RECCE® 327: A Novel Countermeasure for High-Priority Bioterrorism Pathogens

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Introduction

RECCE® 327 (R327), a synthetic anti-infective developed by Recce Pharmaceuticals Ltd, **has demonstrated significant activity against multiple high-priority bioterrorism pathogens in laboratory testing.** This study was conducted by the Battelle Biomedical Research Center (BBRC) and involved Minimum Inhibitory Concentration (MIC) assays to evaluate R327's efficacy. The pathogens tested included *Bacillus anthracis* (Anthrax), *Francisella tularensis* (Tularemia), *Burkholderia mallei* (Glanders), *Burkholderia pseudomallei* (Melioidosis), and *Yersinia pestis* (Plague), **all classified as Category A and B bioterrorism threats by the U.S. Centers for Disease Control and Prevention (CDC).**

Results

The results demonstrated MIC values ranging from 75 to 600 µg/mL, **with R327 exhibiting potent activity against *B. anthracis, F. tularensis,* and *Y. pestis* at concentrations of ≤150 µg/mL. These findings align with efficacy levels achieved in previous studies for ESKAPE pathogens.** Higher concentrations of R327 were required to inhibit *B. mallei* (300-600 µg/mL) and *B. pseudomallei* (600 µg/mL), **showcasing the compound's broad-spectrum activity against both Gram-positive and Gram-negative bacteria.** The starting bacterial concentrations for each pathogen ranged from 3.10×10^5 to 7.73×10^5 CFU/mL.

Pure (100%) R327 comprises an estimated 52,000 ug/ml of oligomers. There are approximately 1500 oligomers. Significant antimicrobial activity is most probably confined to a much smaller number of oligomers. Thus, the MIC values reported herein are comparatively high as they are calculated based on all oligomers present. Studies to identify the individual and active oligomer species and determination of their respective MIC values are ongoing. When the active oligomer species of R327 are identified and quantified, it is anticipated that the MIC values will significantly decrease.

Conclusions

R327's novel mechanism of action, targeting adenosine triphosphate (ATP) synthesis and bacterial membrane integrity, allows it to overcome traditional resistance mechanisms. **The study underscores the importance of innovative anti-infectives like R327 in addressing bioterrorism and emerging infectious disease threats.** Future research, including clinical and field-based validation, is crucial to establish R327 as a scalable and deployable solution for military and public health strategies. **These findings contribute to ongoing efforts towards preparedness and resilience against biological threats.**

Learning Objectives

At the end of the session, attendees will be able to:

- **Evaluate the efficacy of RECCE® 327** as a countermeasure against high-priority bioterrorism pathogens identified by the CDC.
- Discuss the implications of synthetic anti-infectives in **supporting the U.S. military's biodefense readiness and resilience.**
- **Identify opportunities to integrate novel anti-infective agents like RECCE® 327 into military and public health strategies to combat bioterrorism and antibiotic resistance.**

RECCE® 327 Activity

Against multiple high priority biopathogens

Disease	Bacteria	Starting bacterial conc. (CFUs/mL)	RECCE® 327 Minimum inhibitory concentration (ug/ml)
Anthrax	*B. anthracis*	5.43×10^5	75-150
Glanders	*B. mallei*	7.73×10^5	300-600
Melioidosis	*B. pseudomallei*	4.80×10^5	600
Tularemia	*F. tularensis*	5.53×10^5	<150
Plague	*Y. pestis*	3.10×10^5	<150

- MIC testing of R327 (in triplicate)
- Study was conducted by Battelle Biomedical Research Center (BBRC).
- MICs comparable to levels achieved for ESKAPE pathogen MICs tested

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CDC Antimicrobial-Resistant Pathogens Tested

Bacteria	Comparator Antibiotic	Total Number of Strains	Strains Resistant to Comparator Antibiotic	Comparator Antibiotic Efficacious Against	R327 Efficacious Against	Strains Resistant to R327
Enterococcus spp	Ampicillin	26	20	6	26	0
Klebsiella pneumoniae	Levofloxacin	38	28	10	38	0
Acinetobacter baumannii	Levofloxacin	53	47	6	53	0
Pseudomonas aeruginosa	Levofloxacin	63	50	13	63	0
Enterobacter spp	Levofloxacin	12	8	4	12	0
Escherichia coli	Levofloxacin	40	28	12	40	0

- **Strains resistant to levofloxacin** (based on CLSI guidelines) **were still susceptible to RECCE®327**
- **This suggests that pre-existing resistance genotypes are unlikely to confer resistance to RECCE®327 if used on clinical infections**
- Common resistance genotypes covered include: mexA (efflux), mcr1 (lipid syn), KPC (carbapenemase)
- Strains were isolated from a variety of sources (provided by the CDC AR Bank), including but not limited to, wounds, blood, urine, and sputum. In most cases, multidrug-resistance (MDR) was confirmed via sequencing by the CDC Antimicrobial Resistance Isolate Bank. MICs of selected panels of Gram-negative species was determined by Broth microdilution assays, performed with biological duplicates.