

[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [AS](#)[Indexing](#) [View Papers](#) [Aims & Scope](#) [Editorial Board](#) [Guideline](#) [Article Processing Charges](#)[AS](#) > Vol.3 No.1, January 2012

OPEN ACCESS

## Liver cytochrome P450 system as affected by endophyte-infected tall fescue seed extracts and ergot alkaloids

PDF (Size: 45KB) PP. 1-4 DOI: 10.4236/as.2012.31001

### Author(s)

Ali S. Moubarak, Zelpha B. Johnson, Charles F. Rosenkrans Jr.

### ABSTRACT

Endophyte infected tall fescue (E+) is the base diet for nearly all beef cattle in the southern USA. It has been linked to a variety of toxicological conditions due to the presence of large numbers of ergot alkaloids. This study was designed to investigate the effects of E+ seed extract and selected ergot alkaloids on the detoxification pathway by cytochrome P450 (CYP3A4) enzyme system. Tests were performed using the P450- Glo CYP3A4 enzyme activity kit (Promega, WI), according to the manufacturer's manual. Luminescence was measured using a single tube TD20/20 luminometer. Endophyte infected tall fescue seed was extracted with 50/50 methanol/25 mM ammonium carbonate, cleaned and concentrated on Strata-X reversed phase column (Phenomenex). The extracts were evaluated on an HPLC, and then tested using a serial dilution method. Commercially available ergonovine (EN), ergocorine (ER), bromocryptine (BC) and ergocryptine (EC) were tested individually using 0 to 44 nM concentrations. Seed extract of E+ produced a significant ( $P < 0.05$ ) dose dependent inhibition of CYP3A4 enzyme activity similar to that produced by the commercially available ergot alkaloids EC, ER, BC and EN which inhibited CYP3A4 enzyme activity in a significant ( $P < 0.05$ ) dose dependent manner with EC being most potent, followed by ER, BC, and then EN (70%, 40%, 30% and 10% at 44 nM concentration). The similarity of the inhibition curves of seed extract to that of the commercially available ergot alkaloids suggests a related mode of action and that the use of such ergot alkaloids and CYP3A4 assay is a good model to study the toxicity of tall fescue. Furthermore, it provides the foundation to identify the individual toxic components of purified endophyte infected tall fescue extract.

### KEYWORDS

Seed Extract; Tall Fescue; CYP3A4; Ergot Alkaloid

### Cite this paper

Moubarak, A. , Johnson, Z. and Rosenkrans Jr., C. (2012) Liver cytochrome P450 system as affected by endophyte-infected tall fescue seed extracts and ergot alkaloids. *Agricultural Sciences*, 3, 1-4. doi: 10.4236/as.2012.31001.

### References

- [1] Porter, T.D. and Coon, M.J. (1991) Cytochrome P-450. Multiplicity of isoforms, substrates, and catalytic and regulatory mechanisms. *Journal of Biological Chemistry*, 266, 13469-13472.
- [2] Pollock, B.G. (1994) Recent developments in drug metabolism of relevance to psychiatrists. *Harvard Review of Psychiatry*, 2, 204-213. doi:10.3109/10673229409017138
- [3] Ball, S.E., Maurer, G., Zollinger, M., Ladona, M. and Vicker, A.E. (1992) Characterization of the cytochrome P-450 gene family responsible for the N-dealkylation of the ergot alkaloid CQA 206-291 in humans. *Drug Metabolism and Disposition*, 20, 56-63.
- [4] Moochhala, S.M., Lee, E.J., Hu, G.T., Koh, O.S. and Becket, G. (1989) Effects of bromocryptine on hepatic cytochrome P-450 monooxygenase system. *Japanese Journal of Pharmacology*, 49, 285-291. doi: 10.1254/jjp.49.285
- [5] Witkamp, R.F., Nijmeijer, S.M., Monshouwer, M. and Van Miert, A.S. (1995) The antibiotic tiamulin is a potent inducer and inhibitor of cytochrome P4503A via the formation of a stable metabolic

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[AS Subscription](#)[Most popular papers in AS](#)[About AS News](#)[Frequently Asked Questions](#)[Recommend to Peers](#)[Recommend to Library](#)[Contact Us](#)

Downloads: 138,710

Visits: 298,299

### Sponsors, Associates, and Links >>

[2013 Spring International Conference on Agriculture and Food Engineering\(AFE-S\)](#)

intermediate complex. Studies in primary hepatocyte cultures and liver microsomes of the pig. Drug Metabolism and Disposition, 23, 542- 547.

- [6] Moubarak A.S., Rosenkrans, C.F. Jr. and Johnson, Z.B. (2003) Modulation of Cytochrome P450 Metabolism by Ergonovine and Dihydroergotamine. Veterinary & Human Toxicology, 45, 6-9.
- [7] Strickland, J.R, Cross, D.L, Jenkins, T.C., Petroski, R.J. and Powell, R.G (1992) The effect of alkaloids and seed extracts of endophyte-infected tall fescue on prolactin secretion in an in vitro rat pituitary perfusion system. Journal of Animal Science, 70, 2779-2786.