Biotransformation of Curcumin and its Analogs by *Rhizopus Oryzae* and *Beauveria Bassiana*

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Introduction

Curcumin is a polyphenol that is derived from *Curcuma longa* L. rhizomes.[1] The yellow spice is seen in a variety of traditional Asian curries, and it possesses a wide range of pharmacological activities such as anti-inflammatory, anti-oxidant, wound healing, anti-microbial effects, and cancer chemopreventive activities.[2-4] Recent studies have demonstrated that curcumin analogs show inhibitory effect on angiogenesis, which is the growth of new vascular capillary channels from preexisting vessels.[3] In our ongoing search for new chemical agents for the treatment of chronic inflammation and cancer, analogs of curcumin were prepared by chemical and microbial means.

Experimental

The extracts from the fermentations of curcumin with *Beauveria bassiana* ATCC 7159 and *Rhizopus oryzae* ATCC 11145 were purified on silica gel columns. ^{1}H, ^{13}C, and 2D NMR spectra for the curcumin analogs were recorded on a Bruker Avance II 600 MHz NMR spectrometer (equipped with 5 mm probe) located in the ARMIS facility. The compounds will be tested for chemopreventive and anticancer effects at the University of Hawaii at Hilo.

Results and Discussion

Curcumin was incubated with the microbial cultures of *B. bassiana* and *R. oryzae* (Fig. 1). Five metabolites were obtained from the former fermentation and also five from the latter. Four of the metabolites were produced in both fermentations along with a new metabolite. Curcumin and it metabolites are currently being assessed for bioactivities in a series of bioassays including but not limited to the induction of quinone reductase (QR), inhibition of TNF-α activated nuclear factor kappa B (NFκB), inhibition of aromatase, interaction with retinoid X receptor (RXR), and inhibition of nitric oxide (NO) synthase.

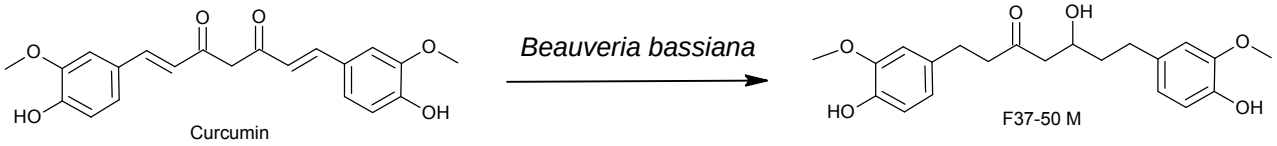

Fig. 1. Incubation of curcumin with *Beauveria bassiana*.

Conclusions

The biotransformation of curcumin by *B. bassiana* and *R. oryzae* afforded one new and five known metabolites. Assessment of their biological activities are currently in progress. The Avance-III-600 ("Silver 600") NMR instrument with 5-mm BBO probe greatly aided in the elucidation of the sample-limited natural products.

Acknowledgements

We thank the External User Program of NHMFL at the Advanced Magnetic Resonance Imaging and Spectroscopy (AMRIS) facility at the McKnight Brain Institute (MBI) of the University of Florida. Special thanks to Mr. James Rocca for assistance in acquiring NMR data. Funding was obtained from the NHMFL, the American Chemical Society (ACS) Project SEED program, the Hillsborough County Public Schools Academic Programs, and the ACS Tampa Bay local section.

References

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