Enhanced production of recombinant proteins in *Escherichia coli* by filamentation suppression

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Abstract

During the high cell density culture (HCDC) of *Escherichia coli*, high-level production of recombinant protein often causes several problems including growth inhibition and filamentation, which consequently leads to reduced productivity of recombinant protein. In order to prevent cell filamentation and possibly to increase protein productivity during HCDC, effects of co-expressing the *E. coli ftsA* and *ftsZ* genes, which encode key proteins in cell division, on the production of human leptin and human insulin like-growth factor (IGF-I) in recombinant *E. coli* were examined. In the case of leptin production using the *trp* promoter by the HCDC of recombinant *E. coli*, the co-expression of the *ftsA* and *ftsZ* genes resulted in 1.3 fold increase of specific growth rate and 2.0 fold increase of volumetric productivity. Also, in the case of IGF-1 production using the inducible *tac* promoter by the HCDC, the co-expression of the *ftsA* and *ftsZ* genes resulted in 1.3 fold and 1.9 fold increase of specific growth rate and volumetric productivity, respectively. Observation of cell morphology using phase contrast microscope revealed that the co-expression of *ftsA* and *ftsZ* genes successfully suppressed filamentation caused by the accumulation of recombinant proteins, and consequently led to enhanced cell growth and protein productivity.

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