
Dynamic regulation of the pinocembrin producing pathway

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Abstract

Progress in metabolic engineering opened widely the doors to produce plenty of chemicals of industrial and therapeutic interest by using genes and biosynthetic circuits from different species. However, introducing heterologous pathways in the cell, is often accompanied with an uncontrolled accumulation of intermediates that could be toxic and provoke the decrease of the cell growth rate. To prevent the unbalanced accumulation of these intermediates, recent advances in the field suggested to set up a dynamic control of the pathway to monitor the precursors and fine-tune enzymes expression. Here, we are proposing the use of two biosensors system to dynamically regulate and screen a flavonoid biosynthetic pathway producing pinocembrin from glucose in *Escherichia coli*. A malonyl-coA sensor (FapR) was used to regulate the genes expression. Two versions of this sensor were tinkered to positively or negatively respond to the detection of malonyl-coA. A Platform plasmids were constructed to build a library of variants by shuffling static promoters and dynamic ones that respond to FapR in the upstream region of the pathway genes. At the same time, the pinocembrin sensor (FdeR) that promotes the expression of fluorescence in presence of pinocembrin, will be used for screening the promising clones. Using biosensors for both regulation and screening, enabled us to select new pathway architectures with improved production yields. Therefore, we strongly believe that we could expand the use of this approach to efficiently produce other compounds.

Keywords: dynamic regulation, pinocembrin pathway, biosensors

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