COMBATTING FUTURE BIOLOGICAL THREATS – HOST-DIRECTED INTERVENTIONS TO EMERGING THREATS FOR RAPID RESPONSE

A Novel Broad-spectrum Rapid Response To MDR Bacterial Threats

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Background: In developing therapeutic medical countermeasures (MCMs) against emerging biological threats, combat-related injuries intersect with the challenge of antimicrobial resistance (AMR). Insights from previous military conflicts, such as those in Iraq and Afghanistan, reveal the emergence of antimicrobial-resistant microorganisms among individuals sustaining war-related injuries. While limited data exist on infections following war wounds in the ongoing conflict in Ukraine, pre-invasion studies underscore a concerning prevalence of multidrug-resistant (MDR) bacteria, particularly among military personnel. Pairing MDR infections with combat wounds over two decades emphasizes the urgent need for rapid and effective treatment in wartime scenarios. RECCE®327 emerges as a promising therapy, demonstrating an innovative and novel approach to combating MDR infections. Recce platform technology is a new class of globally patented and potent wholly synthetic anti-infectives for serious/life threatening and resistant infections. Studies demonstrate RECCE®327 's ability to swiftly and irreversibly attack MDR species, including E. coli and all ESKAPE pathogens, without inducing further resistance mechanisms and maintaining anti-bacterial activity. Notably, recent work highlights RECCE®327 's efficacy in killing M. abscessus bacteria within host biological cells, reinforcing its potential to safely combat MDR infections prevalent in wartime settings. Purpose: To provide an effective therapeutic option for combat-related wounds infected with MDR bacteria. Objective: To demonstrate RECCE®327's ability to effectively and rapidly attack MDR bacterial strains exhibiting a range of resistance mechanisms, without causing damage to infected host cells. Methods: Gram-negative species from the ESKAPE pathogen group were subjected to RECCE®327 treatment to assess antimicrobial activity compared to levofloxacin-treated controls. MDR confirmation was achieved through sequencing via the CDC AR Bank, encompassing common resistance genotypes. Additionally, anti-infective efficacy against M. abscessus and host cell viability was evaluated in stem-cell derived macrophages (SCDMs) using relevant assays. Preliminary Results: RECCE®327 demonstrated broad anti-infective activity against multiple clinical Gram-negative MDR species, suggesting its efficacy even against strains resistant to levofloxacin. Notably, RECCE®327 effectively killed M. abscessus within SCDMs, without cytotoxicity nor loss of macrophage viability. Reduced inflammatory cytokine secretion further supports RECCE®327's potential therapeutic benefits. Preliminary Conclusions: Initial findings suggest that RECCE®327 holds promise in treating MDR infections, particularly in combat-related injuries with limited medical resources. Combined with prior studies, RECCE®327 exhibits rapid onset of action (minutes) and broad-spectrum killing of MDR pathogens without inducing cellular damage in vitro. RECCE®327 comprises synthetic copolymer compounds and is stable, safe, and hydrophilic. Multiple formulations are in development for a range of indications: an intravenous formulation for urinary tract infection and urosepsis. RECCE®327 has demonstrated safety and antibacterial effects in patients with infected burn wounds and post operative wounds with further clinical testing of the gel formulation being planned for diabetic foot ulcer infections in Indonesia later this year. Recce technology is demonstrably innovative, intentionally designed to overcome bacterial resistance mechanisms, and has a time-efficient and cost-effective manufacturing process. RECCE®327 is able to provide a rapid response to a broad range of MDR threats, with significant potential for the particular medical needs of military applications.