Recombinant Bacteria Capable of Expressing Type I Collagen Proteins

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The goal of this research is to observe and analyze the capabilities of Escherichia coli to express the type I collagen triple helix through use of a plasmid vector. Type I collagen is a strong protein that accounts for the majority of the connective tissue that makes up the ligaments and tendons of the body. Collagen produced through recombinant bacteria could potentially be used as a supplement or biomaterial for use in the rehabilitation of soft tissue injuries and diseases of the joints. From the total RNA of a human kidney, cDNA of a select portion of the COL1a1 gene was synthesized and amplified through polymerase chain reaction (PCR). The resulting product of the PCR was then run on an electrophoresis gel, scanned, and then extracted from the gel. The DNA from the electrophoresis bands was then purified and added to a plasmid vector. Two tubes of E. coli were then inoculated with the vector and spread over agar plates coated with the ampicillin. The plates were incubated overnight, and the resulting colonies were sampled and added to a solution containing ITPG in order to induce protein expression via the lac operon. Of the twelve colonies that were induced, nine were selected to be analyzed on a protein gel. All nine samples exhibited electrophoresis bands within the range of 15-20 kDa, suggesting successful expression of the partial COL1a1 gene, as the selected portion contains code for an amino acid sequence with a molecular weight of 17.06 kDa. The bands formed by the protein electrophoresis suggest that the E. coli colonies were successfully able to express a portion of the collagen gene.

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