Metabolic Profiling in the Specific cells of Capitate-Stalked Trichomes of Medicinal Cannabis

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Introduction

Cannabis sativa belongs to the family of Cannabaceae and is originally spread from Eastern or Central Asia. It has long been used as a medicine in Asia, mainly in India, before the Christian era. Because of their biological activities, cannabinoids are the most studied and interesting compound class in this plant.

Recently some researchers tried to obtain more knowledge of the cellular localisation of the cannabinoid biosynthesis with focus on trichomes. Trichomes are small protrusions of epidermal on the surfaces of leaves and other organs of plants. In C. sativa, trichomes are the main site of compounds storage and cannabinoids production, and classified into three types, namely bulbous, capitate-sessile and capitate-stalked trichomes. The presence of genes related to cannabinoids biosynthesis has been identified in the head of capitate-stalked, however the function of the stem of capitate-stalked is not known yet.

With regard to the unclear cannabinoids biosynthesis in the trichomes, here we reported a metabolic profiling analysis on the specific cells of trichomes at flowering period, particularly on the head and stem of capitate-stalked, and intact capitate-stalked. Dissections of the specific cells of trichomes were conducted using laser microdissection microscopy (LMD) and the metabolites were analyzed with liquid chromatography-mass spectrometry (LCMS).

Experiments

[Diagram of experimental workflow]

Results

[Graphs showing MRM Ion Chromatograms in Negative and Positive Mode Measurements]

Conclusions

- LMD combined with LCMS have been used successfully for analyzing cannabinoids in the specific cells of capitate-stalked trichomes.
- Cannabinoids profiles on the head of capitate-stalked, stem of capitate-stalked, and intact capitate-stalked qualitatively did not differ significantly over the flowering period. THCA, CBDA, CBGÁ, THC, CBD, CBN were identified in all samples, while CBC and CBN also could be detected in the intact capitate-stalked and head of capitate-stalked at week 8.
- The discovery of cannabinoids in the stem of capitate-stalked is new and confirms the appearance of other spots for cannabinoid production beside the head of capitate-stalked. Moreover this result suggests that the stem of capitate-stalked plays an important role in cannabinoid biosynthesis.

References

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