Benzophenanthridine alkaloid production associated with mRNA expression level in *Eschscholtzia californica*

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Alkaloids belong to the broad category of secondary metabolites. They have historically been defined as naturally occurring substances that are not vital to the organism that produces them (1). The californica poppy (*Eschscholtzia californica*) is an ancient medicinal plant capable of producing several benzylisoquinoline alkaloids of pharmaceutical importance, including the antibiotic sanguinarine and protein kinase C inhibitor chelerythrine(2). Benzylisoquinoline alkaloids biosynthesis begins with the conversion of L-tyrosine to dopamine and involves several biosynthetic steps and reactions until branch-point intermediate (S)-reticuline. The first step of sanguinarine biosynthesis is the conversion of (S)-reticuline to (S)-scoulerine by the berberine bridge enzyme(BBE; Facchini et al., 1996a). Several cDNAs or genes encoding enzymes involved in benzylisoquinoline alkaloid biosynthesis have been isolated from opium poppy including tyrosine/dopa decarboxylase (TYDC; Facchini and De Luca, 1994), (*S*)-*N*-methylcoclaurine-3'-hydroxylase(CYP80B1; Huang and Kutchan, 2000), berberine bridge enzyme (BBE; Facchini et al., 1996a), (*S*)-norcoclaurine-6-*O*-methytransferase (6OMT; Facchini and S.U. Park, 2003), 3'-hydroxy-(*S*)-*N*-methyl-coclaurine-4'-*O*-methyltransferase (4'OMT; Facchini and S.U. Park, 2003) and (*S*)-coclaurine-*N*-methyltransferase (CNMT; Facchini and S.U. Park, 2003)(3). We constructed several probes of enzymes associated with benzylisoquinoline alkaloids biosynthesis by PCR and compared the level of several genes' transcription after elicitation. We also investigated several metabolites' productivity by high performance liquid chromatography after fungal elicitation. It gave us the relationship between transcription level and metabolite production level, which can be expected to offer the critical information about the bottleneck in sanguinarine production pathway. Our data will also provide insight into the

complex regulation of benzylisoquinoline alkaloids biosynthesis in californica poppy.

References

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