

Construction and application of theophylline-mediated riboswitch to programmed cell death and control of enzyme expression

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Researches in synthetic biology have developed novel biological circuits, functions and systems for new methodologies and approaches. To approach a biological questions in a new way, it is essential to investigate the new synthetic regulation systems. We used theophylline aptamer to construct those kind of new riboswitch. This one works depending on the concentration of that ligand and functions as an on-switch. For application of this on-switch, we chose two target proteins i.e., ccdB and ω -transaminase which are crucial for programmed cell death and control of transamination pathway, respectively. It was observed that the on-switch systems are turned on by theophylline, to selectively kill the engineered microorganism and for manipulating the expression of ω -transaminase. This new riboswitch is cost effective and safe as theophylline used as a ligand is a cheap and non hazardous chemical. Moreover, this switch can be applied in the development of other synthetic system. This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education, Science and Technology (2011-0026295).