Overproduction of Cytidine 5'-Monophosphate *N*-Acetylneuraminic acid in Genetically Engineered *Escherichia coli*

Yeo Jin Son, Jeong Hwan Cho, Nam Soo Han
Dept. of Food Sci. and Tech., Research Center for Bioresource and Health(RCBH),
Chungbuk National University
Tel: +82-43-261-2567, FAX: +82-43-271-4412

Abstract

Sialyloligosaccharides found in glycolipid and glycoprotein of most mammalian cell surface are known to play various important roles in the biochemical communication between cells.[1] Addition of sialyloligosaccharides in food is supposed to prevent adherence of several pathogenic bacteria onto the epithelial cells of human gut. Overproduction of cytidine 5'-monophosphate *N*-acetylneuraminic acid(CMP-NeuAc) is necessary for the synthesis of sialooligosaccharides.[1] The high cost of the essential substrate of sialyltransferase, CMP-NeuAc, limits development of the process using sialyltransferase.[3] In order to overproduce CMP-NeuAc, we employed a recombinant *E. coli* system which was engineered by gene knock-out and gene transformation techniques. Genes for NeuAc synthase(*neuB*) and CMP-NeuAc synthase(*neuA*) were transformed and co-expressed in *E. coli* K12. The *neuB* gene was for the conversion of *N*-acetylmannosamine and phosphoenolpyruvate to NeuAc and the *neuA* gene was for the production of CMP-NeuAc from CTP and NeuAc. Additionally, reversible degradation reaction of accumulated NeuAc by NeuAc aldolase(*nanA*) was avoided by knock-out of *nanA* gene from *E. coli* K12 strain. During the growth of recombinant *E. coli*, various nucleotides and CMP-NeuAc were analyzed with HPLC.

References

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