Employing the synthetic scaffold strategies to redirect metabolic flux into novel gamma-aminobutyric acid pathway in Escherichia coli

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Due to the increasing demand of GABA, it is essential to create an effective alternative pathway for the GABA production. In this study, Escherichia coli were engineered to produce GABA from glucose via GABA shunt, which consists of succinate dehydrogenase, succinate-semialdehyde dehydrogenase and GABA aminotransferase. The three enzymes were physically attached each other through synthetic scaffold, and the Krebs cycle flux was redirected to GABA pathway. By introduction of synthetic scaffold, 0.75 g/l of GABA was produced from 10 g/l of glucose at 30oC and pH 6.5. The inactivation of competing metabolic pathways provided 15.4% increase of the final GABA concentration. This work was supported by a grant from the Next-Generation BioGreen 21 Program (SSAC, grant number: PJ011116) by RDA, Basic Science Research Program by the Ministry of Education (NRF-2014R1A1A2054726), and by the Research and Development Program of the Korea Atomic Energy Research Institute(KAERI).