Talk

Regulation of gene expression and control of protein synthesis in different biotechnological process: Theory and Reality

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ABSTRACT

The impressive biodiversity of microorganisms on the Earth represents an endless source of genetic elements that can be rationally combined by synthetic biology to solve different biotechnological issues.

In our laboratory, we have contributed to the development of a protein expression system, which responds to permissive concentrations of different inducers such as salicylate, acetyl salicylic acid or 3-methyl benzoate. The system involves two transcriptional regulators working in cascade, whereas the first one controls the expression of the second that finally activates the expression of heterologous genes cloned under the control of an inducible promoter. In addition to conventional processes of bioproduction developed in bioreactors, this cascade system has been adapted to its use in bacteria inside higher organisms.

The study of the interactions between micro-organisms and their hosts presents certain limitations during the infection process as bacterial tracking inside higher organisms. The restricted number of tools that allow the control of genes involved in bacteria-host interactions hampers the ability to activate or inactivate these genes at the time or place desired during the course of the infection. These elements come from different bacteria, and have shown their effectiveness in the production of heterologous proteins in various organisms pathogenic for animals (Salmonella) or plant symbionts (Sinorhizobium). One of the interesting features of this system is that inducers freely diffuse between the different tissues of the host without toxicity at tested concentrations. This feature in combination with a good system to monitoring the infection process in vivo, allows to switch on the expression of genes of interest at the desired “time and place”, what could help in the understanding of its role during the infection process.

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