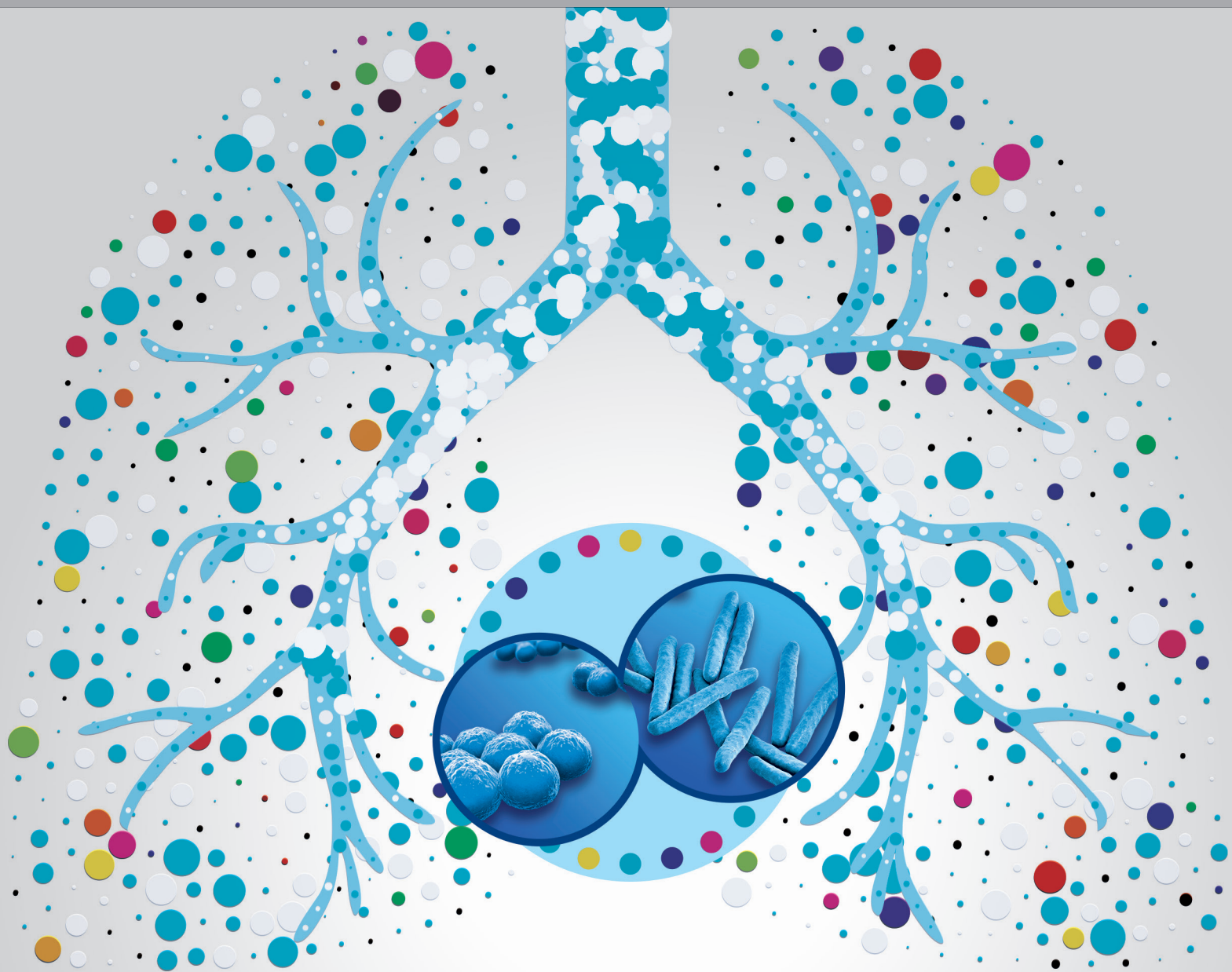




IDENTIFICATION OF CHRONIC PULMONARY DISEASE ASSOCIATED PATHOGENS



PIONEERING DIAGNOSTICS

CHRONIC RESPIRATORY DISEASES & INFECTION SUSPICION

Chronic respiratory diseases (CRD) are conditions of the **airways and other lung structures** that cause significant morbidity and mortality worldwide. This pathology includes **Chronic Obstructive Pulmonary disease (COPD), Bronchiectasis and Cystic Fibrosis (CF)**.^{(1),(2),(3)} With an aging global population, CRD are becoming a more prominent cause of death and disability.⁽⁶⁾

2017
> 500 million
people worldwide
with CRD

7.4%
of the world's
population^{(3),(4)}

The **3rd**
leading cause
of death^{(4),(5)}

- COPD**
- COPD, which includes chronic bronchitis and emphysema, is a long-term lung disease.
 - **Worldwide prevalence of 10.1%**.⁽⁷⁾
 - **In 2017, 3.2 million deaths**.
 - Expected to reach **4.4 million yearly by 2040 worldwide**.⁽⁷⁾
 - Patients with COPD are at a **higher risk** than patients without COPD for the development of coexisting conditions that are associated with poor outcomes, including **death**.⁽⁷⁾
 - They have frequent exacerbations and **30% to 50%** have a **bacterial cause**.⁽⁷⁾
 - This accelerates **lung function loss**.⁽⁸⁾

- Bronchiectasis**
- Bronchiectasis is characterized by **irreversible** widening of medium to small-sized airways, with inflammation, chronic bacterial infection, and destruction of bronchial walls.^{(9),(10)}
 - It affects patients from **early childhood** but the average age is **between 60 and 70 years in high income countries**.⁽¹¹⁾
 - **Bronchiectasis's prevalence: 566 per 100,000**
 - **Increase of 40%** in the past 10 years.⁽¹¹⁾
 - The severity and frequency of exacerbations in bronchiectasis are associated with progressive lung damage, worse quality of life, accelerated lung function decline, and **increased mortality**.^{(16),(17)}

- Cystic Fibrosis (CF)**
- Cystic fibrosis is the most common autosomal recessive disease in the Caucasian population **≈1/3500 births**.⁽¹⁸⁾
 - In the **US ≈1,000 individuals CF each year**.⁽¹⁹⁾
 - Cystic Fibrosis is a multi-system disease with complications that include pancreatic insufficiency, sinusitis, Cystic Fibrosis-related diabetes, infertility, depression, and anxiety.⁽¹⁹⁾
 - **The Respiratory disease** is the **most severe** manifestation and the most frequent cause of death or lung transplant in early adult life. Pulmonary exacerbations are linked to increased mortality, higher health care costs, and reduced quality of life.^{(18),(20)}

≡ **One of the main consequence of these three major examples of Chronic Pulmonary disease are the accumulation of mucus in the lungs which trap bacteria leading to chronic infections. The origin of infection has to be properly diagnosed to manage and treat the patient correctly.**^{(8),(16),(17),(18),(20)}

NTM PULMONARY DISEASE & INFECTION SUSPICION



NTM are found naturally in the environment, are **opportunistic pathogens** of humans, and cause most of the time **pulmonary infections**.^{(21),(22)}

x2 **NTM infections** are increasing among patients **aged 65** and older, a population that's expected to nearly **double by 2030**.⁽²³⁾

Trend is well documented in high income countries: annual prevalence **in the US, from 2008 to 2015, increased from 6.78 to 11.70 per 100,000 persons**.⁽²²⁾

Laboratory isolation of NTM is thus more common than *M. tuberculosis* in high income countries, with an **increase of 8.4% annually**.⁽²⁴⁾

≡ People with a history of lung conditions, like **bronchiectasis, COPD, or Cystic Fibrosis** are more likely to develop an NTM infection.

- COPD**
- **COPD** was associated with **≈ 9X higher** adjusted incidences of pulmonary **NTM disease**.⁽²⁶⁾
 - **COPD patients with NTM, 52.8% hospitalized** for exacerbations within the previous year, vs **COPD patients without NTM, 15.6% hospitalized**.⁽²⁷⁾

- Bronchiectasis**
- **187.5-fold increased risk of associated NTM lung disease**.⁽²⁷⁾
 - **44% of NTM lung disease cases occurrence vs 1% of non NTM cases**.⁽²³⁾

- Cystic Fibrosis (CF)**
- **20% of NTM infections prevalence**.
 - As CF patients have a **high prevalence of NTM infections, and NTM** has emerged as **a major threat**, the CF Foundation has recommended an **annual screening of NTM** in these patients and the need to take precautionary measures to limit transmission of NTM in CF clinics.⁽²⁸⁾

CHRONIC RESPIRATORY DISEASE OUTCOME & TREATMENT

→ Delay of diagnosis can lead to

- Inadequate or overly broad use of antimicrobial therapy for an extended period
- Therapy-related complications
- Antimicrobial resistance
- Increase patient morbidity
- Increase mortality
- Increase costs

→ Bacterial identification and susceptibility testing results are keys to guide therapy according to the antimicrobial therapy guidelines⁽³²⁾

→ Appropriated clinical & microbiological diagnosis allows to:

- Reduced antimicrobial resistance
- Reduced length of stay
- Reduced days of therapy
- Reduced cost
- Improve patient satisfaction

→ To achieved better clinical outcomes, Antimicrobial Stewardship Program (ASP) is used to ensure that

- The selection of antibiotics is consistent with the resistance profile of the organisms
- The dose and route of administration are carefully ordered
- The duration of treatment is accurate

→ Empiric therapy is an educated guess based on local prevalence of resistance for the common representative pathogens such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Haemophilus influenza*, *Streptococcus pneumonia*.

NTM PULMONARY DISEASE OUTCOME & TREATMENT^{(29),(30),(31)}

Everyone, during their daily activities, will come in contact with NTM. However, healthy people can clear NTM in their lungs. People with a history of lung conditions, like **bronchiectasis, COPD, or Cystic Fibrosis**, are more likely to develop an NTM Pulmonary infection.

The most common NTMs are the rapid growers' ***Mycobacterium abscessus*** group and ***Mycobacterium avium complex (MAC)***, and the slow-growing ***Mycobacterium kansasii***.

The main predictor of mortality are chronic underlying pulmonary disease combined with *M.abscessus*.

- ❑ A diagnosis of NTM pulmonary disease requires **microbiological** (growth from one bronchoscopic specimen or two sputum cultures) and **clinical criteria** (symptoms, radiographic findings, exclusion of other diagnoses).
- ❑ **Susceptibility testing** is highly recommended to **guide the treatment** of NTM infections.
- ❑ Most of the **NTM** are **naturally resistant** to common antibiotics. Recommended **treatment** regimens vary greatly **depending on the species** and frequently requires a **combination of 2 to 3 antimicrobial agents, of some highly toxic drugs**, for up to **two years** for some infections.

- ❑ The **3** major drugs used in the treatment of NTM infection are **azithromycin, rifampin, and ethambutol**. The treatment of *M.abscessus* is more challenging and require the addition of amikacin and oral macrolide.
- ❑ As defined by the **American Thoracic Society/ERS/ ESCMID/IDSA Clinical Practice Guideline**, the goals of therapy are sustained culture conversion, improved symptoms, and achieved radiologic improvement.

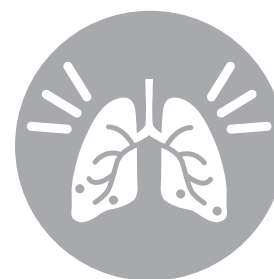


THE BIOMÉRIEUX OFFER, A COMPREHENSIVE SOLUTION TO SUPPORT ANTIMICROBIAL STEWARDSHIP

RESPIRATORY TRACT INFECTIONS PATHOGENS

	Cystic Fibrosis	COPD (non-CF)	Bronchiectasis (non-CF)
Bacterial pathogens	Major pathogens • <i>S. aureus</i> /MRSA • <i>P. aeruginosa</i> • <i>H. influenzae</i> • <i>Burkholderia cepacia</i> complex • NTM	• <i>H. influenzae</i> • <i>S. pneumoniae</i> • <i>M. catarrhalis</i> • <i>P. aeruginosa</i> • NTM	• <i>H. influenzae</i> • <i>P. aeruginosa</i> • <i>S. pneumoniae</i> • <i>S. aureus</i> • <i>M. catarrhalis</i> • NTM
	Minor pathogens • <i>M. catarrhalis</i> • <i>B. pseudomallei</i> • Enterobacterales • <i>Stenotrophomonas maltophilia</i> • <i>Achromobacter xylosoxidans</i> • <i>S. pneumoniae</i>	• <i>M. pneumoniae</i> • <i>S. pneumoniae</i> • Enterobacterales • <i>H. parainfluenzae</i>	• <i>M. tuberculosis</i>
Fungal Pathogens	Mold • <i>Aspergillus fumigatus</i> • <i>Scedosporium apiospermum</i> / <i>Pseudallescheria boydii</i>	• <i>Aspergillus fumigatus</i> • <i>Aspergillus</i> spp.	• <i>Aspergillus fumigatus</i> • <i>Aspergillus</i> spp.
	Yeast • <i>Candida albicans</i> • <i>Candida</i> spp.	• <i>Candida</i> spp.	• <i>Candida albicans</i> • <i>Candida</i> spp.

RESPIRATORY SPECIMENS



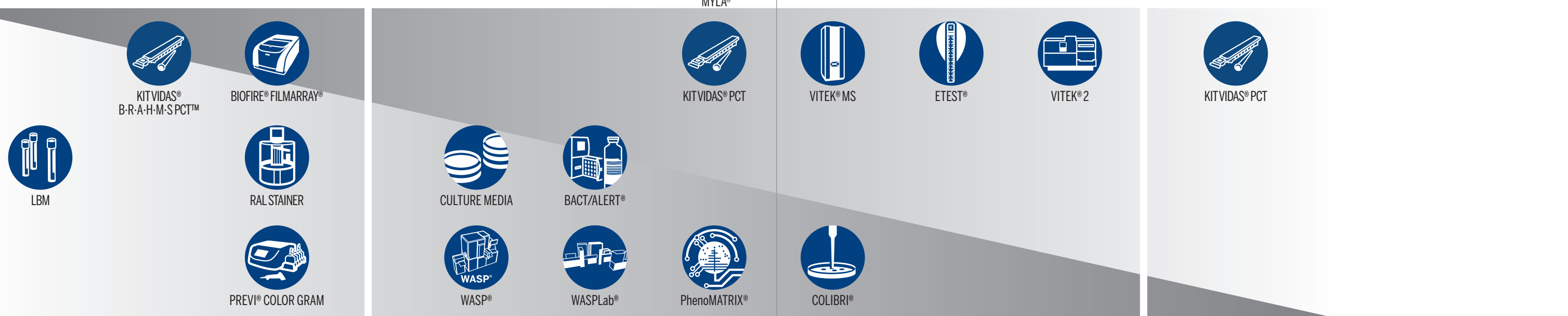
ATB THERAPY INITIATION ZONE

ATB THERAPY OPTIMIZATION ZONE

ATB THERAPY DISCONTINUATION ZONE

MEDICAL VALUE

DATA MANAGEMENT & ANALYTICS



LAB EFFICIENCY

LABCONSULTANCY

Challenge Yourself. Consult with Us. Transform Together

LabSERVICES

Keep your lab running at maximum efficiency



PARTNER TO DELIVER

TEST RESULTS THAT ENABLE
THE HEALTHCARE TEAM TO PROVIDE TIMELY,
APPROPRIATE THERAPY & FIGHT AGAINST AMR

NTM ELITE AGAR

Mycobacterium abscessus 1 5 days



- Easier diagnosis of NTM Respiratory infection
- Improve respiratory diagnostic with an accurate detection of NTM
- Improved workflow and better accuracy with NTM Elite agar
- NTM diagnostic accessible in routine condition with reduced handling steps and confirmatory test

Compared to the AFB reference method*, our innovative NTM Elite agar plate offers many advantages:

- No prior decontamination needed
- Higher **selectivity: 85.6%** versus 18.6%
- Drastically improved **fertility: 95%** versus 40%
- Incubation at 30°C enhances growth of NTM
- Usable in routine BSL2** microbiology laboratories

* Lowenstein Jensen medium associated with MGIT medium ** BSL: BioSafety Level



COMPONENT OF BIOMÉRIEUX OFFER	D0	D1	D2
LIQUID BASED MEDIA (LBM)	●		
VIDAS® B-R-A-H-M-S PCT™	●	●	●
RAL STAINER	●		
PREVI® COLOR GRAM	●		
BIOFIRE® RP2 PANEL	●		
CONVENTIONAL MEDIA, CHROMID®, NTM Elite agar	●		
WASP®	●		●
BACT/ALERT® MP BOTTLE	●		
WASPLab®, PhenoMATRIX®, COLIBRI®		●	
VITEK® MS, VITEK® 2 IDENTIFICATION CARDS		●	
VITEK® 2 AST CARDS, ETEST®			●
VILINK®	●	●	●
MYLA®	●	●	●

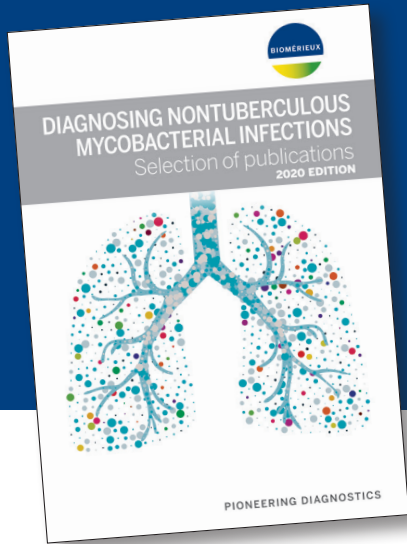
AMS CHALLENGE



As a pioneer, bioMérieux provides solutions to facilitate the preparation and analysis of biological samples, detect and quantify disease-causing agents, evaluate their susceptibility to antibiotics, and monitor antibiotic drug resistance trends over time. This is key for determining the sources of disease and contamination, improving human medical product safety.



EDUCATIONAL TOOLS



COVID-19 PANDEMIC

Today's global health crisis highlights the crucial role diagnostics play in the healthcare pathway.

Moreover, Chronic Respiratory disease patients should be considered as a high-risk group in COVID-19.⁽³³⁾

With a comprehensive offer dedicated to COVID-19, bioMérieux is also committed to support the management of COVID-19 patients, from primary diagnosis to outcome assessment discharge.

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