

一次代謝と二次代謝の切り替えスイッチ

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カビの二次代謝遺伝子の多くは一般的な実験室培養条件下では休眠状態にあることが明らかとなっている。これらの休眠遺伝子を覚醒させる戦略の一つとして、複数の二次代謝遺伝子を制御している制御因子の探索が挙げられる。今回は二次代謝遺伝子のみならず一次代謝遺伝子を含む多くの遺伝子を制御している転写因子が発見されたという論文を紹介する。この転写因子は一次代謝を促進し、二次代謝を抑制するというスイッチとしての機能を果たしている可能性が示された。

紹介論文

Transcription factor Xpp1 is a switch between primary and secondary fungal metabolism
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要旨

Fungi can produce a wide range of chemical compounds via secondary metabolism. These compounds are of major interest because of their (potential) application in medicine and biotechnology and as a potential source for new therapeutic agents and drug leads. However, under laboratory conditions, most secondary metabolism genes remain silent. This circumstance is an obstacle for the production of known metabolites and the discovery of new secondary metabolites. In this study, we describe the dual role of the transcription factor Xylanase promoter binding protein 1 (Xpp1) in the regulation of both primary and secondary metabolism of *Trichoderma reesei*. Xpp1 was previously described as a repressor of xylanases. Here, we provide data from an RNA-sequencing analysis suggesting that Xpp1 is an activator of primary metabolism. This finding is supported by our results from a Biolog assay determining the carbon source assimilation behavior of an *xpp1* deletion strain. Furthermore, the role of Xpp1 as a repressor of secondary metabolism is shown by gene expression analyses of polyketide synthases and the determination of the secondary metabolites of *xpp1* deletion and overexpression strains using an untargeted metabolomics approach. The deletion of Xpp1 resulted in the enhanced secretion of secondary metabolites in terms of diversity and quantity. Homologs of Xpp1 are found among a broad range of fungi, including the biocontrol agent *Trichoderma atroviride*, the plant pathogens *Fusarium graminearum* and *Colletotrichum graminicola*, the model organism *Neurospora crassa*, the human pathogen *Sporothrix schenckii*, and the ergot fungus *Claviceps purpurea*.