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DISCOVERY OF POTENT ANTIMICROBIAL PEPTIDES AS ALTERNATIVE NATURAL FOOD PRESERVATIVES: *IN SILICO* AND *IN VITRO* APPROACHES

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Novel and potent antimicrobial agents are urgently needed to replace currently-used food preservatives such as nitrite, benzoates and sorbates. Although existing preservatives have protected processed food against spoilage and pathogenic microorganisms for decades, presence of these chemicals on products label is perceived negatively by new generation of consumers. Additionally, researchers are increasingly detecting microbial strains that are resistant to these conventional preservatives. Many researchers have screened beneficial bacteria for natural alternatives preservatives, and several promising antimicrobial peptides have been discovered. These include paenibacillin, paenibacterin and brevibacillin which were discovered in our laboratory since 2007. Considering how tedious current screening protocols are, and that many antimicrobial producers are missed by traditional screening, there is a need to develop rapid high-throughput protocols to accomplish these tasks efficiently. Few bacterial strains are known to carry DNA codes for antimicrobial peptides, but several others have not been discovered yet. Although the capability of strains to produce antimicrobials is not widely-spread, this capability can be revealed *in silico* by searching (using appropriate software) for a number of DNA sequence patterns in whole genomes deposited in gene banks. Experienced analysts can screen further the selection resulting from these *in silico* searches. However, presence of candidate sequences needs to be complimented with *in vitro* detection of potential antimicrobials. This involves collecting potential producers from commercial culture collections (e.g., ATCC and NCTC) and research laboratories and testing these cultures for the presence of the antimicrobials predicted *in silico*. We also used a metagenomics approach successfully, in lieu of the *in silico* search just described. The technique involves designing degenerate primers, targeting DNA sequence patterns associated with different categories of antimicrobial peptides, and running PCR on metagenomics DNA extracted from food or environmental samples. The presentation will include how these approaches were used recently to detect several promising antimicrobial peptides.

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