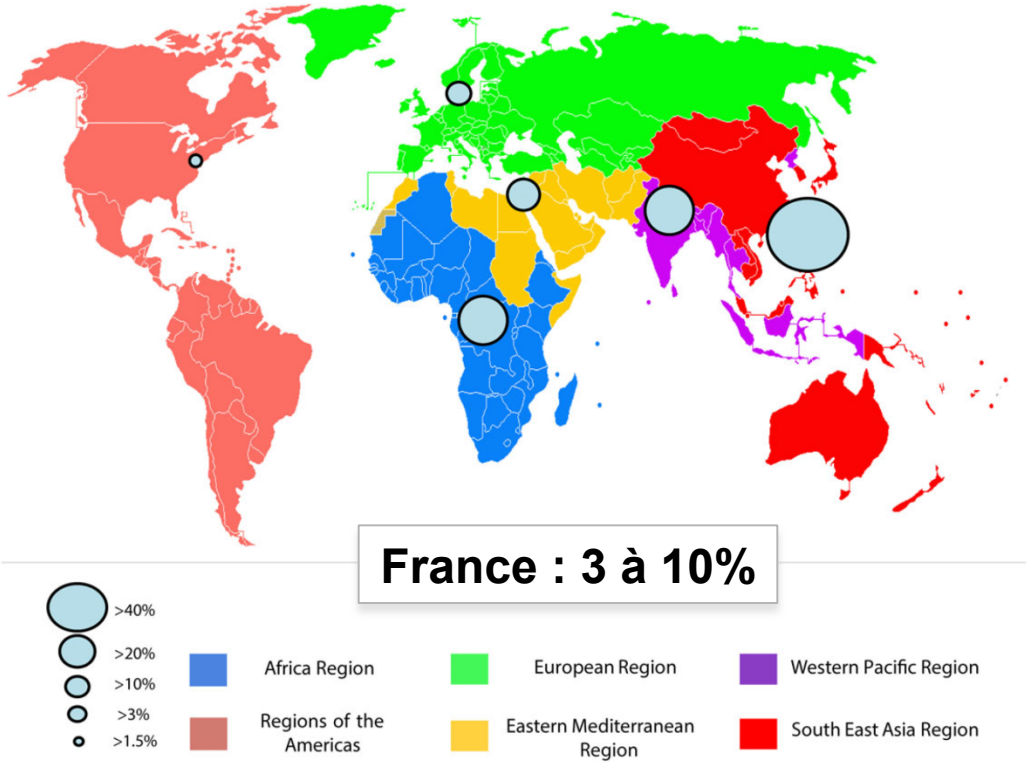


Figure 3. Pooled prevalence of fecal colonization with extended-spectrum beta-lactamase (ESBL)–producing organisms per World Health Organization region. Circle size represents the ESBL colonization rates.

La prévalence du portage communautaire d'EBLSE (essentiellement *E. coli* CTX-M) est en augmentation constante

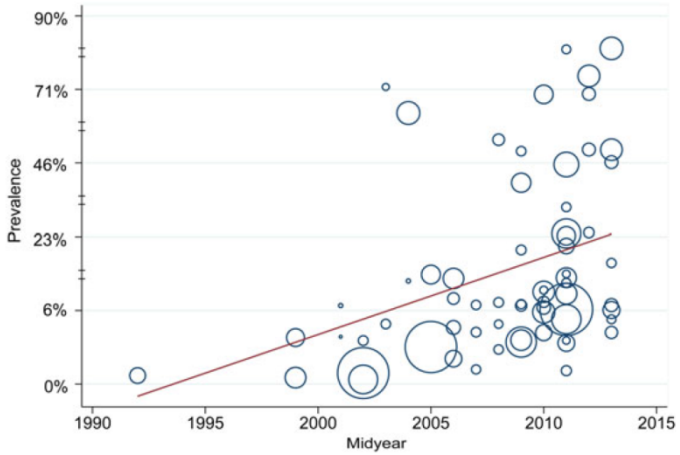


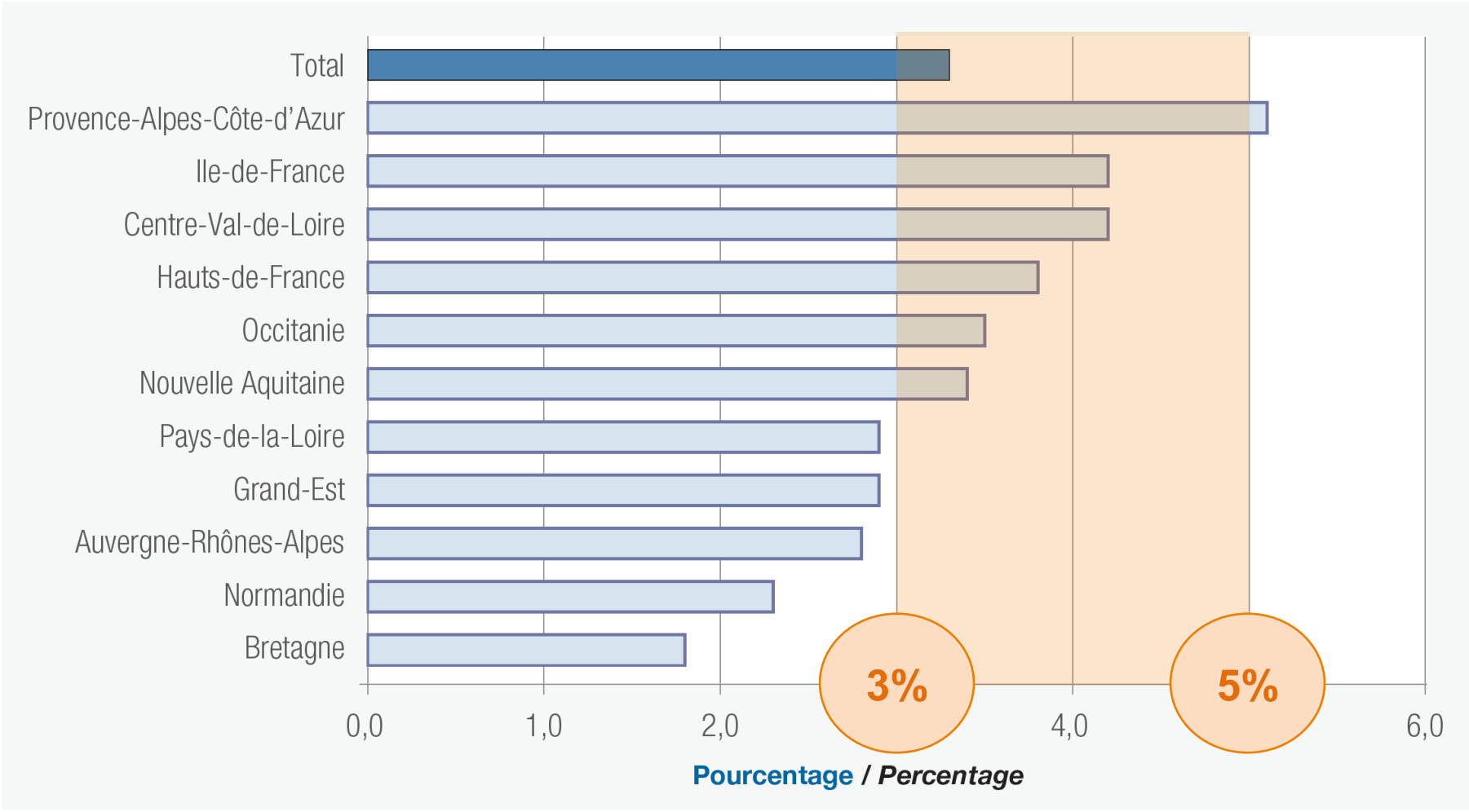
Figure 4. Extended-spectrum beta-lactamase class A colonization trends over time. Circles represent the estimates from each study, sized according to the precision of each estimate. The fitted regression line is depicted by study midyear. The estimated annual increase is 5.38%.

IU communautaires à *Escherichia coli*

Prévalence des souches BLSE

France, 2015

ONERBA France
Observatoire National de l'Epidémiologie de la Résistance Bactérienne aux Antibiotiques



Diagnostic et antibiothérapie des infections urinaires bactériennes communautaires de l'adulte - SPILF 2015

Antibiothérapie probabiliste d'une PNA grave

C3G IV (céfotaxime ou ceftriaxone) + amikacine

Si antécédent d'IU ou de colonisation à EBLSE < 6 mois

Carbapénème (imipénème ou méropénème) + amikacine

Si choc septique et présence d'au moins un facteur de risque d'EBLSE

(colonisation ou IU à EBLSE < 6 mois, antibiothérapie par BL/BLI, C2G, C3G ou FQ < 6 mois, voyage récent en zone d'endémie d'EBLSE, hospitalisation < 3 mois, vie en long-séjour)

Carbapénème (imipénème ou méropénème) + amikacine

AMERICAN SOCIETY FOR MICROBIOLOGY | Journal of Clinical Microbiology

Comparison of Three Biochemical Tests for Rapid Detection of Extended-Spectrum-β-Lactamase-Producing *Enterobacteriaceae*

Laurent Poirel,[a] Javier Fernández,[a,b,c] Patrice Nordmann[a,d]

Détection rapide (< 2h) des souches productrices de BLSE à partir des cultures H12-H24, sans attendre l'antibiogramme (tests biochimiques/chromogéniques)

TABLE 3 Diagnostic parameters of the different tests

Diagnostic test parameter	Performance (%) by test			
	Rapid ESBL NDP	β-Lacta	Rapid ESBL Screen kit 30 min	Rapid ESBL Screen kit 2 h
Sensitivity for CTX-M-type ESBL	100	91.4	82.8	94.3
Sensitivity for non-CTX-M-type ESBL	88	84	72	88.0
Global sensitivity for ESBL	95.0	88.0	80	91.7
Global specificity	100	70.8	87	83

BLSE ?

- + + - + + + + - - - -

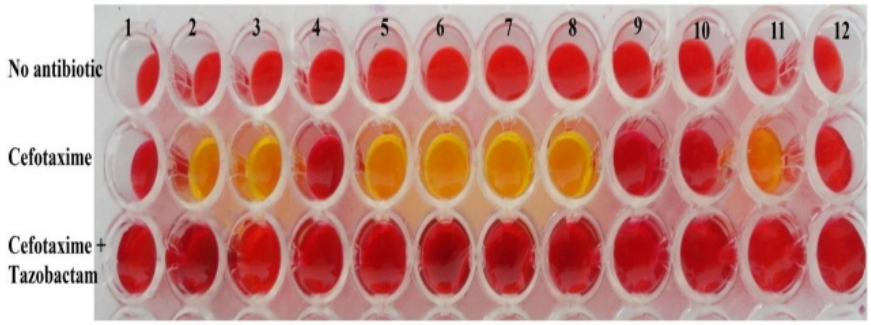
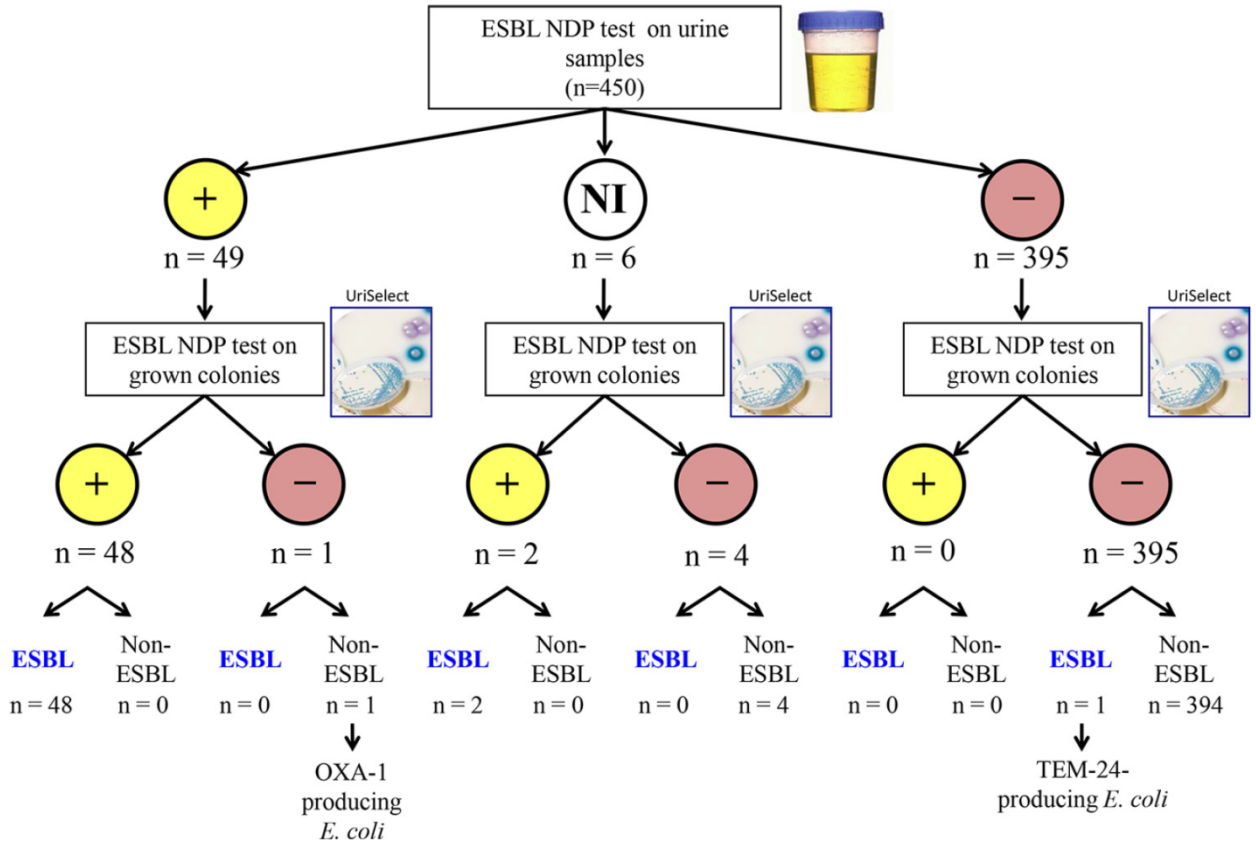


Figure 1. Representative results of the ESBL NDP test. Strains 1 and 2 are negative and positive controls, respectively; strains 3, 5,6,7,8 and 11 are ESBL producers; strains 4,9,10 and 12 are non-ESBL producers.

Ex : Rapid NDP test

ESBL NDP test : utilisation directement sur l'ECBU (pas de subculture)

Dortet et al. *J Clin Microbiol* 2014; 52 (10) : 3701-3706



« Results of the ESBL NDP test were obtained **within 15 min**. The **sensitivity and specificity of the ESBL NDP test were 98% and 99.8%,** respectively, whereas the PPV and NPV of this test were 98% and 99.8%, respectively. »

Comparative Evaluation of Four Phenotypic Tests for Detection of Carbapenemase-Producing Gram-Negative Bacteria

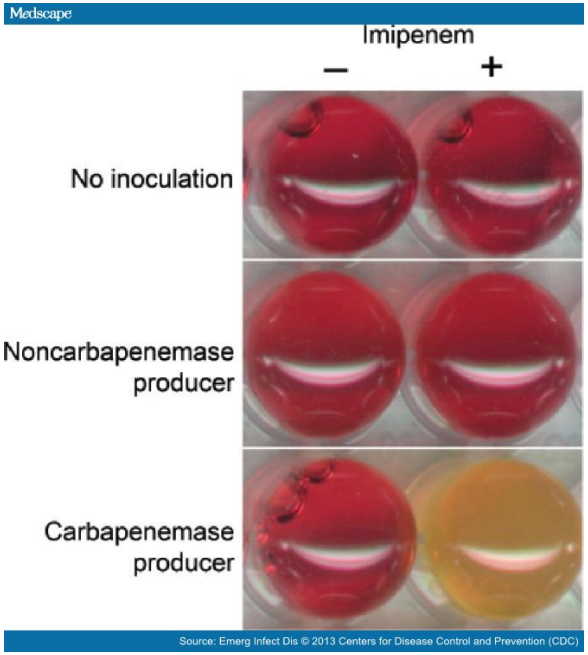
February 2017 Volume 55 Issue 2

Audrey Noël, Te-Din Huang, Catherine Berhin, Martin Hoebeke, Warda Bouchahrouf, Sami Yunus, Pierre Bogaerts, Youri Glupczynski

TABLE 3 Analytical performances of the BYG Carba test, β Carba test, Rapidec Carba NP test, and Neo-Rapid Carb screen kit

Parameter[a]	Results for[b]: BYG	BCT	RCNP	NRCK
Enterobacteriaceae (n = 198)				
Sensitivity (%)	100	97.3	91.9	89.2
95% CI	100–100	93.4–100	85.4–98.4	81.8–96.6
Specificity (%)	98.9	97.7	83.9	89.7
95% CI	96–100	93.7–100	74.1–93.8	81.5–97.8
PPV (%)	99.1	98.2	87.9	91.7
95% CI	96.9–100	95–100	80.4–95.5	85–98.3
NPV (%)	100	96.6	89	86.7
95% CI	100–100	91.8–100	80.4–97.7	77.7–95.6
Pseudomonas spp. (n = 89)				
Sensitivity (%)	87.3	90.9	90.9	92.7
95% CI	76–98.5	81.2–100	81.2–100	84–100
Specificity (%)	94.1	94.1	88.2	88.2
95% CI	84–100	84–100	74.4–100	74.4–100
Acinetobacter spp. (n = 41)				
Sensitivity (%)	72.7	75.8	36.4	27.3
95% CI	53.3–92.1	57.1–94.4	15.4–57.3	7.9–46.7
Specificity (%)	100	87.5	75	100
95% CI	100–100	58.3–100	36.7–100	100–100

Ex : Carba NP test



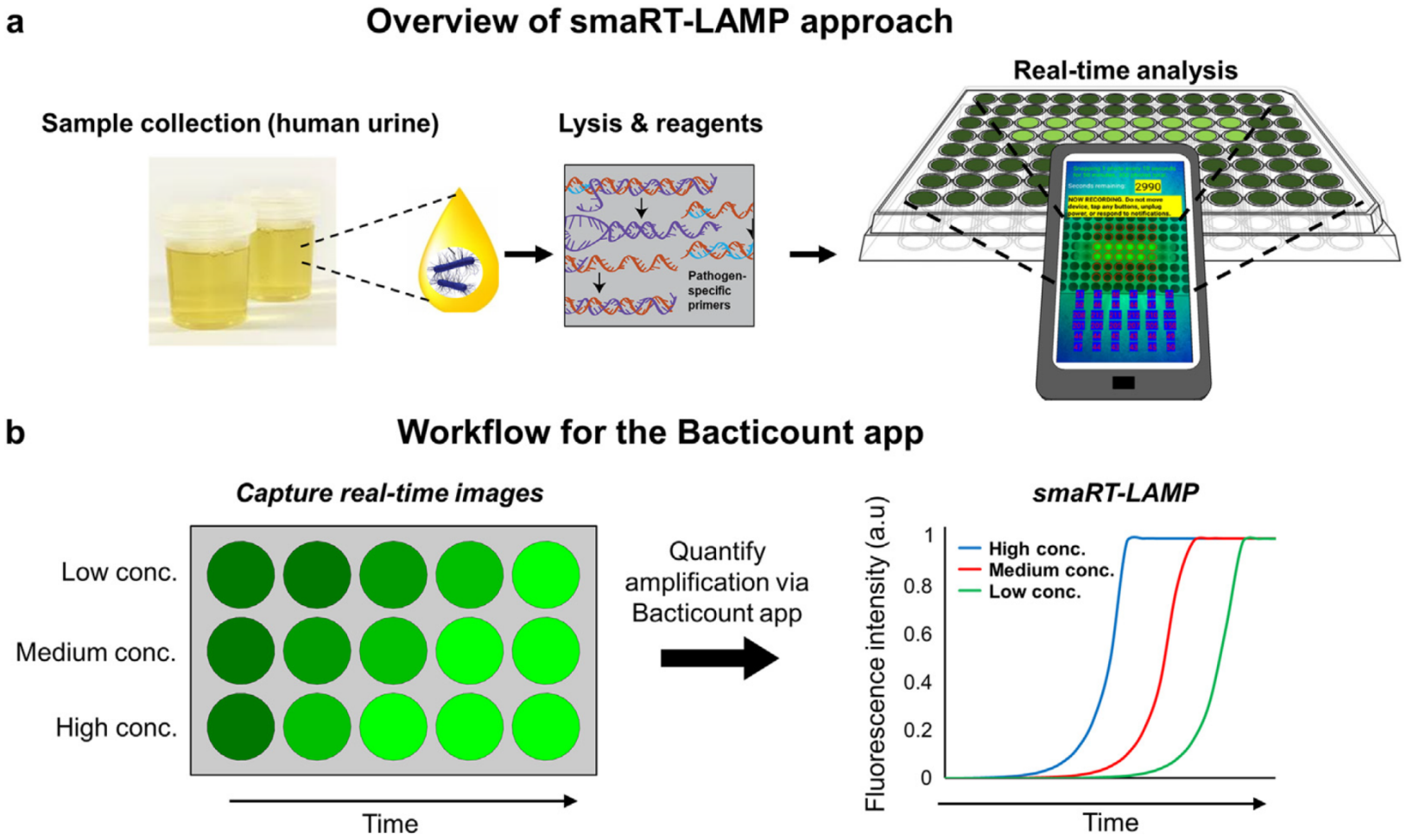
⇨ Manque de Se chez *Acinetobacter* spp. (problème : carbapénémases OXA)

Research paper

Smartphone-based pathogen diagnosis in urinary sepsis patients

EBioMedicine
Published by THE LANCET

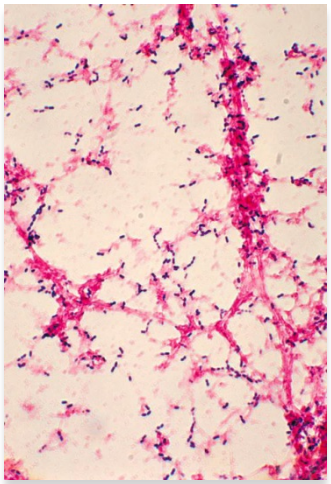
Barnes et al. *EBioMedicine* 2018; 36: 73-82

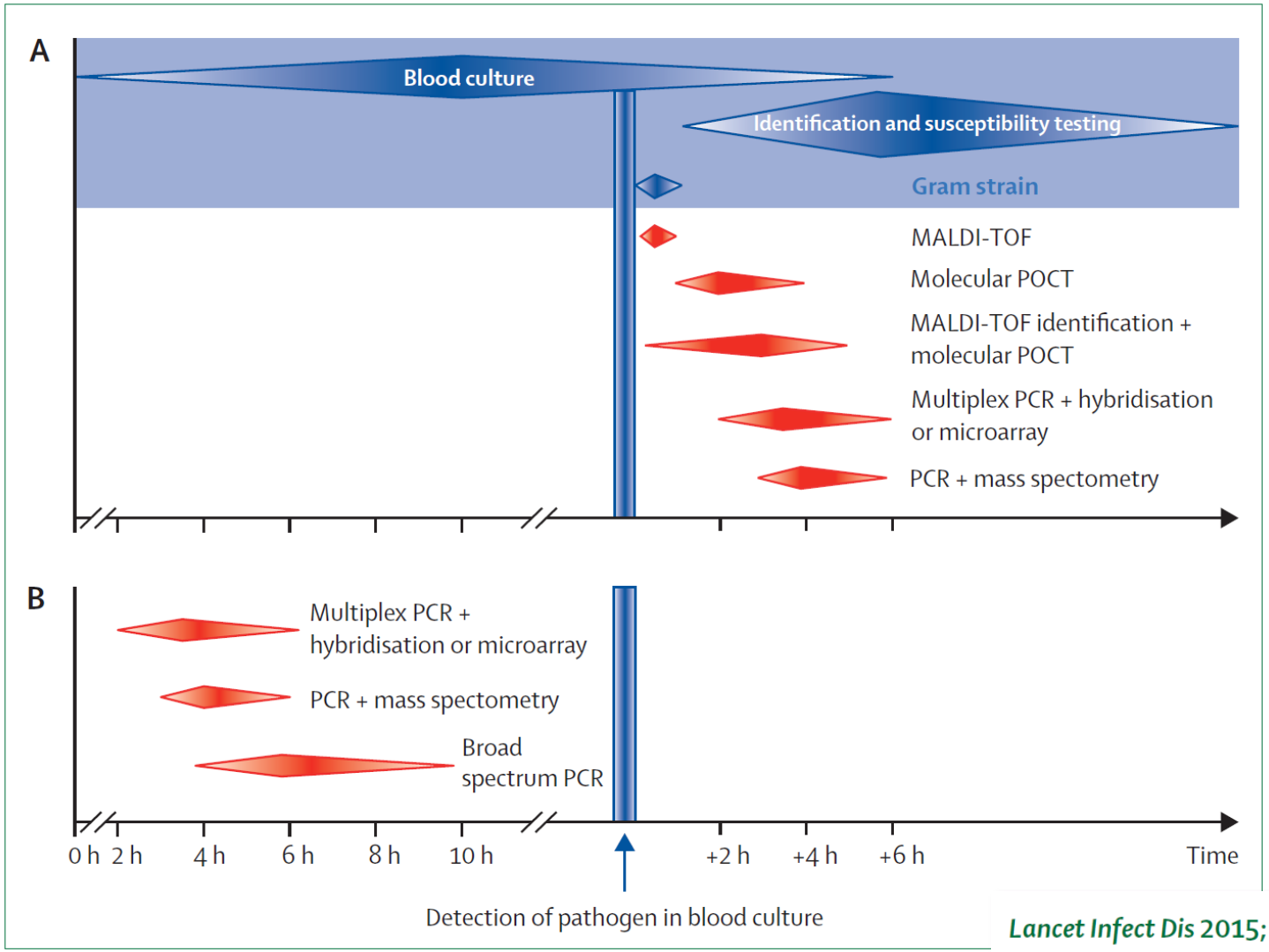


Apport des outils de diagnostic microbiologique rapide au SAU

Bactériémies

Bactériémies : identifier les pathogènes en cause et dépister la résistance aux antibiotiques

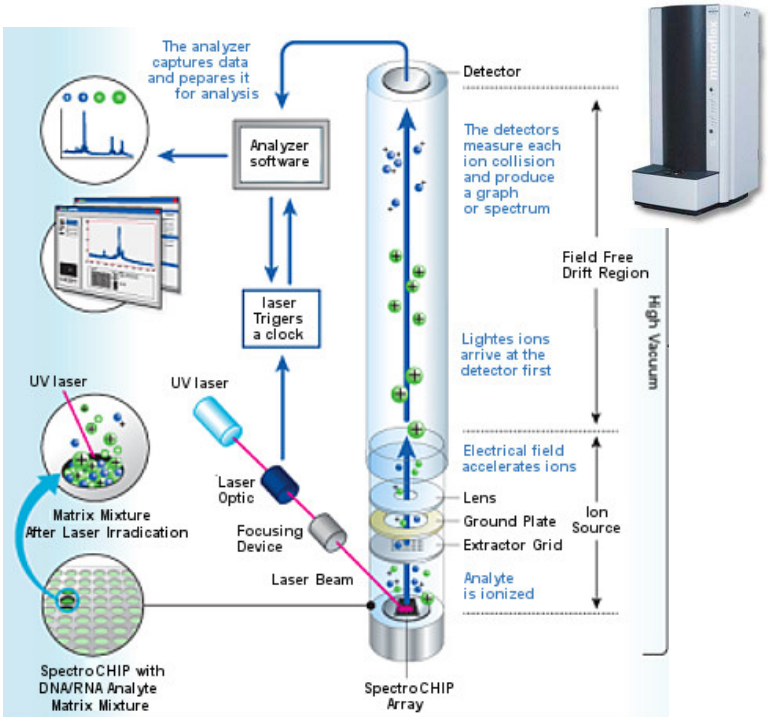


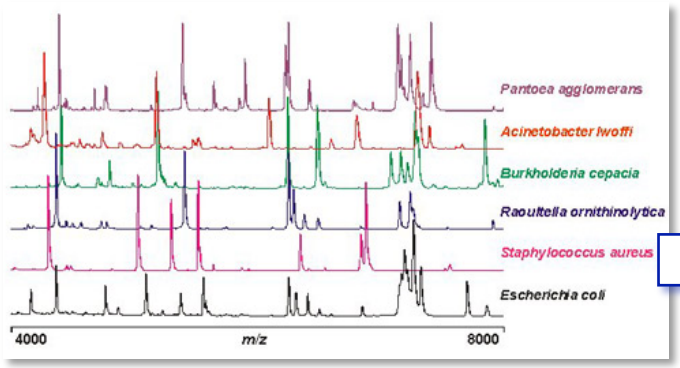


Lancet Infect Dis 2015; 15: 581–614

Identification des pathogènes par spectrométrie de masse

Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS)





- Identification bactérienne à partir des cultures (délai < 1 heure)
- **Identification possible sur le flacon d'hémoculture positif, sans subculture (Se 75-80%, Sp > 90%)**
- Diminution significative du délai d'initiation d'une antibiothérapie optimale (si intervention d'une EMA)

Leli et al. *J Med Microbiol* 2013; 303: 205-209

Huang et al. *Clin Infect Dis* 2013; 57: 1237-1245

Liesenfeld et al. *Eur J Microbiol Immunol* 2014; 4:1-25

Huang et al. *Clin Infect Dis* 2013; 57: 1237-1245

Osthoff et al. *Clin Microbiol Infect* 2017; 37: 78-85

Database (mass spectum) → **Species identification**

Rapid Diagnosis of Infection in the Critically Ill, a Multicenter Study of Molecular Detection in Bloodstream Infections, Pneumonia, and Sterile Site Infections*

Even faster?

PCR / ESI-MS

(*polymerase chain reaction/electrospray ionization-mass spectrometry*)

Détection de > 800 pathogènes différents (bactéries et *Candida* spp)

en < 6 heures à partir du prélèvement (**sang total**, LBA, liquide de ponction)

TABLE 2. Bloodstream Infection Assay Performance

		Culture				
		+	−	Total	Sensitivity	81% (95% CI, 70–89%)
Polymerase chain reaction/ electrospray ionization-mass spectrometry	+	55	173	228	Specificity	69% (95% CI, 65–73%)
	−	13	384	397	Positive predictive value	24% (95% CI, 19–30%)
	Total	68	557	625	Negative predictive value	97% (95% CI, 94–98%)

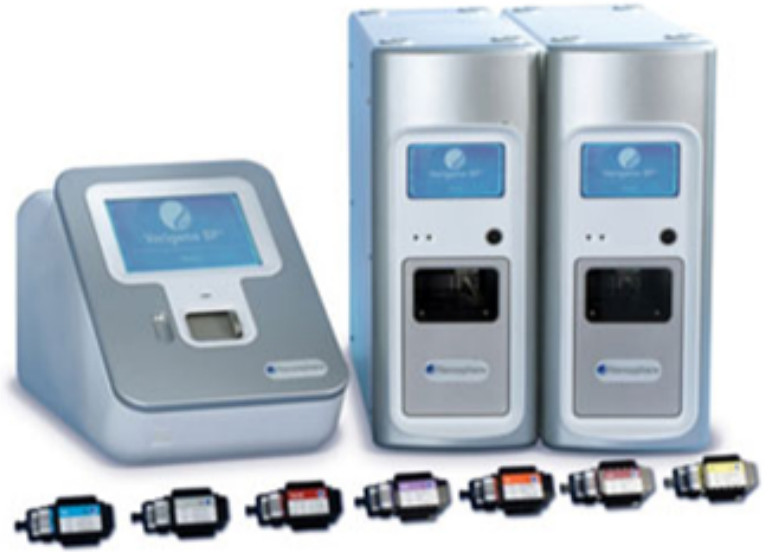
Vincent JL et al. *Crit Care Med* 2015; 43: 2283-2291

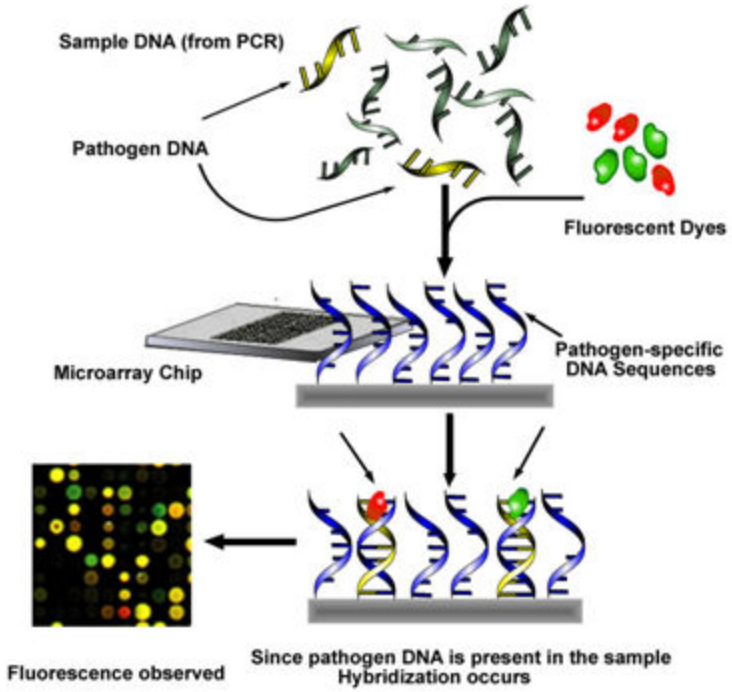
Comercially available systems for the identification of pathogens from positive blood cultures

System (Manufacturer)	Methods	Time to result	Microorganism coverage	Resistance and virulence markers	Sensitivity Specificity Correlation with conventional methods (%)
PNA FISH and QuickFISH (AdvanDx, Woburn, MA, USA)	FISH	<1–3 hours	4 Gram positive 4 Gram negative 5 Fungi	0	97–100 90–100 96–99
AccuProbe (Gen-Probe, San Diego, CA, USA)	FISH	<1 hour	*Staphylococcus aureus* *Enterococcus* spp. *Streptococcus pneumoniae* *Streptococcus* group A *Streptococcus* group B	0	80.8–100 98.7–100 nr
Verigene (Nanosphere, Northbrook, IL, USA)	Microarray	2.5 hours	12 Gram positive 9 Gram negative	*mecA*, *van*A/B, KPC, NDM, CTX-M,VIM, IMP,OXA12	81–100 98–100 nr
Prove-it Sepsis (Mobidiag, Esbo, Finland)	Microarray	3.5 hours	60 bacteria 13 fungi	*mecA*	95% 99% nr
FilmArray (Idaho Technology, Salt Lake City, UT, USA)	Multiplex PCR	1 hour	8 Gram positive 11 Gram negative 5 Fungi	*mecA*, *van*A/B, KPC	97–95 91–98 nr
Xpert MRSA/SA BC (Cepheid, Sunnyvale, CA, USA)	Real-time PCR	1 hour	*S. aureus*	*mecA*	100 99–100 nr
StaphSR assay (BD GeneOhm, San Diego, CA, USA)	Multiplex PCR	1–2 hours	*S. aureus*	*mecA*	96–100 95–98 nr
StaphPlex (Genaco Biomedical Products, Huntsville, AL, USA)	Multiplex PCR + Microarray	5 hours	*S. aureus*	*mecA* (+ PVL)	100 95–100 92
MALDI-TOF MS Brucker Daltonics (Bremen, Germany) bioMérieux (Marcy l'Etoile, France)	Mass-spectrometry	<1 hour	<1000[a]	not in routine	– – 76–99

Opota et al. *Clin Microbiol Infect* 2015; 21: 313–322

Identification des pathogènes et détection des gènes de résistance par *DNA Microarray*





Amplication par PCR des gènes-cibles (spécificité d'espèce ou gène de résistance)

▼

Hybridation (sondes spécifiques, panel sur puce)

▼

Détection ► **Identification du ou des pathogènes ± gène(s) de résistance**

Identification des pathogènes et détection des gènes de résistance par *DNA Microarray*

Ex. : **système VERIGENE (Nanosphere ®)**

Cartouche « Infections respiratoires »
13 virus respiratoires + *Bordetella* spp

Cartouche « Infections digestives »
Norovirus, rotavirus, bactéries entéro-invasives, shiga-toxine, *Clostridium difficile*

Cartouche « Hémocultures positives à bactéries à Gram positif »
Staphylococcus aureus, S. epidermidis, *S. lugdunensis,* Staphylococcus spp.
Streptococcus pneumoniae, streptocoques A/B, *Streptococcus* spp., *Enterococcus faecalis*, *E. faecium*, *Listeria* + *mecA* + *vanA*/*vanB*

Cartouche « Hémocultures positives à bactéries à Gram négatif »
Entérobactéries, *Pseudomonas aeruginosa*, *Acinetobacter* spp.
+ gènes codant les **carbapénémases** de types KPC, OXA, NDM, VIM, IMP
+ gènes codant les **BLSE** de type CTX-M

Rapid Testing Using the Verigene Gram-Negative Blood Culture Nucleic Acid Test in Combination with Antimicrobial Stewardship Intervention against Gram-Negative Bacteremia

Jacqueline T. Bork,[a] Surbhi Leekha,[a,b] Emily L. Heil,[a,c] LiCheng Zhao,[d] Rilwan Badamas, J. Kristie Johnson[b,d]

Hémoculture positive à BGN : prise en charge conventionnelle versus *DNA microarray* + intervention de l'équipe mobile d'antibiothérapie

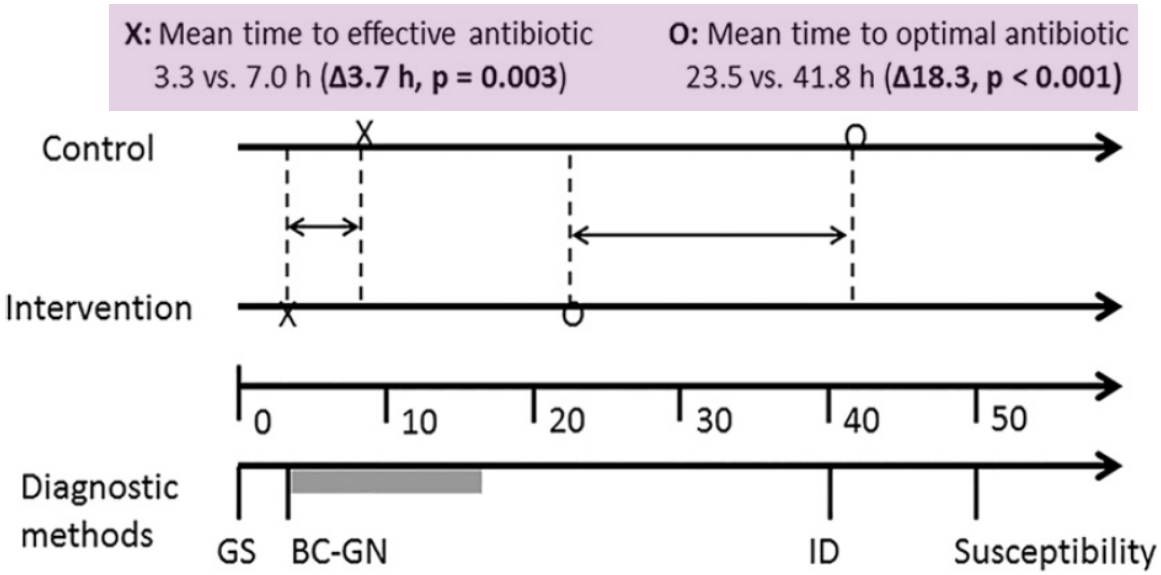


FIG 3 Timeline of events (hours). Abbreviations: GS, Gram stain; ID, identification.

Rapid Testing Using the Verigene Gram-Negative Blood Culture Nucleic Acid Test in Combination with Antimicrobial Stewardship Intervention against Gram-Negative Bacteremia

Jacqueline T. Bork,[a] Surbhi Leekha,[a,b] Emily L. Heil,[a,c] LiCheng Zhao,[d] Rilwan Badamas, J. Kristie Johnson[b,d]

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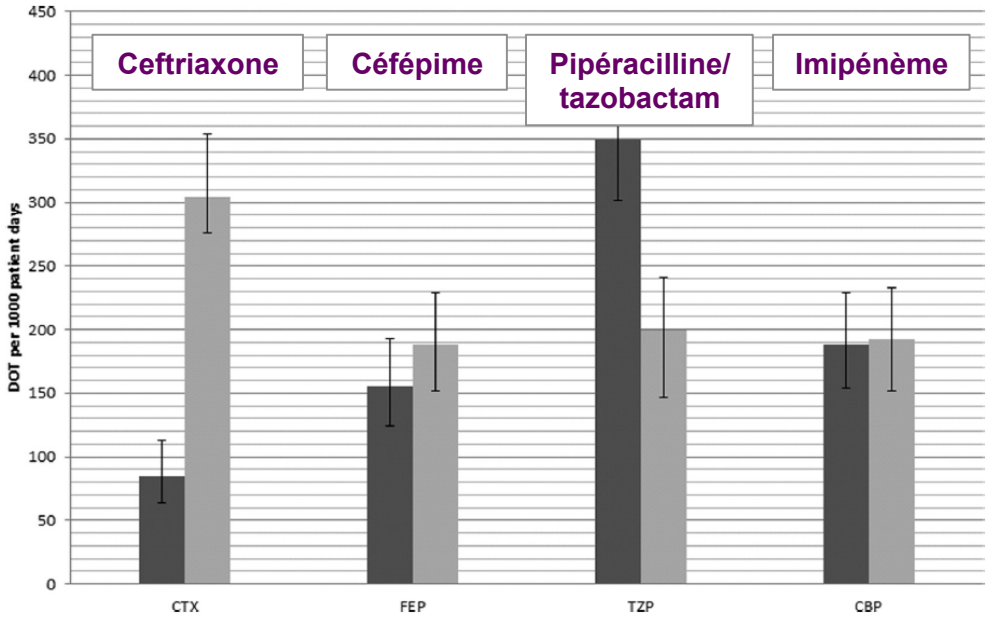


FIG 2 Days of therapy (DOT) per 1,000 patient days from the Gram stain report until 24 h after the susceptibility report. Dark gray bars, control; light gray bars, intervention. For the intervention group, the antibiotic is considered to be administered 3 h from the Gram stain report. Abbreviations: CTX, ceftriaxone; FEP, cefepime; TZP, piperacillin-tazobactam; CBP, carbapenem.

ACCELERATE DIAGNOSTICS™

Accelerate Pheno System

Identification bactérienne par méthode FISH
+
Antibiogramme (CMI) par lecture automatisée

Type de prélèvement : **hémocultures**

Résultats complets ~ 7 h après le prélèvement

Evaluation of the Accelerate Pheno System for fast identification and antimicrobial susceptibility testing from positive blood cultures in bloodstream infections caused by Gram-negative pathogens

Marschal et al. *J Clin Microbiol* 2017; 55: 2116-2126

- **Évaluation prospective sur 125 flacons d'hémocultures** (mono-microbiennes, n = 115)
- Entérobactéries ~ 70%
- *P. aeruginosa* ~ 8%
- **Comparateur :** antibiogramme conventionnel sur subculture

Antimicrobial agent	Accelerate Pheno system AST			
	No. of AST results	No. (%) of category agreements		
		S	R/I	Total
SAM	66	31	32	63 (95.5)
TZP	91	78	6	84 (92.3)
FEP	90	73	6/1*	80 (88.9)
CRO	85	75	8	83 (97.6)
ETP	85	85	0	85 (100)
MEM	94	91	2	93 (98.9)
AMK	95	91	2	93 (97.9)
GEN	94	84	9	93 (98.9)
TOB	94	82	10	92 (97.9)
CIP	94	69	21	90 (95.7)
CST	88	85	0	85 (96.6)
Total	976	844	97	941 (96.4)

Apport des outils de diagnostic microbiologique rapide au SAU

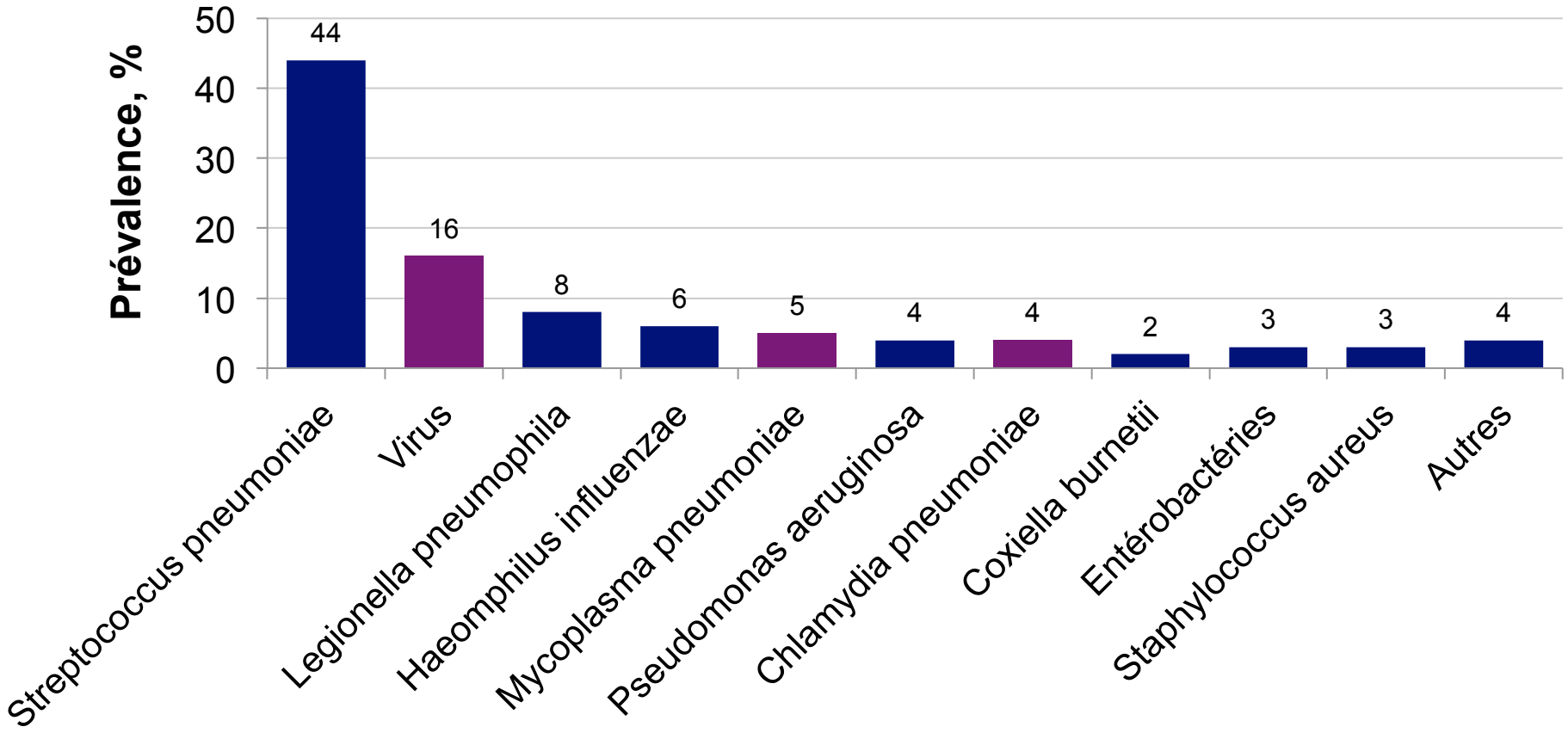
Pneumonies aiguës communautaires

Risk Factors Associated with Potentially Antibiotic-Resistant Pathogens in Community-Acquired Pneumonia

Elena Prina[1,2], Otavio T. Ranzani[1,2], Eva Polverino[1,3], Catia Cillóniz[1,3], Miquel Ferrer[1,3], Laia Fernandez[1,3], Jorge Puig de la Bellacasa[4], Rosario Menéndez[3,5], Josep Mensa[6], and Antoni Torres[1,3]

Ann Am Thorac Soc Vol 12, No 2, pp 153–160, Feb 2015

Cohorte prospective (SAU, Barcelone, 1996-2011) - PAC documentée (n = 1597)



Diagnostic microbiologique rapide et pneumonies communautaires : 3 points essentiels

1. Implication fréquente de **virus respiratoires** (avec ou sans co-infection bactérienne) dans les PAC graves

2. Comment diagnostiquer rapidement une formes grave de **PAC à *Chlamydia pneumoniae* ou *Mycoplasma pneumoniae*** (pas de test urinaire disponible, diagnostic sérologique fastidieux et tardif) ?

3. Implication possible de BMR (*Pseudomonas aeruginosa* > SARM) dans les **pneumonies associées aux soins**

Laboratory diagnosis of pneumonia in the molecular age

Antoni Torres[1], Nelson Lee[2], Catia Cilloniz[1], Jordi Vila[3] and Menno Van der Eerden[4]

Eur Respir J 2016; 48: 1764–1778

TABLE 1 Rapid microbiological tests for pneumonia diagnostics

Platform	Pathogens	Technology	Sensibility/ specificity %	Clinical evidence	Time/cost	Sample
Curetis Unyvero system (P50 pneumonia) [42]	Bacterial/fungal pathogens (18 types) Antibiotic resistance markers (22 types)	Multiplex-PCR (cartridge system)	81/99	Potential for accurate and timely detection of pathogens and their resistance in severe pneumonia	4 h/€280–300	Sputum BAL BAS
Gene Xpert MRSA/SA [43, 44]	MRSA MSSA	Multiplex-PCR	99/72	Rapid, accurate tool for detecting MRSA and MSSA in blood and respiratory samples	1 h/€40	Blood Nasal swabs
MALDI-TOF MS [45, 46, 47]	Microorganisms (200 types)	MS Identification directly from bacterial/fungal colonies	99–100/97–100	Rapid identification of microorganisms in BAL was associated with adjustment of antibiotic therapy and a shorter ICU stay for ventilated patients with pneumonia Detects certain types of antibiotic resistance mechanisms	30 s–1 min/ €0.50–1.00	Colonies Positive blood cultures Direct samples (*e.g.* urine)
Gene Xpert Flu Assay [48]	Influenza A/B (A/2009 H1)	Multiplex-PCR	97–100/100	Rapid identification of influenza virus in outbreaks	1 h/€40	Nasopharyngeal swabs Nasal aspirates Nasal washes
Gene Xpert Flu/RSV Assay [48]	Influenza A/B/RSV	Multiplex-PCR	97–100/100	Rapid identification of influenza virus in outbreaks	1 h/€40	Nasopharyngeal swabs Nasal aspirates Nasal washes
eSensor Respiratory Viral Panel [49]	Influenza A/B (seasonal H1, H3, 2009 H1) RSV A/B Parainfluenza 1, 2, 3 Human metapneumovirus Rhinovirus Adenovirus B/E/C	Multiplex-PCR	98–99/99	Rapid identification of respiratory viruses Co-infection detection	8 h/no data	Nasopharyngeal swabs
FilmArray Respiratory Panel [50, 51]	Adenovirus Coronavirus 229E, OC43, NL63, HKU1 Metapneumovirus Influenza A, H3, H1, 2009 H1 Parainfluenza virus 1, 2, 3, 4, RSV Rhinovirus/enterovirus *Bordetella pertussis* *M. pneumoniae* *C. pneumoniae*	Nucleic acid purification, reverse transcription, high-order nested multiplex-PCR and DNA melting curve analysis (unprocessed biological/ clinical sample needed)	84–100/98–100	Detection of several respiratory pathogens in one test Significant impact on the care of patients with respiratory infections	1 h/€100–120	Nasopharyngeal swabs

Routine molecular point-of-care testing for respiratory viruses in adults presenting to hospital with acute respiratory illness (ResPOC): a pragmatic, open-label, randomised controlled trial

Nathan J Brendish, Ahalya K Malachira, Lawrence Armstrong, Rebecca Houghton, Sandra Aitken, Esther Nyimbili, Sean Ewings, Patrick J Lillie, Tristan W Clark

***Lancet Respir Med* 2017**

Point-of-Care Testing :

PCR multiplex FilmArray sur écouvillon nasal et pharyngé

	POCT (n=360)	Control (n=354)
Patients tested for viruses	360 (100%)	158 (45%)
Patients with any virus detected	161 (45%)	52 (15%)
Influenza A or B	61 (17%)	37 (10%)
Rhinovirus or enterovirus (unspecified)*	55 (15%)	..
Coronavirus*	18 (5%)	..
Human metapneumovirus	14 (4%)	5 (1%)
Parainfluenza	11 (3%)	2 (<1%)
RSV	9 (3%)	6 (2%)
Adenovirus	1 (<1%)	2 (<1%)
Viral co-detection	8 (2%)	0
Turnaround time (h)	2·3 (1·4)†	37·1 (21·5)

Routine molecular point-of-care testing for respiratory viruses in adults presenting to hospital with acute respiratory illness (ResPOC): a pragmatic, open-label, randomised controlled trial

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***Lancet Respir Med* 2017**

	POCT (n=360)	Control (n=354)	Risk difference (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Number needed to test (95% CI)	p value
All antibiotics							
Antibiotics given	301 (84%)	294 (83%)	0·6% (−4·9 to 6·0)	1·04 (0·70 to 1·54)	0·99 (0·57 to 1·70)	..	0·96*
Single dose only	31/301 (10%)	10/294 (3%)	6·9% (2·9 to 11·0)	3·26 (1·59 to 6·68)	..	15 (9 to 35)†	0·0010
Given for <48 h	50/301 (17%)	26/294 (9%)	7·8% (2·5 to 13·1)	2·05 (1·40 to 3·39)	..	13 (8 to 41)‡	0·0047
Duration (days)	7·2 (5·1)	7·7 (4·9)	−0·4 (−1·2 to 0·4)§	0·95 (0·85 to 1·05)¶	0·91 (0·80 to 1·04)‖	..	0·17*

"Although POCT was not associated with a reduction in the duration of antibiotics overall, ***more patients in the POCT group received single doses or brief courses of antibiotics*** than did patients in the control group. POCT was also associated with a reduced length of stay and improved influenza detection and antiviral use."

Usefulness of the multiplex-PCR Unyvero system to decrease broad-spectrum antibiotics consumption in patients with VAP

Luyt C.-E., Bréchot N., Hékimian G., Aubry A., Lafeuille E., Schmidt M., Franchineau G., Besset S., Nieszkowska A., Bourcier S., Coutrot M., Combes A.

réanimation 2018 PARIS 24-26 JANVIER

Annals of Intensive Care 2018, **8 (Suppl 1):** CO-25

Unyvero « hospitalized pneumonia » (HPN) cartridge

Gram-positive bacteria	*Enterobacteriaceae*	Non-fermenting bacteria	Others / Fungi	Resistance	Gene
Staphylococcus aureus	*Citrobacter freundii*	*Moraxella catarrhalis*	*Pneumocystis jirovecii*	Macrolide/ Lincosamide	*ermB*
Streptococcus pneumoniae	*Escherichia coli*	*Pseudomonas aeruginosa*	*Haemophilus influenzae*	Oxacillin	*mecA*
	Enterobacter cloacae complex	*Acinetobacter baumannii* complex	*Mycoplasma pneumoniae*		*mecC*
	Enterobacter aerogenes	*Stenotrophomonas maltophilia*	*Chlamydophila pneumoniae*	Penicillin	*tem*
	Proteus spp.	*Legionella pneumophila*			*shv*
	Klebsiella pneumoniae			3rd generation Cephalosporins	*ctx-M*
	Klebsiella oxytoca			Carbapenem	*kpc*
	Klebsiella variicola				*imp*
	Serratia marcescens				*ndm*
	Morganella morganii				*oxa-23*
					oxa-24/40
					oxa-48
					oxa-58
					vim
				Sulfonamide	*sul1*
				Fluoroquinolone	*gyrA83*
					gyrA87

Usefulness of the multiplex-PCR Unyvero system to decrease broad-spectrum antibiotics consumption in patients with VAP

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réanimation 2018 PARIS 24-26 JANVIER

Annals of Intensive Care 2018, **8 (Suppl 1):** CO-25

- Étude prospective mono-centrique
- Suspicion de PAVM avec LBA positif à l'examen direct (n = 44 patients)
- **PAVM :** *P. aeruginosa* 43%, entérobactéries 48%, polymicrobien 30%
- **Identification bactérienne : correcte dans 80% des cas** (10% faux-négatifs, 10% discordance avec culture conventionnelle)
- **Détection de la résistance : échec dans 43% des cas** (défaut/excès), essentiellement dans les PAVM à *P. aeruginosa*

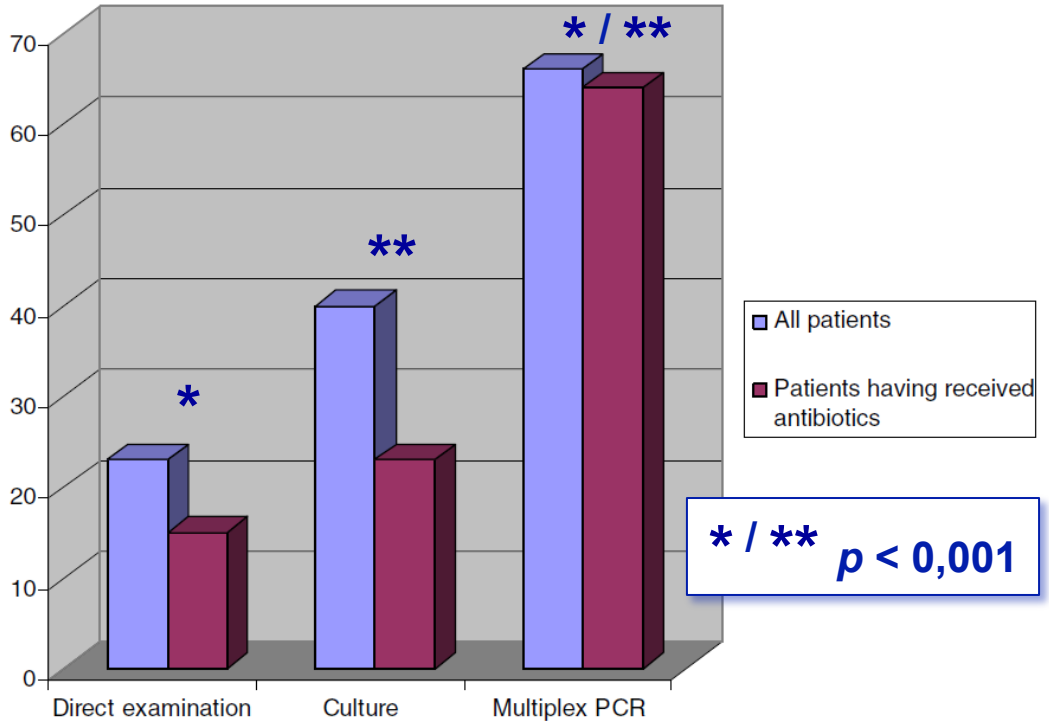
RESEARCH Open Access

Multiplex PCR performed of bronchoalveolar lavage fluid increases pathogen identification rate in critically ill patients with pneumonia: a pilot study

Jean-Luc Baudel[1], Jacques Tankovic[2], Redouane Dahoumane[2], Fabrice Carrat[3,4], Arnaud Galbois[1], Hafid Ait-Oufella[1,4], Georges Offenstadt[1,3,4], Bertrand Guidet[1,3,4] and Eric Maury[1,3,4*]

Annals of Intensive Care 2014, **4**:35

Pathogens identification rates



*** / **** $p < 0,001$

LightCycler – SeptiFast ®
(Roche Diagnostics)

Table 1 Bacteria and fungi detected by the multiplex PCR assay

Gram-positive bacteria	Gram-negative bacteria	Fungi
Staphylococcus aureus	*Escherichia coli*	*Candida albicans*
Coagulase-negative Staphylococcus	*Klebsiella (pneumoniae/ oxytoca)*	*Candida tropicalis*
Streptococcus pneumonia	*Serratia marcescens*	*Candida parapsilosis*
Streptococcus spp.	*Enterobacter (cloacae/ aerogenes)*	*Candida krusei*
Enterococcus faecium	*Proteus mirabilis*	*Candida glabrata*
Enterococcus faecalis	*Pseudomonas aeruginosa*	*Aspergillus (fumigatus)*
	Acinetobacter baumannii	
	Stenotrophomonas maltophilia	

β LACTA test performance for detection of extended-spectrum β-lactamase-producing Gram-negative bacilli directly on bronchial aspirates samples: a validation study☆

S. Gallah [1], Y. Benzerara [1], J. Tankovic [1], P.-L. Woerther [2], H. Bensekri [3], J.-L. Mainardi [3, 4], G. Arlet [1, 5, 6], S. Vimont [1, 5, 7], M. Garnier [5, 8, 9, *]

Clinical Microbiology and Infection 24 (2018) 402–408

Objectives: Incidence of extended-spectrum β-lactamase-producing Gram-negative bacilli (ESBL-PE-GNB)-related infections is worryingly increasing worldwide. ESBL-PE-GNB detection directly on bronchial aspirate samples (BAS) performed for suspected pneumonia may help save empirical carbapenems. Our objectives were to optimize β-LACTA™ test (BLT) realization and evaluate BLT performance for ESBL-

The β-LACTA test detected ESBL-PE-GNB directly on bronchial aspirates positive for GNB on MGSE and/or growing with 10^4 CFU/mL with 100% sensitivity, specificity, and positive and negative predictive values.

validation cohort, 21 (17%) gave positive BLT (ten in BAS positive and 11 in BAS negative on MGSE). All BLT-positive BAS grew with ESBL-PE-GNB, including five hyper-L2-producing *Stenotrophomonas maltophilia* strains. BLT detected ESBL-PE-GNB directly on clinical BAS positive for GNB on MGSE and/or growing with $\geq 10^4$ CFU/mL with 100% sensitivity, specificity, and positive and negative predictive values. *Conclusions:* BLT is an accurate tool for ESBL-PE-GNB detection directly on BAS. Further studies are needed to evaluate the impact of BLT-guided early antimicrobial de-escalation strategies. **S. Gallah, Clin Microbiol Infect 2018;24:402**

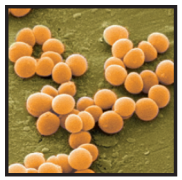
RCT en cours (NCT03147807)

Apport des outils de diagnostic microbiologique rapide au SAU

Infection du SNC

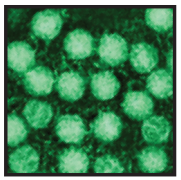
FilmArray® Meningitis/Encephalitis Panel

1 Test. 14 Targets. All in about an hour.



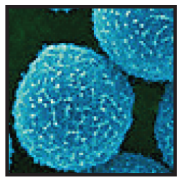
Bacteria

Escherichia coli K1
Haemophilus influenzae
Listeria monocytogenes
Neisseria meningitidis
Streptococcus agalactiae
Streptococcus pneumoniae



Viruses

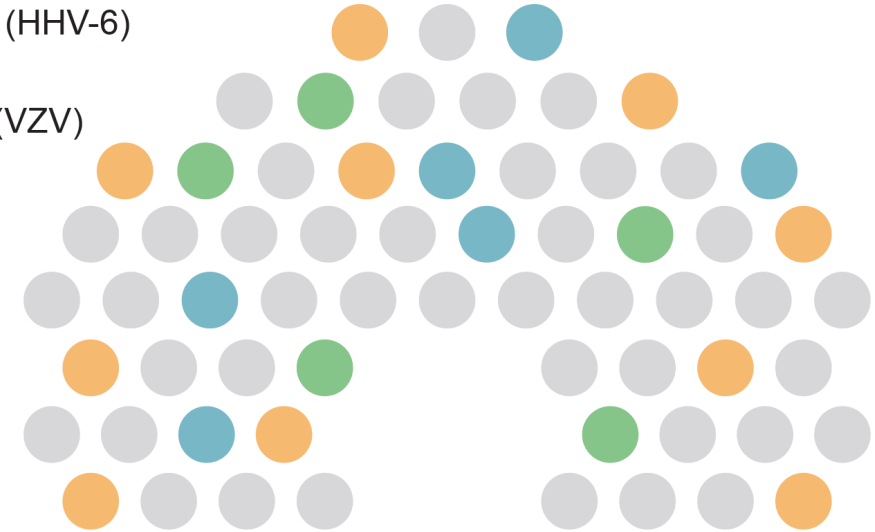
Cytomegalovirus (CMV)
Enterovirus
Herpes simplex virus 1 (HSV-1)
Herpes simplex virus 2 (HSV-2)
Human herpesvirus 6 (HHV-6)
Human parechovirus
Varicella zoster virus (VZV)



Fungi

Cryptococcus neoformans/gattii

BIOFIRE®



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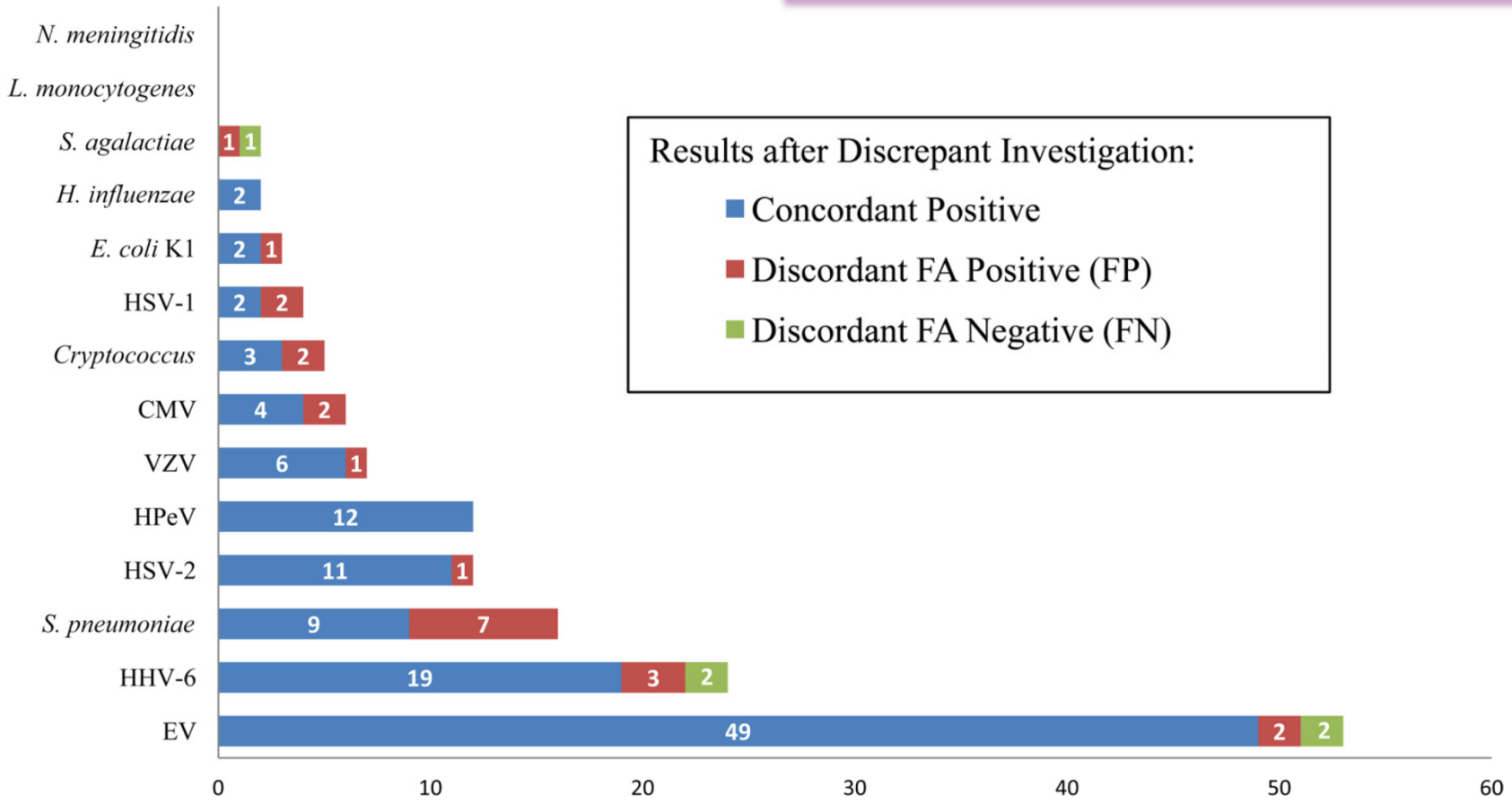
Multicenter Evaluation of BioFire FilmArray Meningitis/Encephalitis Panel for Detection of Bacteria, Viruses, and Yeast in Cerebrospinal Fluid Specimens

Leber et al. *J Clin Microbiol* 2016; 54: 2251-2261



Comparative evaluation of the FilmArray meningitis/encephalitis molecular panel in a pediatric population

Erin H. Graf [a,b], Maria Victoria Farquharson [b], Ana María Cárdenas [a,b,*]

Diagnostic Microbiology and Infectious Disease 87 (2017) 92–94

*"We compared the FilmArray ME panel to lab developed viral PCRs and bacterial culture. Of the 67 viral PCR or bacterial culture-positive samples, 92.5% were positive for the same target by the panel (**2/4 = 50% false-negative for HSV-1**). Of the 66 negative samples tested, no targets were detected by the panel, for an agreement of 96.2%."*

Clinical Significance of Human Herpesvirus 6 Positivity on the FilmArray Meningitis/Encephalitis Panel

Daniel A. Green,[1] Marcus Pereira,[2] Benjamin Miko,[2] Sara Radmard,[3] Susan Whittier,[1] and Kiran Thakur[3]

Clinical Infectious Diseases® 2018;67(7):1125–8

*"A review of 15 patients who tested positive for HHV-6 on the FilmArray ME panel revealed that the majority (**13/15 = 87% false-positive**) were unlikely to have HHV-6 encephalitis."*

Apport du diagnostic microbiologique rapide pour la conduite de l'antibiothérapie au SAU

Take-home messages

- **Objectif :** réduire le délai d'administration d'une antibiothérapie optimale (active sur le ou les germes en cause, spectre le plus étroit possible)
- **Nombreux outils déjà disponibles en routine** (MALDI-TOF, PCR multiplex ou microarrays automatisés, tests chromogéniques ou PCR pour la détection des béta-lactamases), sur culture ou directement sur le prélèvement
- **Intérêt d'une approche combinée :** identification (ex. MALDI-TOF) + détection des résistances avant les résultats de l'antibiogramme
- **Intégration obligatoire de ces tests dans une approche d'*antibiotic stewardship*** (les TDR ne remplaceront pas la clinique)

Inventory of Extended-Spectrum-β-Lactamase-Producing *Enterobacteriaceae* in France as Assessed by a Multicenter Study

F. Robin,[a,b] R. Beyrouthy,[a,b] S. Bonacorsi,[c,d] N. Aissa,[e] L. Bret,[f] N. Brieu,[g] V. Cattoir,[h] A. Chapuis,[i] H. Chardon,[g] N. Degand,[j] F. Doucet-Populaire,[k] V. Dubois,[l] N. Fortineau,[m] A. Grillon,[n] P. Lanotte,[o] D. Leyssene,[p] I. Patry,[q] I. Podglajen,[r] C. Recule,[s] A. Ros,[t] M. Colomb-Cotinat,[u] V. Ponties,[u] M. C. Ploy,[v] R. Bonnet[a,b]

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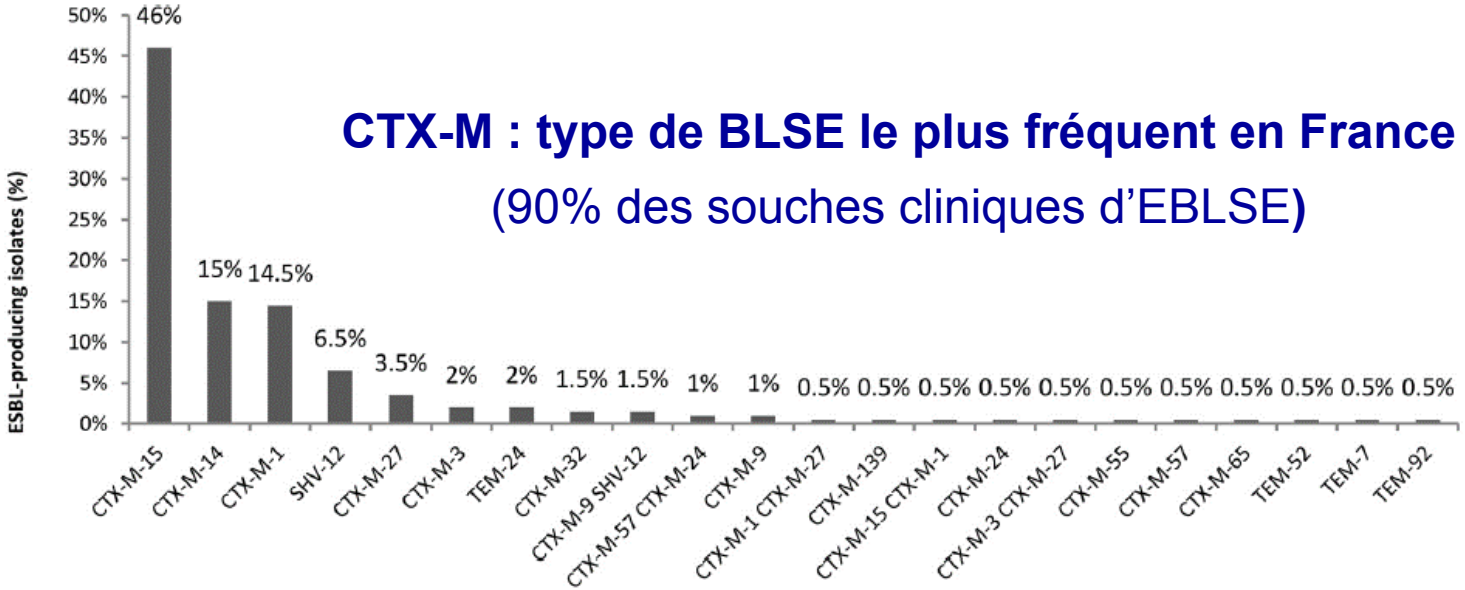

CTX-M : type de BLSE le plus fréquent en France

(90% des souches cliniques d'EBLSE)

37e Réunion Interdisciplinaire de Chimiothérapie Anti-Infectieuse (RICAI) 2017
Paris,
18-19 décembre 2017

Auteurs

V. Pontiès[1], Y. Savitch[1], S. Soing-Altrach[1], M. Colomb-Cotinat[1], H. Blanchard[2], C. Bernet[3], L. Simon[4], H. Sénéchal[5], A-G. Venier[6], L. Dortet[7], A. Berger-Carbonne[1]

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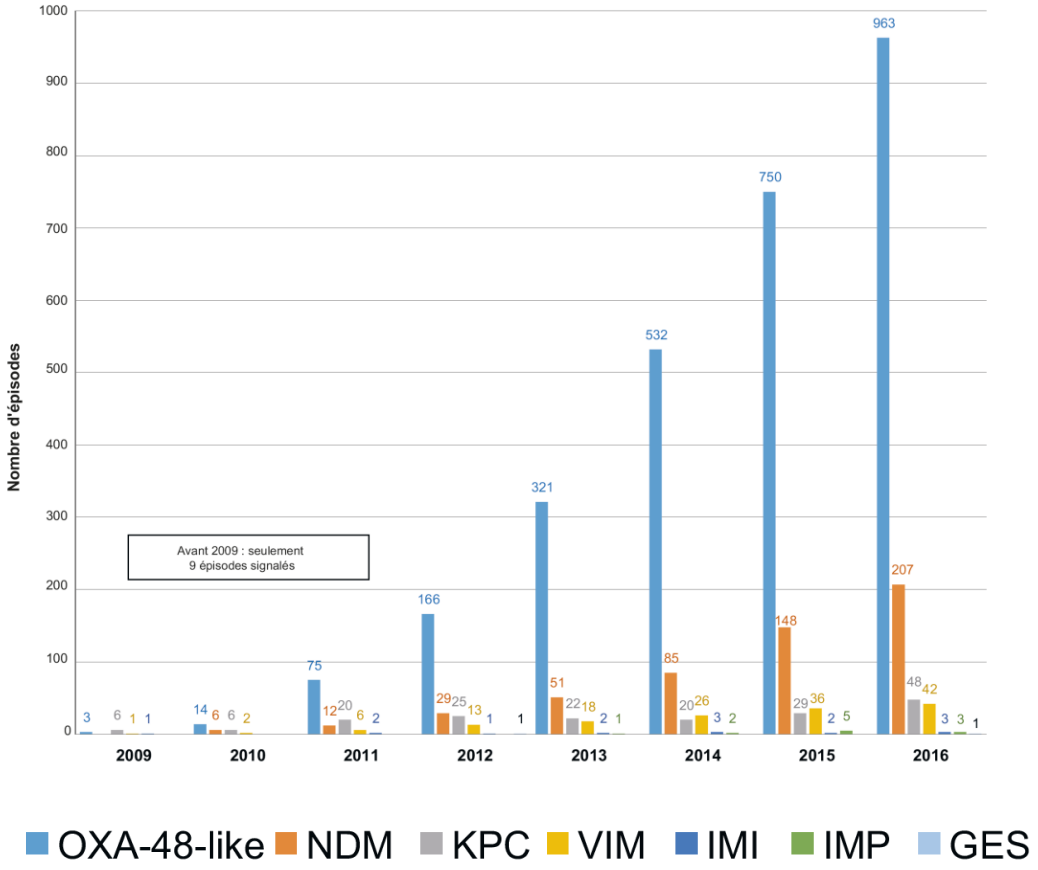
1. Santé publique France, Saint-Maurice, France / 2. CClin Paris-Nord, Paris, France / 3. CClin Sud-Est, Lyon, France/ 4. CClin Est, Nancy, France / 5. CClin Ouest, Rennes, France / 6. CClin Sud-Ouest, Bordeaux, France / 7. CNR de la résistance aux antibiotiques, Paris, France

Surveillance des EPC en France : bilan 2004 - 2016

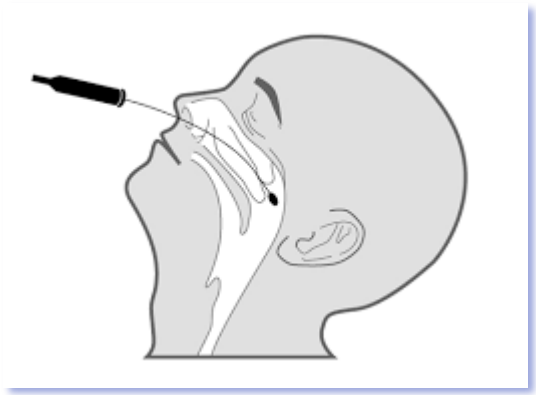


FilmArray Respiratory Panel Assay: Comparison of Nasopharyngeal Swabs and Bronchoalveolar Lavage Samples

Natalya Azadeh,[a] Kenneth K. Sakata,[b] Anjuli M. Brighton,[a] Holenarasipur R. Vikram,[c] Thomas E. Grys[d]

PCR multiplex pour détection des virus respiratoires et des bactéries intracellulaires

(*Chlamydia pneumoniae*, *Mycoplasma pneumoniae*, *Bordetella pertussis*)



Ecouvillon naso-pharyngé ou LBA ?

FilmArray Respiratory Panel Assay: Comparison of Nasopharyngeal Swabs and Bronchoalveolar Lavage Samples

Natalya Azadeh,[a] Kenneth K. Sakata,[b] Anjuli M. Brighton,[a] Holenarasipur R. Vikram,[c] Thomas E. Grys[d]

PCR multiplex pour détection des virus respiratoires et des bactéries intracellulaires

(*Chlamydia pneumoniae*, *Mycoplasma pneumoniae*, *Bordetella pertussis*)

TABLE 1 Summary data for concordant and discordant results of NP and BAL FARPs in 86 patients

NP and BAL FARP results[a]	No. (%) of patients
Concordant	
NP FARP and BAL FARP both negative	51 (59)
NP FARP and BAL FARP both positive	15 (17)
Total	66 (77)
Discordant	
NP FARP positive, BAL FARP negative	3 (4)
NP FARP negative, BAL FARP positive[b]	17 (20)
Total	20 (23)