Proc. KMB Annual Meeting
June 24-26, 2003, Muju, Korea

Biosynthesis of Deoxysugar and New Antibiotics

Jae Kyung Sohng, Hei Chan Lee, Kwangkyoung Liou, Jin-suk Woo[1], and Byung-Gee Kim[2]

IBR, SunMoon University, Asansi, Chung-nam
[1]School of Chemical Engineering, Seoul National University
[2]GeneChem Inc., Daeduk Bio Community, Yoosunggu, Daejon

Recent progress in the biochemistry and molecular biology of biosynthetic capacities of secondary metabolites enables the attempts to redesign these pathways in a directed fashion to produce hybrid type. The wide-spread use of deoxysugar and aminoinositol constituents is in natural products, the biosynthetic pathway gene of deoxysugar and aminoinositol should allow to detect a vast array of different secondary metabolic gene clusters in actinomyces. The universal methods were developed to obtain the biosynthetic genes of deoxyhexose and aminoglycoside.

I present two subjects. One is the biosynthesis of deoxysugar and the other is the aminoglycoside. We isolated four biosynthetic gene clusters; rubradirin (rubranitrose,), mithramycin (trisaccharide and disaccharide), olendomycin (D-desosamine and L-olendose) and spectinomycin (spectinose). The functions of these gene clusters have been proving by expression and gene knock-out. I present the biosynthesis of TDP-D-olivose, their derivatives and new vancomycin. Recently, we have cloned and sequenced the genes involved in the biosynthesis of 2-deoxystreptamine, a sugar moiety retained in gentamicins, kanamycin, tobramycin and ribostamycin. All gene clusters were annotated. To prove the functionalities, 2-deoxyscyl-loinosose synthase, a key enzyme required for the biosynthesis of DOS, was manupulated. The genes were over expressed in *E. coli* in the soluble form and the activity was studied in vitro. In a parallel experiment, the gene was inactivated and its function was studied in vivo by analyzing the metabolites produced by the mutants. In addition, the function of gentamicin and kanamycin resistant ribosomal methylase was also verified. We cloned DOI synthase, two aminotransferase and dehydrogenase to pDOS plasmid in order to synthase 2-deoxystratamine. We are going to biosynthesize a deoxystreptomine by pDOS in *E. coli*.