World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:9, No:07, 2015

Production of Novel Antibiotics of Tylosin by Importing eryK and eryG Genes in Streptomyces fradiae

Authors : Neda Gegar Goshe, M. Moradi, Hossein Rassi

Abstract : The antibacterial properties of macrolide antibiotics (such as erythromycin and tylosin) depend ultimately on the glycosylation of otherwise inactive polyketide lactones. Among the sugars commonly found in such macrolides are various 6-deoxyhexoses including the 3-dimethylamino sugars mycaminose and desosamine (4-deoxymycaminose). Some macrolides (such as tylosin) possess multiple sugar moieties, whereas others (such as erythromycin) have two sugar substituents. Streptomyces fradiae is an ideal host for development of generic polyketide-overproducing strains because it contains three of the most common precursors-malonyl-CoA, methylmalonyl-CoA and ethylmalonyl-CoA-used by modular PKS, and is a host that is amenable to genetic manipulation. As patterns of glycosylation markedly influence a macrolide's drug activity, there is considerable interest in the possibility of using combinatorial biosynthesis to generate new pairings of polyketide lactones with sugars, especially 6-deoxyhexoses. Here, we report a successful attempt to alter the aminodeoxyhexose-biosynthetic capacity of Streptomyces fradiae (a producer of tylosin) by importing genes from the erythromycin producer Saccharopolyspora erythraea. The bio transformation of erythromycin-D into the desired major component erythromycin-A involves two final enzymatic reactions, EryK-catalyzed hydroxylation at the C-12 position of the aglycone and EryG-catalyzed O methylation at the C-3 position of macrose. This engineered S. fradiae produced substantial amounts of two potentially useful macrolides that had not previously been obtained by fermentation.

Keywords : tylosin, eryK and eryG genes, streptomyces fradiae
Conference Title : ICBBMB 2015 : International Conference on Biochemistry, Biophysics and Molecular Biology
Conference Location : Istanbul, Turkey
Conference Dates : July 29-30, 2015