

## Crystal structure of methylenetetrahydrofolate reductase (MTHFR) from *Sphingobium* sp. SYK-6

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$N^5$ -methyltetrahydrofolate (5-CH<sub>3</sub>-THF) is the most important folate derivative in one-carbon metabolism, which is involved in nucleic acid and amino acid synthesis. 5-CH<sub>3</sub>-THF can be transported into cells through a folate receptor and functions as a methyl donor for methionine metabolism, which synthesizes AdoMet serving as a major methyl donor for DNA/histone methylation. In most organisms, 5-CH<sub>3</sub>-THF is generated from  $N^5$ ,  $N^{10}$ -methylene tetrahydrofolate (5,10-CH<sub>2</sub>-THF) reversibly by methylenetetrahydrofolate reductase (MTHFR). However, in the gram-negative bacterium *Sphingobium* sp. SYK-6, which grows on lignin-derived aromatic compounds as a sole carbon energy source, MTHFR (S6MTHFR) catalyzes a conversion of 5-CH<sub>3</sub>-THF to 5,10-CH<sub>2</sub>-THF irreversibly. We speculated that the difference of catalytic-reaction characters between MTHFR and S6MTHFR arise from their structural differences. To investigate the molecular mechanism of the irreversible reaction of S6MTHFR, we initiated a crystallographic study of S6MTHFR. S6MTHFR was overexpressed in *E. coli* BL21, and purified by anion exchange and size exclusion chromatography. From 4L culture of *E. coli*, 25 mg of S6MTHFR could be obtained. We have succeeded in crystallization of S6MTHFR and collected diffraction data for native SAD phasing at BL-1A of Photon Factory (Tsukuba, Japan). Details of the S6MTHFR structure will be described in the poster presentation.