



STOP NTM

Targeting Non-Tuberculous Mycobacteria with AI-Designed  
Antimicrobial Peptides

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## MD

- Board certified in pulmonary medicine
- Board certified in critical care

## MS

- Computational biology and bioinformatics

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**Associate Professor**



# Antimicrobial Resistance (AMR) is a Major Problem

## AMR Deaths in Millions

2021  
Attributable

1.1

2050

1.9





Associated

4.7

8.2

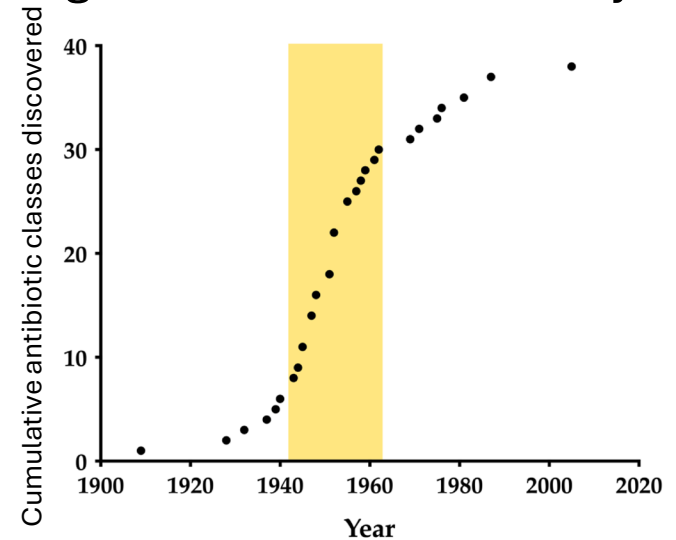
Lancet 2024; 404:1199-226



-  **Mycobacterium abscessus** is a highly resistant Non-Tuberculous Mycobacteria (NTM)
-  NTM Treatment is toxic and prolonged often lasting more than a year
-  The prevalence of NTM is increasing by 8% annually worldwide
-  Large unmet need: Novel mechanisms of action aimed at NTM and other highly resistant organisms are lacking

## Antibiotics Alone Will Not Solve AMR:

We are past the Golden age of antibiotic discovery



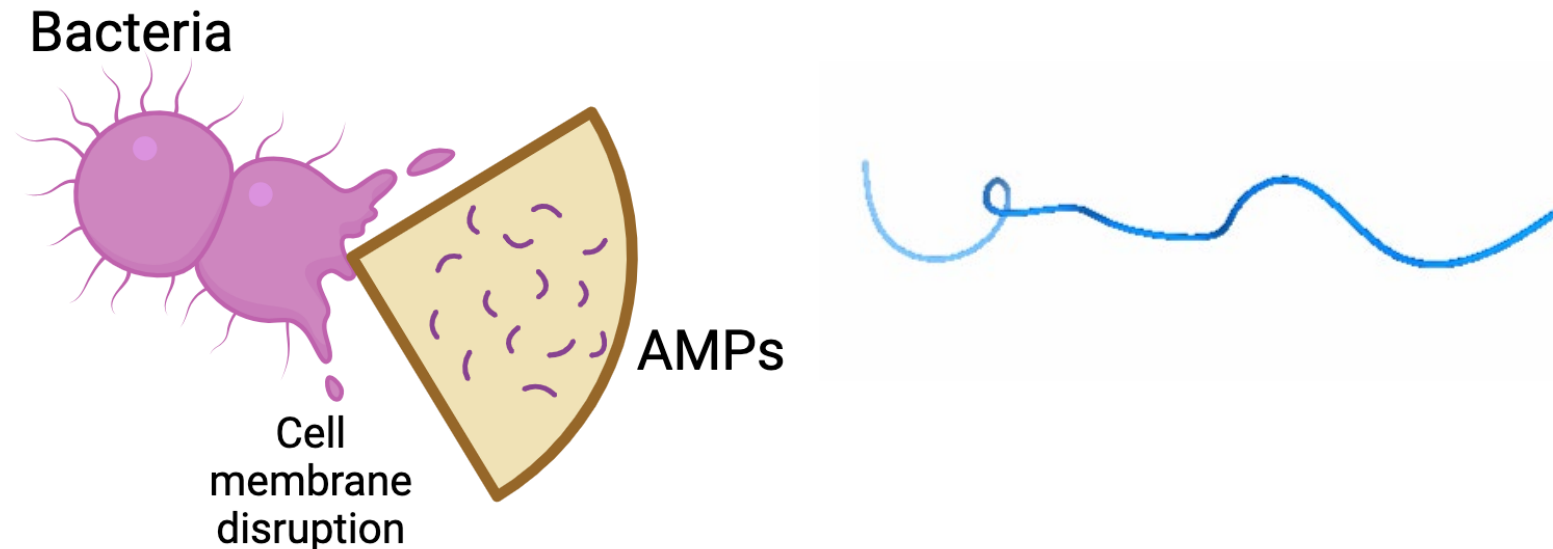
Stennett et al. Antibiotics 2022



# Synthetic Antimicrobial Peptides (STAMPs)

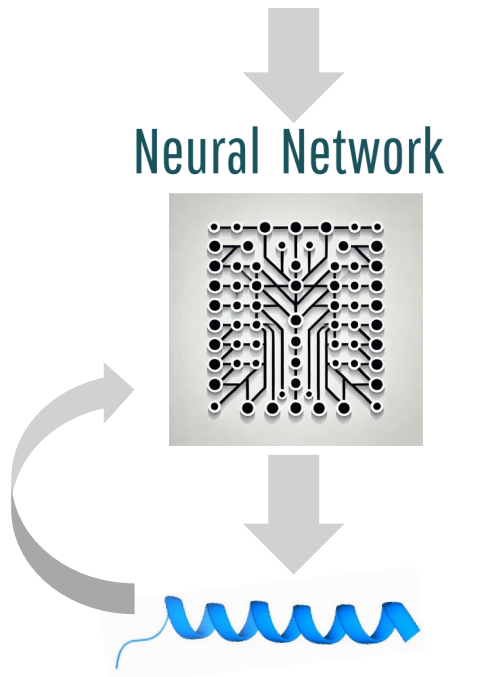
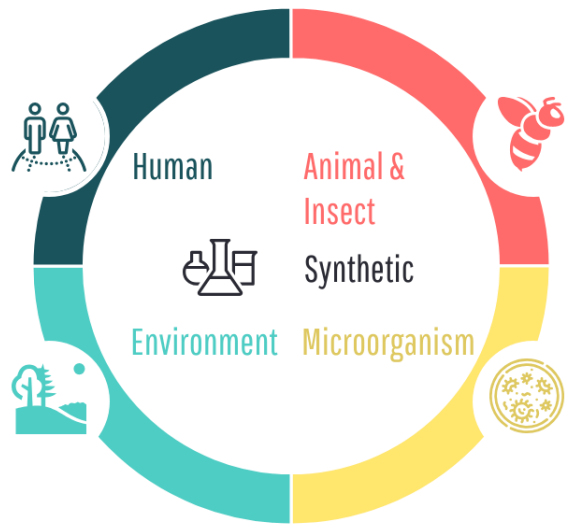
## Why STAMPs?

Broad antimicrobial activity  
Less resistance vs. antibiotics

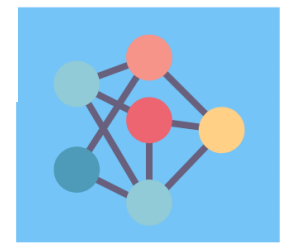




# Our Platform for STAMP Design



## AI Design



Our neural network can design thousands of novel STAMPs with potential activity

## Screening



We synthesized and validated 200 STAMPs against M. Abscessus

## Hits Current IP



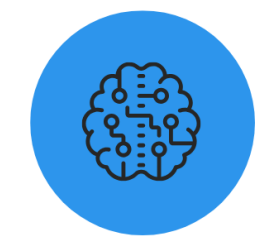
We have identified multiple novel STAMPs with activity against M. Abscessus

## Superior Performance



Our approach is 1000-fold better than a peptide array method

## Accelerated IP Expansion



Our proprietary positive and negative data, and new algorithm are unique advantages for STAMP development

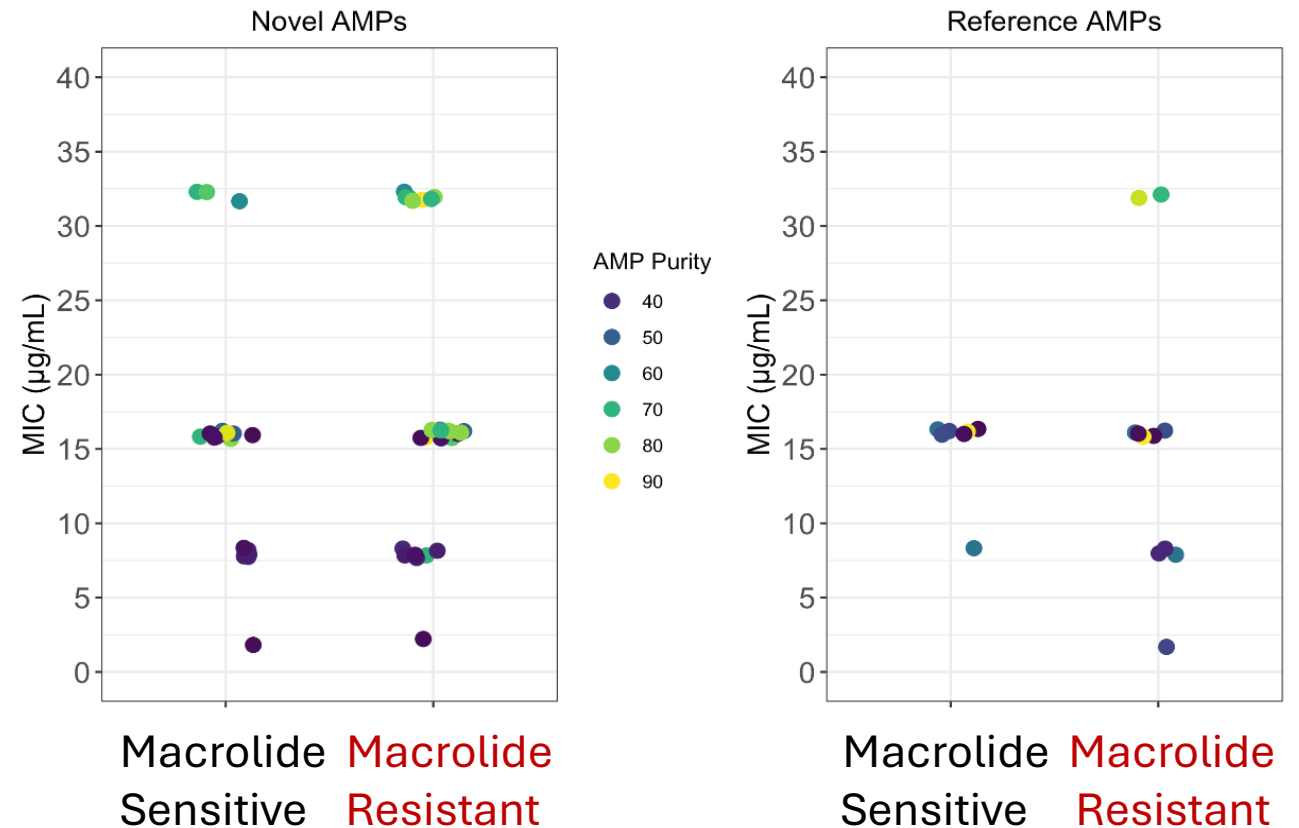
### New Synthetic AMPs



# AI-STAMPs are Active Against Macrolide Sensitive and Resistant M. Abscessus

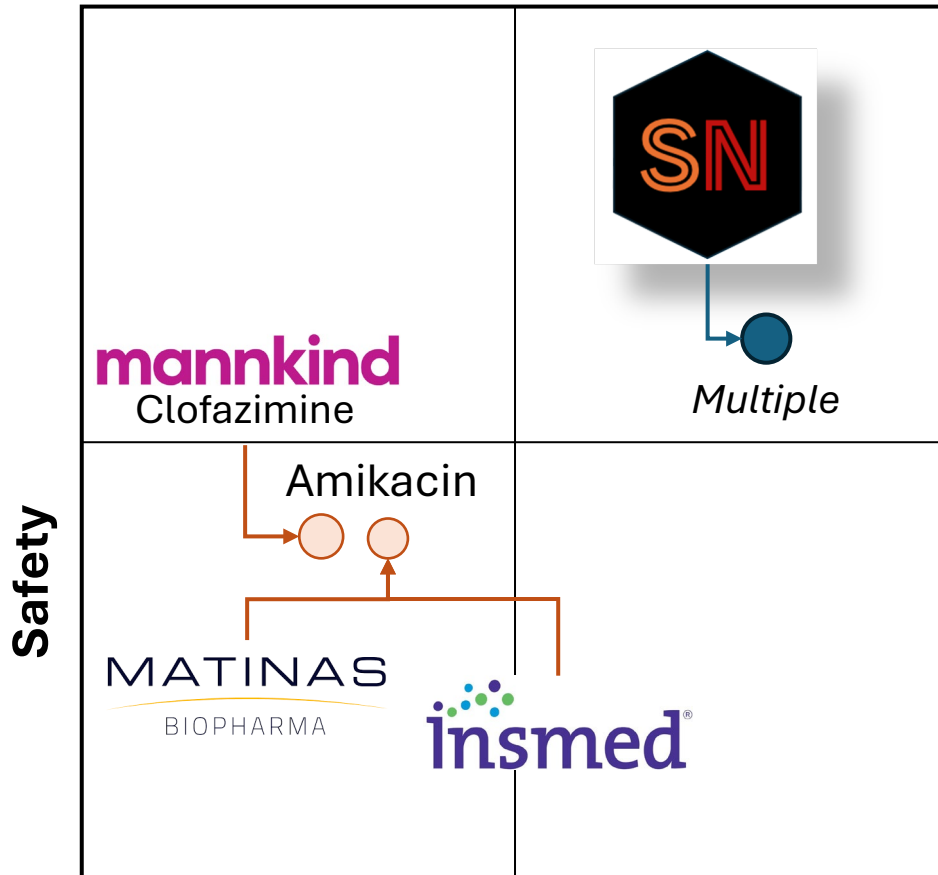
## Example of our technology

- Mycobacteria (such as M. Abscessus) are clinically relevant bacteria that cause lung disease
- Macrolides are central to the treatment of M. Abscessus, but development of resistance is a significant therapeutic challenge
- Here we show how **multiple novel STAMPs are active** against macrolide sensitive and resistant M. Abscessus



*Discussion with **Yale Ventures** to file provisional patent application before publication*

# Competitive Analysis



## SN STAMPs

**Innovation:** AI-Designed STAMPs exploit a new **pathway** and are new chemical entities (IP).

**Safety:** Our iterative protein design accelerates the identification of **highly potent STAMPs** while **eliminating structures associated with increased toxicity**.

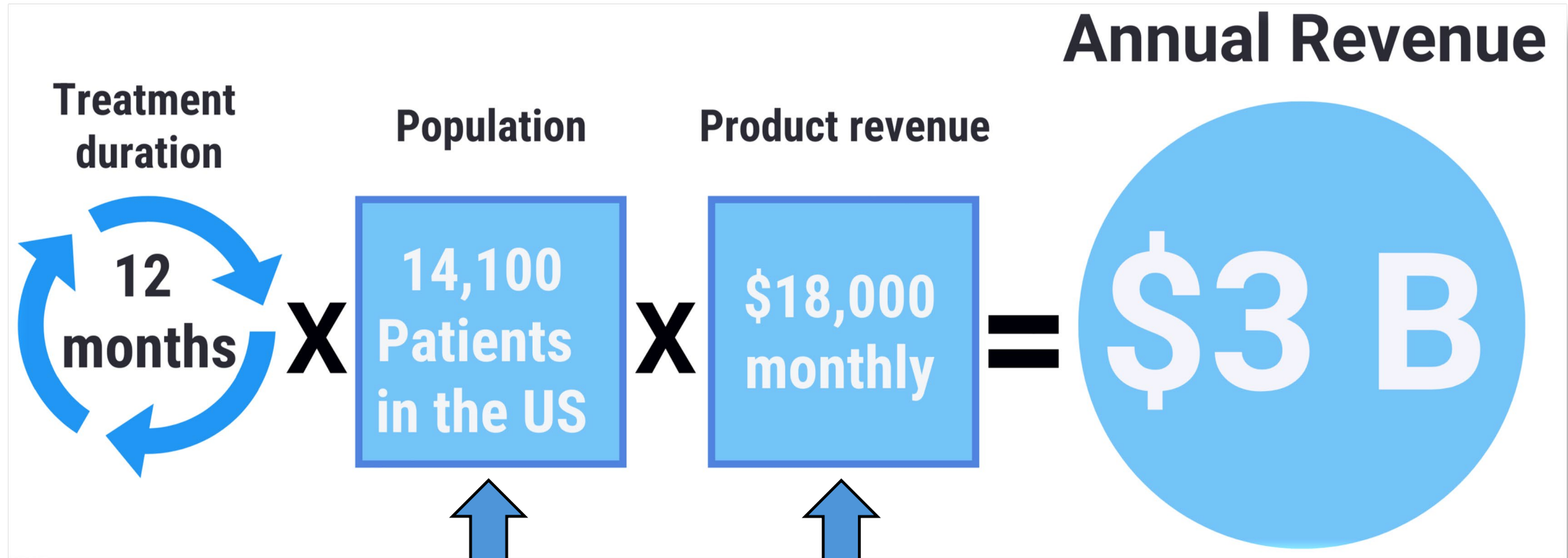
## Competitors

**Innovation:** **Reformulation of antibiotics** that have been in use for over 50 years.

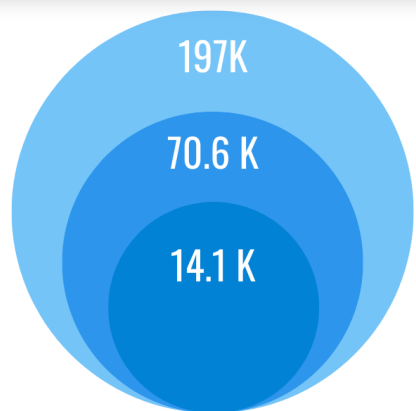
**Safety:** **Known multiorgan toxicity**

Innovation

# Market Potential for STAMPs in NTM Lung Disease Treatment



- NTM Global Prevalence 2024
- US Prevalence 2024
- 20% US Market Penetration



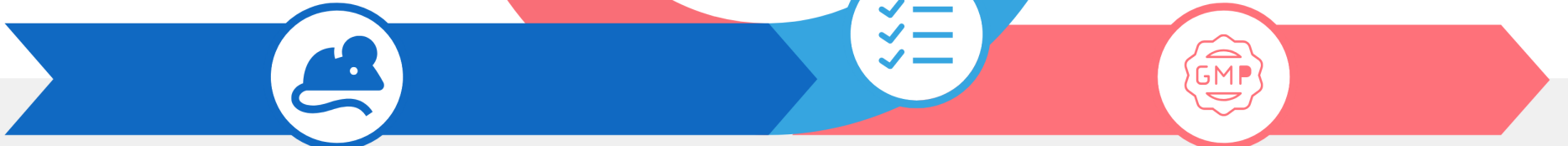
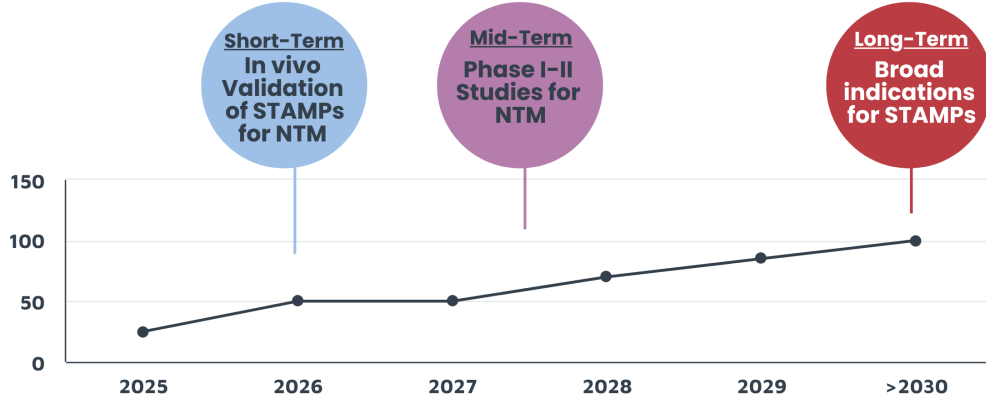
**insmed**  
Arikayce  
Inhaled Amikacin  
monthly price





**Current IP Portfolio**

- Patents  
STAMPs
- Trade Secrets  
AI Algorithms  
Negative Information



<p>Evaluate Activity of Lead STAMP in Mouse Model of Abscessus</p>	<p>PK/PD of STAMPs in Mice</p>	<p>Evaluation Toxicity in Mice</p>	<p>Evaluate Activity Against Other NTM and Resistant Bacteria</p>	<p>Evaluate Second Generation STAMPs</p>	<p>Medicinal Chemistry to Optimize Potency of Lead STAMP</p>	<p>GMP-compliant Synthesis</p>
<p><b>\$120,000</b> In Vivo Validation</p>		<p><b>\$80,000</b> Additional Targets</p>		<p><b>\$100,000</b> IND-Enabling</p>		

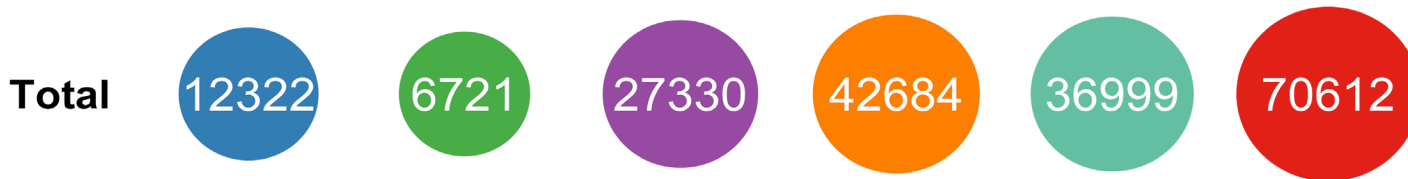


# Appendix

# Details Market Opportunity

Australia Canada European 5 Japan Korea United States

Estimated Prevalence of NTM Lung Disease in 2024



## Assumptions

- 12 Months: Minimal duration of NTM lung disease
- \$18,000: Arikayce monthly price in the US

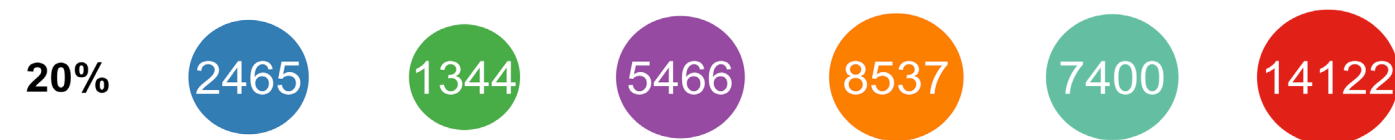
## Estimate

- Similar monthly price= \$18,000
- Duration of Rx= 12 months
- US market penetrance=20%

Market Penetrance 40%



Market Penetrance 20%












Total Annual in the US

**\$3,050,352,000**

Sources, PMIDs: 31830805, 32992265, 30789139, 28118021, 37347810

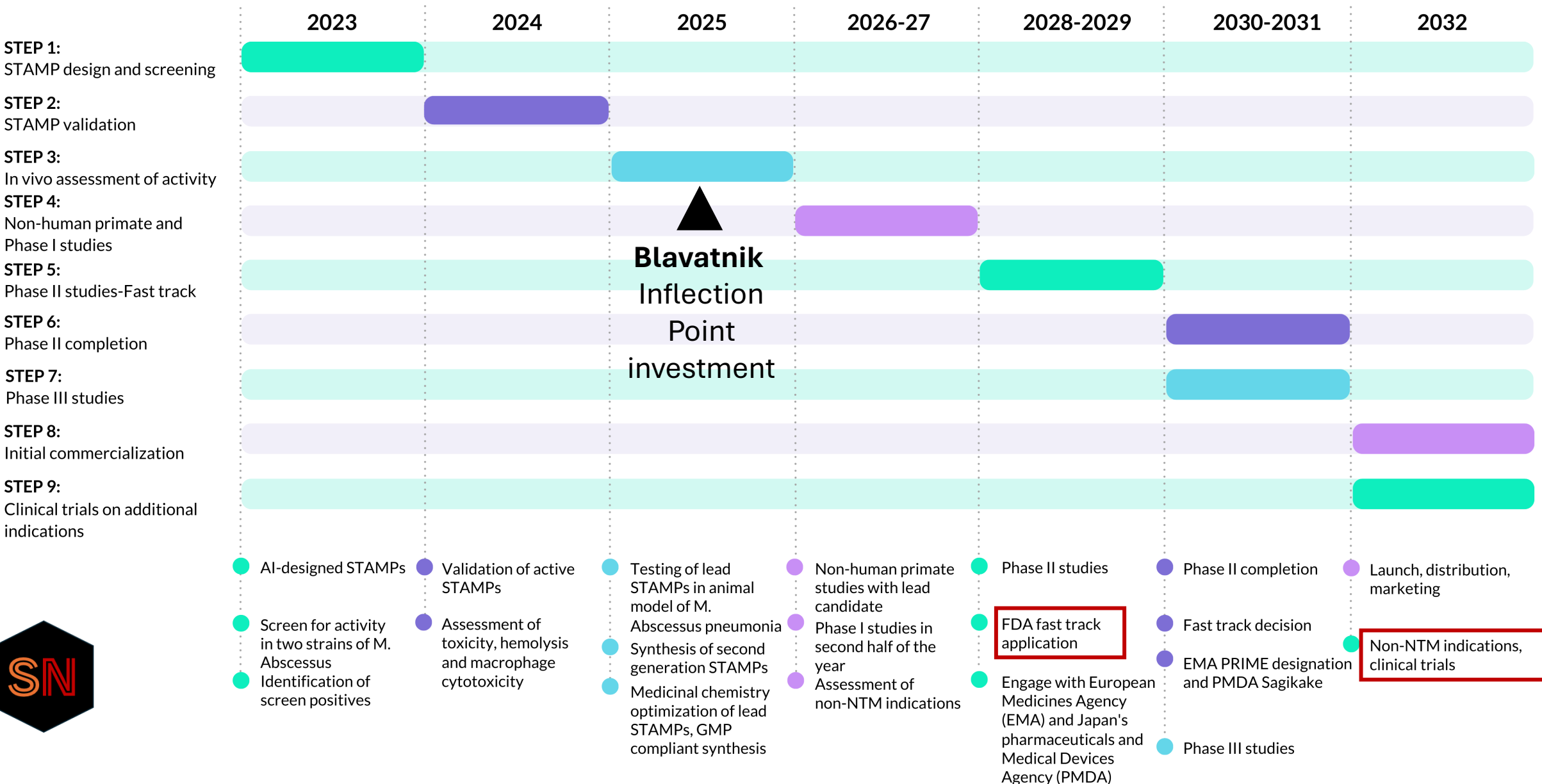


# Details Competitive Landscape

Company	Product	Current Status	Total Revenues
	Arikayce: Amikacin liposome inhalation suspension	Commercially available	\$90.3 million 2 <sup>nd</sup> quarter 2024
	MNKD-101: Clofazimine inhalation suspension	FDA fast-track designation for NTM	
	Omadacycline: IV and Oral	Phase II completed July 2024	
	Epetraborole: Leucyl-tRNA Synthetase Inhibitor. Oral	Recent failure in EBO-301 study	
	SPR720: ATP activity of gyrase. Oral	Phase IIa reported in Q4 2024 failed on NTM vs. placebo & hepatotoxicity	
	MAT2501: Oral amikacin	Phase I	
	CRS0393: MmpL3 inhibitor	Preclinical	
	Nitric oxide inhalation	Preclinical	
	ENTX_001: Enzymatic degradation of lipid wall	Preclinical	



# PROJECT TIMELINE



# Existing AMPs and Patents

- Teixobactin (2013). Binds to lipids II and III in the bacterial cell wall. NovoBiotic Pharmaceuticals has been issued two US patents: 9,163,065 and 9,402,878). In preclinical development.
- Lugdunin (2016). International patent: WO2016151005A1.
- Malacidins (2018). US: 16617052
- Mainly activity against gram positive pathogens