Synthetic Biology Approach for Development of a Monosodium Glutamate Detector, Phase II

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Monosodium Glutamate (MSG) is one of the most commonly used spices for taste enhancement. Research has shown that people are sensitive to MSG and that all organs of the body contain glutamate receptors that MSG can damage. The main symptom from MSG is damage done to the brain. Due to the health risks of MSG, there is a need for a low-cost readily available MSG detector for easy use by the public. The purpose of this project was to address this need by designing and developing an inexpensive gene-based biosensor that provides sensitive detection for MSG, and indicates its presence by a visual color change. Accomplishments towards this purpose included: (1) Designing the promoter and fluorescent protein (FP) nucleotides that should be responsive to MSG; (2) Assembling and amplifying the promoter and the FP genes using the nucleotides in a polymerase chain reaction (PCR) thermocycler instrument; (3) Transforming the promoter and the FP into a bacterial plasmid vector; and (4) Testing the completed E. coli on agar plates with and without (control) MSG, and in minimal medium with various amounts of MSG. Results from gel electrophoresis measurements showed that the assembly of the promoter and the FP genes was successful. The cell colonies on the MSG-layered agar plates showed visual color change, indicating that the overall project was a success. Results for the minimal medium tests showed increased color change corresponding to increased concentration of MSG, providing further evidence of project success, and indicating that a consumer product is possible.

Awards Won:
First Award of $5,000