study was conducted in an attempt to optimize the fermentation parameters for *T. matsutake* and its active ingredients by using statistical and mathematical techniques.

Methods Chemometrics methods were employed to optimize the fermentation medium and conditions. Based on a single-factor optimization strategy, suitable carbon and nitrogen sources were obtained. The key medium components were then identified using a Plackett-Burman design (PBD) and further optimized using a Box-Behnken design (BBD). Response surface methodology (RSM) was further used to optimize the experimental results obtained from BBD. Based on the optimum medium, the culture conditions were further optimized using a single-factor optimization strategy.

Results The optimum components of nutrient medium comprised (g/L): glucose 43.2, peptone 26.9, $NaNO_3$ 0.18, $(NH_4)_2SO_4$ 0.36, KH_2PO_4 2.0, $MgSO_4$ 7 H_2O 0.5, and vitamin B1 0.15. The best production of mycelium was 22.66 g/L, which was 59% higher than that of the original culture. The suitable culture conditions were: initial pH 4.25, temperature 26° C, culture time 6 days, seed age 3 days, rotating speed 225 rpm, inoculation amount 5%, and 75 mL liquid volume in a 250 mL flask. The best production of mycelium was 24.2 g/L, which was 7.0% higher than that of the original culture.

Conclusions In this study, we used chemometrics methods to optimize the fermentation medium and conditions for *T. matsutake*. Our finding provides experimental evidence that PBD, BBD and RSM are effective tools for mathematical modeling and factor analysis of a medium optimization process.

10 EFFECTS OF *EUPATORIUM ADENOPHORUM* (FLAVONOIDS) IN THE RAT MODEL OF BENIGN PROSTATIC HYPERPLASIA

Mingsan Miao*, Tan Wang, Jing Liu, Lin Guo. *Department of Pharmacology, Henan University of Chinese Medicine, Zhengzhou, China*

10.1136/jim-2016-000328.10

Objectives This study investigated the effect of total flavonoids on benign prostatic hyperplasia (BPH) rats though the administration of Lycopus decoction and *Eupatorium adenophorum*.

Methods Ninety male Wistar rats, weighing 280–300 g, received an intraperitoneal injection of hydrazine hydrate, and the testes were removed bilaterally. Another 10 rats underwent a sham operation. Intramuscular injections of penicillin 200 000 units/kg were given. The rats were randomly and evenly divided into a control group, model group, Longbishu group, large, medium and small doses of Lycopus decoction groups, and large, medium and small doses of *E. adenophorum* flavonoids groups. On the 8th day after castration, rats were injected with testosterone propionate 4 mg/kg/day and irrigated with large, medium and small water decoctions of *E. adenophorum* (4 g/kg, 2 g/kg and 1 g/kg, 0.2 mL/100 g), large, medium and small doses of total *E. adenophorum* flavonoids (400 mg/kg, 200 mg/kg and 100 mg/kg, 0.2 mL/100 g) and Longbishu capsule suspension (300 mg/kg, 0.2 mL/100 g). The model group and blank control group were given the same volume of normal saline, continuing for 30 days. Then 2 hours after the last administration, the rats were weighed and euthanized. Prostate tissue was removed, the wet weight was measured, and the prostate index was calculated. Testosterone and oestradiol levels in prostate homogenate, and the levels of bFGF, TGF-β1, IGF-I and EGF were determined. Other samples of prostate tissue were fixed in formalin solution, and cytological morphology was examined under a light microscope.

Results *E. adenophorum* water decoction and total flavonoids significantly reduced the rat prostate index, decreased serum testosterone levels, increased serum oestradiol levels, decreased bFGF, EGF and IGF levels in the rat prostate, elevated TGF-β1 levels, reduced rat prostate density, and increased the specific surface area.

Conclusions The results of this study showed that treatment of benign prostatic hyperplasia (BPH) had a good effect and suggest a new therapy for BPH.

Acknowledgments This research was financially supported by the Henan University of Chinese Medicine Graduate Student Innovation Fund (Grant No. 2014YCX011) and Research Topics of Traditional Chinese Medicine in Henan Province (Grant No. 2014ZY02007).

11 RESEARCH STATUS AND DEVELOPMENT TRENDS IN NAVEL THERAPY

Mingsan Miao*, Xiaoli Yan, Huan Li, Tang Wang. *Department of Pharmacology, Henan University of Chinese Medicine, Zhengzhou, China*

10.1136/jim-2016-000328.11

Objectives This article summarizes the modern development of navel therapy, analyses future trends and puts forward suggestions for future development.

Methods This paper provides a history of the development of navel therapy, describes the theory of traditional Chinese medicine and reports the clinical application of umbilical therapy in detail.

Results The author describes some problems in modern navel therapy development, for instance there is no unified national standard and proprietary Chinese medicine products are not listed or promoted.

Conclusions Navel therapy is a unique TCM treatment. Doctors apply the particular drug externally to the navel or to the appropriate external stimulus on the navel in order to treat disease. This method is also called 'green therapy'. In future research, we will apply modern science and technology to explore the mechanisms of navel therapy, establish an optimization scheme for navel therapy and develop a unified national standard to promote this traditional Chinese treatment worldwide.

Acknowledgments This research was financially supported by the Henan Province Outstanding Scientific and Technological Innovation Team (Grant No. TCJ2014-391), Natural Science Foundation of Henan Province (Grant No. 132300410019) and Zhengzhou Science and Technology Innovation Team (Grant No. 131PCXTD612).

12 EXPERIMENTAL STUDY ON THE EFFECT OF *PERILLA* SEED IN THE RAT MODEL OF ASTHMA

Yan Li, Tang Wang, Tao Yu, Peng Xi, Mingsan Miao*. *Department of Pharmacology, Henan University of Traditional Chinese Medicine, Zhengzhou, China*

10.1136/jim-2016-000328.12

Objectives To investigate the effects of *Perilla* seed in the rat model of bronchial asthma.

Methods To observe the effect of ovalbumin (OVA) on the behavior of rats, NO and IL-6 levels in serum and in the lungs were measured using aluminium hydroxide sensitisation and an