1. Introduction

Antimicrobial resistance is a global issue, not only for medical and veterinary treatment, but also for economic development. One of the critical bacterial pathogens known to develop resistance to antimicrobial agents is Acinetobacter baumannii, one of the ES KA P pathogens[1].

A. baumannii is an aerobic Gram-negative coccobacillus bacterium associated with bacteraemia, urinary tract infections and ventilator-associated pneumonia, and is typically viewed as an opportunistic pathogen [2]. Strains of A. baumannii commonly produce biofilms as a means of adhering to surfaces, which aids in the development of antimicrobial resistance. Previous research has shown that clinical strains of A. baumannii have susceptibility to novel antimicrobial peptides (AMPs), specifically those identified from a rumen metagenomic dataset (Lynronne 1, Lynronne 2 & Lynronne 3)[3].

The Lynronne AMPs are short (<25AA in length) α-helical peptides which have been seen to exhibit antimicrobial effects against a number of different pathogenic species, and it is expected that they will have inhibitory and anti-biofilm properties towards A. baumannii.

2. Methods

The MICs of the 3 peptide (Lyn-1, Lyn-2, Lyn-3) against 13 strains of A. baumannii were determined using standardized 96 well plate methodologies.

The activity of peptides against biofilms (formation and established biofilms) was tested using a modified 96 well plate methodology. Biofilms were grown over 48 hours to ensure adequate biofilm production. Established biofilms were challenged with a gradient of peptide concentration from 512µg/ml to 4µg/ml.

Synergistic effects to determine peptide/peptide and peptide/antibiotic (such as vancomycin) effects were determined using checkerboard assays with 2 varying concentrations of chosen compounds.

3. Results

The MIC results showed that all 3 peptides exhibited inhibitory effects against all strains of A. baumannii, with noticeable variation between species. These effects were visible against clinical isolates with demonstrated resistance to clinical antibiotics, with resistance to beta-lactams and imipenem.

In addition, the peptides were able to reduce the formation of biofilms (Figure 2), and were seen to have a limited effect on established biofilms produced by some sub-strains of A. baumannii.

The peptides showed no real synergistic effects when combined with each other, and Lynronne 1 showed no ability to allow vancomycin to effect A. baumannii.

4. Discussion and Future Works

These results show that using novel antimicrobial peptides could potentially have therapeutic applications when treating A. baumannii. In addition, they have an ability to disrupt biofilms, though they appear to induce higher biofilm production at sub-MIC concentrations. It is interesting that there were no synergistic effects between Lynronne 1 and vancomycin, as

The next stages of this project will look into common serum protease degradation sites, and continuing testing using modified Lynronne peptides (initially D- and L- form substitutions, with the possibility of conjugation).

In addition, novel antimicrobial peptides are to be mined from an alternative metagenomic dataset, in order to identify other candidates with therapeutic potential.