*Selecciona una categoría*


# Engineering Pseudomonas putida for increased vitamin B12 production

Hedo Berrocal, Rodrigo; Martínez Sánchez, Igor & Nogales Enrique, Juan.

Systems Biology Group / National Centre for Biotechnology, Darwin,3 -28049, Madrid, Spain

Tutor académico: Lopez Sánchez, Aroa.

*Keywords:* Vitamin B12; Pseudomonas putida; Metabolic engineering, Synthetic Biology, Genome edditing.

## ABSTRACT

Vitamin B12 (adenosylcobalamin) is a water-soluble vitamin composed of a corrinoid ring that belong to the cobalamin family. The B12 is a key cofactor involve in several essential metabolic processes in the cell, including energy production, DNA biosynthesis and regulation, and the metabolism of amino and fatty acids. Interestingly, vitamin B12 is only synthetized de novo by some bacteria and archaea thus it biotechnological production is of great interest. Current industrial production is powered by Pseudomonas denitrifians and Propionibacterium freudenreichii strains. Still, B12 production yields are hampared by the low growth rates and lack of proper systems and synthetic biologly tools available for these strains. In addition, current bioprocess producing B12 are fuelled by complex and expensive culture media. Therefore, it is interesting to unravel alternative bacterial hosts for the cost-effective microbial production of B12. Here we use the natural B12 producer Pseudomonas putida KT2440 as cell factory towards this objective. P. putida KT2440 is a model microorganism and possesses an extremely versatile metabolism, which makes it the perfect candidate to study the intricate metabolic processes of the B12 biosynthesis. Since the de novo biosynthetic pathway contains around 30 genes, instead to overexpress the whole pathway using classical metabolic engineering procedures, we address here a multilayer approach including gene overexpression, natural regulation blocking, and OMIC-driven metabolic botlenecks removal to avoid rate-limiting reactions in the B12 biosynthetic pathway.

## REFERENCES

Fang, H., Li, D., Kang, J., Jiang, P., Sun, J., & Zhang, D. (2018). Metabolic engineering of Escherichia coli for de novo biosynthesis of vitamin B12. Nature Communications, 9(1). https://doi.org/10.1038/s41467-018-07412-6

Chamlagain, B., Edelmann, M., Kariluoto, S., Ollilainen, V., & Piironen, V. (2015). Ultra-high performance liquid chromatographic and mass spectrometric analysis of active vitamin B12 in cells of Propionibacterium and fermented cereal matrices. Food Chemistry, 166, 630–638. https://doi.org/10.1016/j.foodchem.2014.06.068

Weber, E., Engler, C., Gruetzner, R., Werner, S., & Marillonnet, S. (2011). A Modular Cloning System for Standardized Assembly of Multigene Constructs. PLoS ONE, 6(2), 16765. https://doi.org/10.1371/journal.pone.0016765.