Genetically Engineering Nonpathogenic E. coli to Bind to a Cellulose Matrix Using Curli Fibers and Cellulose Binding Domains

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The growing concerns about GMOs are causing more research to be completed to preserve the human body. This project aims to encapsulate GMOs inside of a cellulose matrix using long fibrous structure, called curli fibers and cellulose binding domains. These fibers create a mesh around the bacterium that can connect to cellulose. Curli fibers are made up of several different subunits called curli specific genes (csg) which are labeled A through G. The subunit that creates the fiber protruding from the cell is csgA. This csgA gene will be used in combining with the double cellulose binding domains. The first step in combining the genes was to isolate them individually from their original plasmids. In order to isolate these specific genes, restriction enzymes were used in order to cut the DNA where these genes start and end in the initial plasmid. These isolated genes were then ligated into a different plasmid together, called pBAD. The two genes were combined by removing the stop codon from the csgA gene which allows for the production of both the binding domain and the curli fibers at the same time as one fusion protein. Creating this new fusion protein allows for the GMO to bind to the cellulose matrix. This will be used to transport other GMOs through the gastrointestinal tract without harming the body.