Self-Derived Peptides: Inhibition of Bacterial Growth Without Resistance

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The World Health Organization warns antibiotic-resistant pathogenic bacteria are a major global health issue. Some gram-negative bacteria such as Escherichia coli and Acinetobacter baumannii even have strains resistant to all available antibiotics. However, a truly innovative antibiotic has not occurred for 60 years. This investigation aims to explore the viability of self-derived peptides as the future of antibiotics. E. coli MG1655 strain was tested for cell growth inhibition at twelve concentrations of a designed peptide. Then, a drug resistance assay was conducted to detect resistance of the bacterium by comparing the change of minimum inhibition concentrations (MIC) of the peptide and the standard drug enrofloxacin. Lastly, a cytotoxicity assay was conducted to test the effects of peptide concentrations on the relative activity of mammalian cells. The E.coli growth curve confirmed the self-derived peptide inhibited E. coli cell growth at concentrations greater than 2 μM. Over eighteen days, the peptide MIC increased two-fold, compared to the 256-fold MIC increase of the standard antibiotic enrofloxacin. The peptide also showed low cytotoxicity in mammalian cells at concentrations less than 50.0 μM. In conclusion, with little resistance and low cytotoxicity, self-derived peptides have a promising future as a new class of antibiotics. It is estimated that in the year 2050 alone, 10 million deaths worldwide will be attributed to antibiotic resistance. With more comprehensive research and development, self-derived peptides could potentially combat multi-antibiotic resistant bacterial strains and save countless lives.