

***Analysis of: AtbFinder
Diagnostic Test System
Improves Optimal Selection of
Antibiotic Therapy in Persons
with Cystic Fibrosis***

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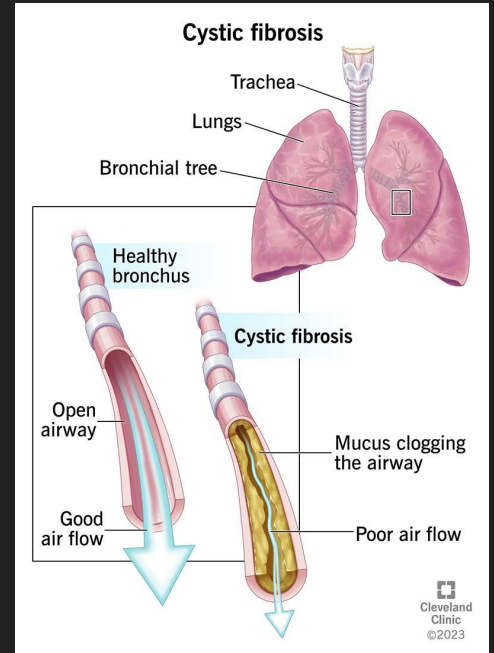
Experimental Question:

How effective are the antibiotic treatments selected by AtbFinder compared to those selected by conventional AST methods?



What is Cystic Fibrosis (CF)?

- **Genetic Disorder:**
 - Mutations to the CFTR gene⁵
- **Symptoms⁹:**
 - Build up of mucus in sinuses/lungs
 - Nasal polyps
 - Bowel function decline
 - Increased risk of infection
- **Treatment:**
 - No cure
 - Antibiotics to treat/prevent infection⁹



<https://my.clevelandclinic.org/health/diseases/9358-cystic-fibrosis>

Pseudomonas Aeruginosa

- **CF patients at elevated risk of developing *P. aeruginosa* infection⁸**
 - Lung function decline
 - Found in polymicrobial biofilms
- **Opportunistic pathogen**
- **Morphology:** Gram-negative, rod shaped, motile
- **Obligate aerobe**
- Secretes virulence factors
- **Antibiotic Resistance!!**



https://microbewiki.kenyon.edu/index.php/Pseudomonas_aeruginosa

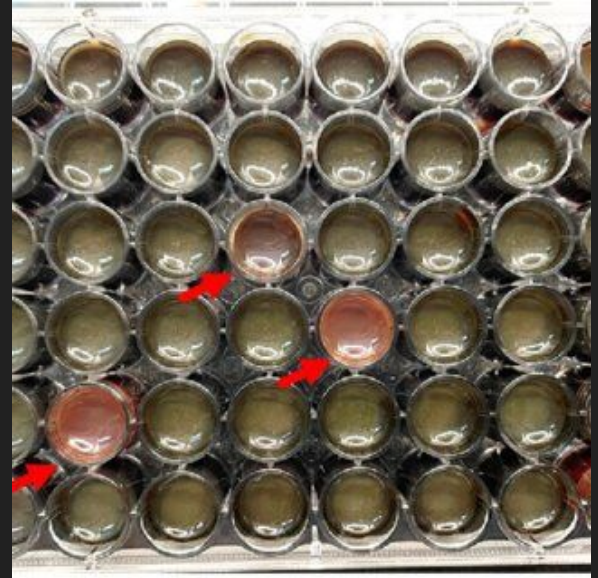
Conventional Antimicrobial Susceptibility Testing (AST)

- Traditional method
- Not effective against *P. aeruginosa*
- Only tests single pathogen
- Allowing accessory pathogens to thrive = antibiotic resistance



AtbFinder

- New diagnostic tool
- Accounts for bacterial interactions occurring within biofilms⁸
- 12 wells with TBV nutrient medium and antibiotics
 - Growth = antibiotic resistance



https://www.researchgate.net/figure/mage-of-a-48-well-AtbFinder-plate-showing-bacterial-growth-after-12-h-of-cultivation-at_fig2_366651365

Hypothesis:

The AtbFinder system would be more effective than conventional AST measures because it factors in microbial relationships when selecting a treatment plan.

Experimental Methods: Study Design

- **Independent variable:** antibiotic selection method
- **Dependent variable:** effectiveness of antibiotic treatment
- **Control group:** participants served as their own control
- Conducted January 2013 - December, 2018
- **Participants:** 35 people ages 15-59 with CF

Experimental Methods: Clinical Parameters

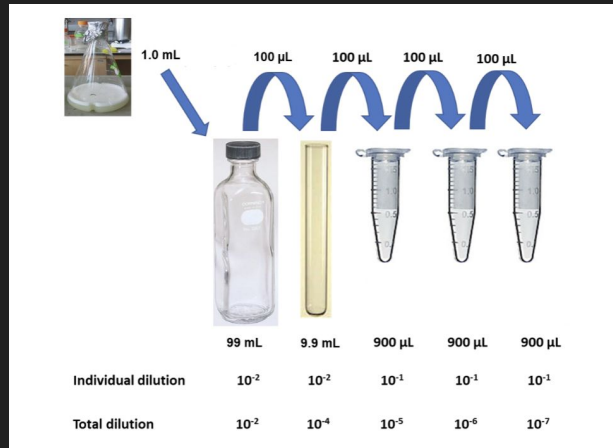
Efficacy of antibiotic treatment measured through:

- Pulmonary exacerbation
- FEV₁%
- *P.aeruginosa* culture count
- WBC and CRP Immunological tests

Experimental Methods: Bacterial Culture and Identification

Pseudomonas aeruginosa

- MacConkey agar, Cetrimide agar
- 5% sheep agar
- Serial dilutions to determine bacterial density



https://bridgewater.instructure.com/courses/85975/assignments/180726?module_item_id=406902

Burkholderia cepacia complex

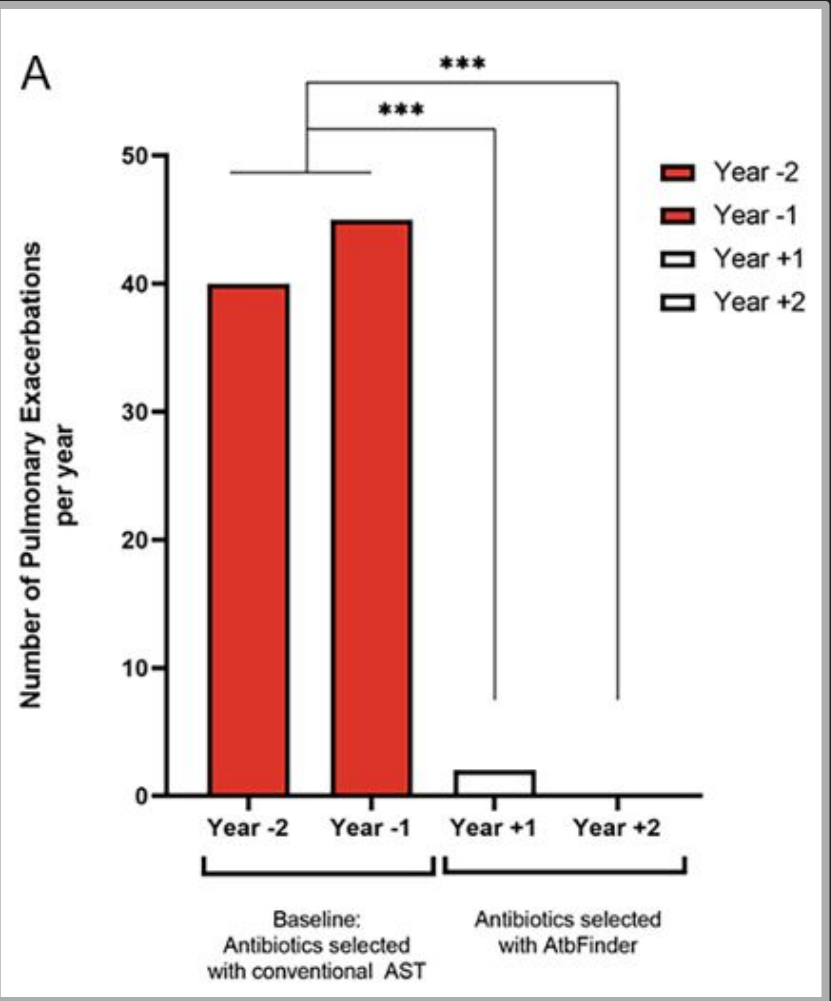
- Burkholderia cepacia-selective agar
- Identification with Vitek-2 Gram-negative identification card



<https://microbiologyclass.net/features-of-the-vitek-2-automated-com-pact-system-for-bacterial-identification-and-antimicrobial-susceptibility-test-ast/>

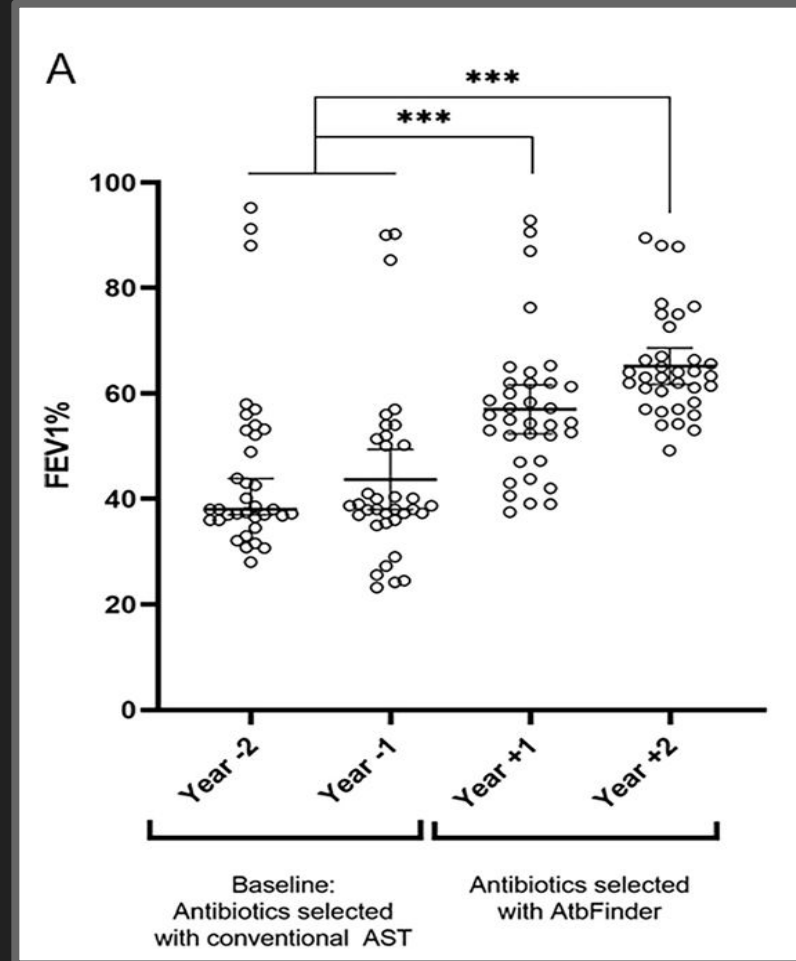
Results

- Pulmonary Exacerbations erased
- 40 & 45 → 2 & 0 cases



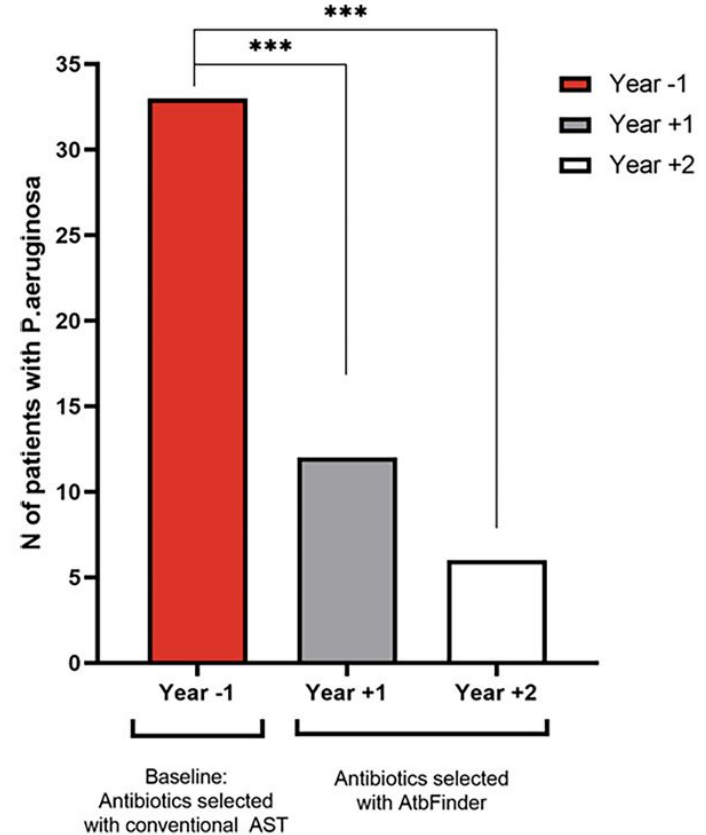
Results

- FEV1%
- 16% Y1 & 28% Y2
- Upward trend in lung function



Results

- *P. aeruginosa*
- 81.8% of patients culture negative
- Different CTA's introduced



Clinical Trials

Advantages ✓

- **Successful treatment**
- **Universal Results**
- **No Combination of SA w/ BL+**

Disadvantages ✗

- **Lack of Controls**
- **Variation**
- **Population**

Why is AtbFinder Better?

AtbFinder

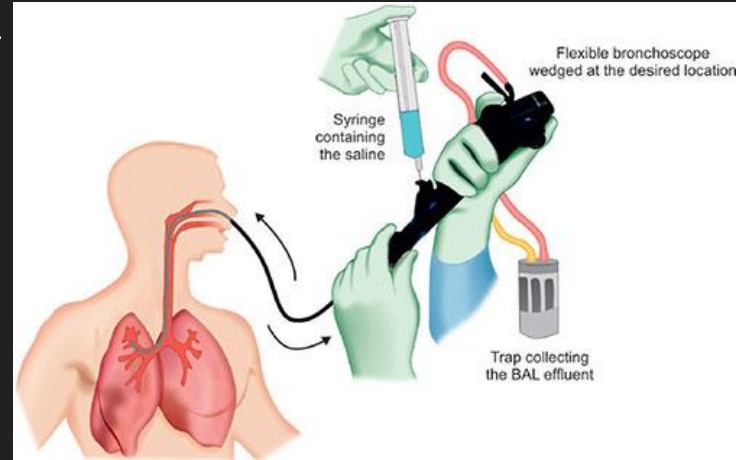
- Infection site testing
- Mixed Culture's
- 4 hour turnaround time

Other(traditional)

- Sweat/Blood/Genomic testing
- Isolation Techniques
- 48 hour Turnaround time

Are the Author's Conclusions Valid?

- Partially, implementation would be premature
- **Limitations:**
 - Control
 - Lack of BAL analysis
 - No long-term outcomes
- **Recommendation:** a follow up study
 - Larger sample
 - Randomized control design
 - Include BAL fluid analysis



Why do we care?

**Antibiotics selected with
AtbFinder are more effective.**

70 → 45 regimens

**AtbFinder decreases use of many
broad spectrum antibiotics.**

Healthcare costs and Efficacy



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