# Lycopene production in recombinant *E. coli* engineered with foreign mevalonate pathway

[1]Ju-Eun Kim, [2]Sang-Hawl Yoon, [1]Sook-Hee Lee, [1]Hye-Min Park,
[1]Eun-Kyeong Lee, [1]Jung-Hun Kim, [3]Hossein Shahbarri, [4]Si-Hyoung Lee,
[3,4]Yong-Chul Shin,[1,2]Seon-Won Kim
[1]Division of Applied Life Science (BK21),
[2]Department of Food Science & Nutrition and
[3]Department of Microbiology, Gyeongsang National University, Jinju 660-701,Korea,
[4]Amicogen Inc., Jinsung, Jinju 660-852, Korea
TEL:+82-55-751-5974, FAX:+82-55-751-5971

**Abstract**

*E. coli* harboring *crtE, crtB* and *crtI* of *Erwinia herbicola,* was able to produce lycopene. Lycopene is synthesized from isopentenyl pyrophosphate(IPP) which is a common five-carbon building block of all isoprenoids.(1) IPP synthesis in *E. coli* is carried out by MEP pathway. DXP synthease of MEP pathway combines glyceraldehyde-3-phosphate (G3P) and pyruvate to produce 1-deoxy-D-xylulose -5-phosphate (DXP). Oversythesis of DXP caused metabolic imbalance of MEP pathway and growth inhibition because intracellual pool of G3P is significantly lower than one of pyruvate.(2) Therefore, foreign Mevalonate pathway was introduced for efficient supply of IPP for lycopene production. A plasmid pSSN12Didi containing *mvaK1, mvaK2* and *mvaD* of *Streptococcus pneumoniae* and *idi* of *E. coli* which can synthesize IPP with exogenous supplementation of mevalonate, was constructed by using a low-copy vector, pSTV28. Another plasmid pBBR1PZSN containg *mvaK1, mvaK2* and *mvaD* of *Streptococcus pneumoniae, idi* and *atoB* of *E. coli* and *mvaS* and *mvaA* of *Paracoccus zeaxanthinificiens* was constructed for synthesis of IPP without supplementation of mevalonate. *E. coli* harboring pSSN12Didi and pBBR1PZSN produced 25.5 lycopene/g DCW and 12.6 lycopene /g DCW, respectively, which were 5-fold and 2.4-fold higher than that using MEP pathway. The increased lycopene production was suspected to be caused by no

both metabolic imbalance and feed-back regulation of mevalontate pathway in *E. coli* beacuase mevalonate pathway is foreign pathway and uses acetyl-CoA as starting material.[3]

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