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Analysis of inducible expression in pharmaceutical microorganisms

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An inducible enzyme is an enzyme that is expressed when specific compounds are added to the cells. While in general it is inductively formed by the enzyme substrate, other compounds exhibiting induction of the enzyme were searched for. We have focused on pharmaceutical actinomycetes. Particularly, *Streptomyces* genus has been industrially used for the production of a lot of pharmaceutically important compounds, and therefore this genus should be used as a host strain for the formation of such pharmaceuticals and enzymes involved in their biosynthesis. Previously, we have investigated microbial metabolism of nitrile compounds. Particularly, we found that a nitrile, isovaleronitrile, can be a good inducer for the formation of nitrilase enzyme, which degrades nitrile to the corresponding acid and ammonia; more than 35% of all soluble proteins are nitrilase in an actinomycete, *Rhodococcus* strain. We also clarified the regulation mechanism of the nitrilase expression and identified the enzyme gene promoter in the strain. Based upon its unique expression mechanism, developed an expression system using this enzyme gene promoter in *Streptomyces*. Here, using actinomycetes, we searched for inducers, which can form a protein or enzyme inducibly. When amide-related compound was added into a culture medium in the actinomycete, a major protein band was observed on SDS-polyacrylamide gel. More than 30% of all soluble protein in the cells, the protein was inductively overexpressed. This is very significant expression of the protein, and therefore, this expression system could be useful for the development of a new expression vector for several industrial *Streptomyces* species.

Biography

Michihiko Kobayashi (BS, MS and PhD) is a Professor at University of Tsukuba (Japan). He graduated from Kyoto University (Agricultural Chemistry), Japan in 1985. He started his professional career in Kyoto University (1991-1999) as an Assistant Professor, Senior Lecturer and as an Associate Professor, respectively. In 1999, he became a Professor, and started the Lab of Molecular Microbial Bioengineering at University of Tsukuba. He has received many awards: (i) JSPS Prize (the Japan Society for the Promotion of Science Prize) (2004); (ii) High Technology Grand Prize "Special Prize" (2005); (iii) Prize for Science Technology (Research Category): The Commendation for Science and Technology by the Ministry of Education, Culture, Sports, Science and Technology, Japan (2006); (iv) SAJ Award ("the Society for Actinomycete Japan" Award) (2009); (v) Japan Bio-industry Association Award (2012); (vi) Japan Bioscience, Biotechnology and Agrochemistry Society Award (2015).

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