

ABSTRACTS (MASTER THESIS)

Studies of lignan *O*-demethylase from a human intestinal bacterium, *Blautia producta* ATCC27340

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Abstract

A lignan glycoside, secoisolariciresinol diglucoside (SDG), is one of the most abundant dietary lignans. After oral administration of SDG, SDG is converted into the mammalian lignans, enterodiols (ED) and enterolactone (EL), by human intestinal bacteria ^[1] (Figure. 1). The mammalian lignans are lignan-type phytoestrogens and contribute the reduction of risk of breast cancer in females. Elucidation of the formation mechanism for mammalian lignans could be useful for further reduction of risk of breast cancer. In addition, the *O*-demethylation and dehydroxylation of aromatic rings in mammalian lignan formation attract a great attention because these reactions are essential for eliminating methoxyl substitutions in aromatic monomers or oligomers derived from depolymerized lignin in lignin biorefineries. To date, few human intestinal bacterial species including *Eubacterium limosum* and *Blautia producta*, have been known to catalyze *O*-demethylation, and very recently a tetrahydrofolate-dependent secoisolariciresinol (SIR) *O*-demethylase has been identified in *E. limosum* ZL-II ^[2]. Thus far, other *O*-demethylases have not been identified, and much information remain elusive. Therefore, we aimed at identifying a lignan *O*-demethylase in *B. producta* ATCC27340.

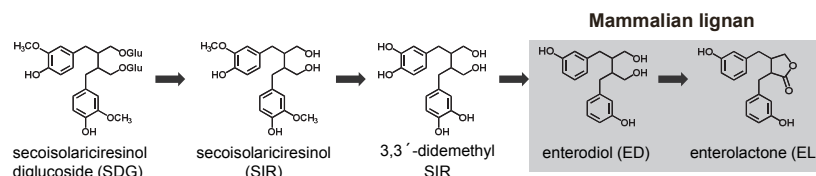


Figure 1. SDG transformation by human intestinal bacteria

The author's previous bioinformatic study suggested that the lignan *O*-demethylase reaction was catalyzed by a tetrahydrofolate-dependent *O*-demethylase system, composed of methyltransferase I (MT I), methyltransferase II (MT II), a corrinoid protein (CP), and an activating enzyme (AE) ^[3], which is independently reported of [2]. Furthermore, the author found an *O*-demethylase gene cluster encoding the four components in *B. producta* ATCC27340 genomic sequences ^[3]. In this present study, the author shows that lignan *O*-demethylation occurred in liquid culture of the bacterium and that the recombinant proteins expressed in *Escherichia coli* catalyzed *O*-demethylation of SIR.

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References

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