

medicinal herbs, and some natural agents. This study aims to discuss several aspects of natural medicines for treating liver problems.

Methods Electronic databases including Web of Science and PubMed were searched for in vitro, in vivo and clinical studies on the effects of natural medicines on liver problems.

Results Nearly half of the natural medicines used in treatment of liver diseases today are natural products and their derivatives. Sho-saiko-to is effective on hepatitis, liver fibrosis, and HCC. But long-term consumption of this herb drug may lead to interstitial pneumonia and even acute respiratory failure. *Silybum marianum* is a hepatoprotective agent and long-term use of this herb was considered to be safe. Some other natural medication, such as long pepper, holy basil, coffee, apple, and citrus, for example, have hepatoprotective effect, but more in-depth studies are required to confirm the dosages of each agent to avoid side effects when using them to treat liver problems.

Conclusions Naturopathy is becoming more popular worldwide and provides benefits to many patients with liver diseases such as hepatitis, liver cirrhosis and liver cancer. The integration of conventional and naturopathic medicine will produce a practice style that provides excellent medical care for the liver.

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19 DELIVERY OF 1,2-DIHYDROQUINOLINES VIA TRANSFERRIN-TARGETED LIPOSOMES

¹Yan Liu, ^{1,2}Robert J Lee, ¹Lesheng Teng, ¹Lirong Teng*. ¹School of Life Sciences, Jilin University, Changchun, China; ²Division of Pharmaceutics, College of Pharmacy, The Ohio State University, Columbus, OH, USA

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Objectives Quinolines have been shown to have anticancer activities. This study investigates delivery of a novel quinolone using liposomes targeted to cancer cells.

Methods A 1, 2-dihydroquinoline was loaded into transferrin-targeted liposomes. Lipids (6.0 μmol), HSPC, cholesterol and PEG-DSPE in the ratio 63:36:1, and 0.5 μmol 1, 2-dihydroquinoline were dissolved in ethanol. An ethanol injection method was used to prepare transferrin-targeted liposomes. Mean particle size and ζ potential measurements, cytotoxicity assay, flow cytometry and confocal microscopy were performed.

Results The mean particle size of transferrin liposomes was 124 ± 2.7 nm. The ζ potential was -6 ± 1.2 mV. Transferrin-targeted liposomes showed high cytotoxicity for tumour cells. In competitive binding assays, the uptake from transferrin-targeted liposomes was inhibited 78% by 10 nM holo human transferrin. Flow cytometry and confocal microscopy analyses indicated that association of transferrin-targeted liposomes to tumour cells was much greater than that of non-targeted liposomes.

Conclusions We have identified a 1, 2-dihydroquinoline as a potential anticancer agent. Furthermore, this compound can be efficiently loaded into transferrin-targeted liposomes for targeted delivery to tumour cells. These data suggest that transferrin-targeted liposomes carrying 1, 2-dihydroquinoline are a potential anticancer agent for clinical application.

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20 THE HYPOLIPIDEMIC EFFECT OF *SOPHORA JAPONICA* POWDER ON A MOUSE MODEL OF HYPERLIPIDAEMIA

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

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Objectives To investigate the hypolipidemic effect of *Sophora japonica* powder on a mouse model of hyperlipidaemia.

Methods A hyperlipidaemic mouse model was established by feeding mice with a high fat diet and a fat emulsion complex, factors which produce hyperlipidaemia. At the same time, large, medium and small doses of *S. japonica* powder were administered for 10 days and serum total cholesterol (TC), triglycerides (TG), HDL-C and LDL-C were measured.

Results A hyperlipidaemia mouse model was successfully established. High, medium and low doses of *S. japonica* powder significantly decreased serum TC and TG levels ($p < 0.01$), significantly increased HDL-C levels ($p < 0.01$) and significantly reduced serum LDL-C levels ($p < 0.01$). Low doses of *S. japonica* powder significantly reduced serum LDL-C levels ($p < 0.05$).

Conclusions *S. japonica* powder has an obvious hypolipidemic effect on mice with hyperlipidaemia, can effectively regulate lipid metabolism and has a therapeutic effect on hyperlipidaemia.

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21 ANALYSIS OF THE CHARACTERISTICS OF HEMORRHOIDS MODELS

Mengfei Zhang, Mingsan Miao*, Peng Xi, Liling Xiang. Department of Pharmacology, Henan University of Traditional Chinese Medicine, Zhengzhou, China

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Objectives Based on the characteristics of the clinical symptoms of hemorrhoids and analysis of the corresponding animal model, treatment methods are proposed.

Methods The clinical diagnosis of hemorrhoids and the therapeutic effects of Chinese medicine and Western medicine were analyzed and the establishment and characteristics of the current animal model were summarized. The current animal model and clinical symptoms of anastomosis were analyzed and discussed in relation to clinical symptoms and standards.

Results In Western medicine, hemorrhoids are divided into external, internal and mixed hemorrhoids. There are three research models of inflamed external hemorrhoids: the croton oil and carrageenan anal edema model, the acetic acid bacteria and ulcer model, and the anal skin trauma model. The blood stasis type model is used for thrombotic external hemorrhoids. The esophageal varices model is mainly used for internal hemorrhoids. Mixed hemorrhoid models include the inferior rectal vein occlusion model and the ligation of hemorrhoids model. The above models are only approximate models of hemorrhoids as there are large differences in clinical incidence and the degree of anastomosis. More effective models of hemorrhoids must be produced, combining clinical pharmacology and related research. In addition, our laboratory has long been engaged in the study of

Chinese medicine for the prevention and treatment of hemorrhoids. Research on hemorrhoid models must be strengthened in the future, and clinical close contact maintained.

Conclusions Existing animal models, in addition to the soybean oil model, are based on low quality and inadequate modeling, and are biased towards Western medicine, ignoring the combination of symptoms used in traditional Chinese medicine. The soybean oil model has good development prospects and should be improved.

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22 IMPROVED STABILITY AND RELEASE BEHAVIORS OF RHGH IN PK3/PLGA MICROSPHERES WITH DIFFERENT PK3/PLGA RATIOS

¹Chengguo Zhao, ¹Shuzhi Qin, ¹Liyang Wang, ¹Ruwen Yuan, ¹Jing Li, ^{1,2}Lirong Teng*. ¹Zhuhai College, Jilin University, Zhuhai, China; ²College of Life Science, Jilin University, Changchun, China

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Objectives We designed a series of formulations of rhGH PK3/PLGA microspheres with different PK3/PLGA ratios to improve the stability and incomplete release of rhGH with the aim of achieving long-acting sustained-release rhGH microspheres. PK3 can undergo acid-catalyzed hydrolysis into low molecular weight hydrophilic compounds and release encapsulated drugs at an accelerated rate in acidic environments. PK3/PLGA microspheres effectively avoided the influence of the acidic environment produced by the degradation of PLGA on rhGH stability and solved the problem of difficult release of denaturated rhGH. The microspheres improved the poor mechanical properties of PK3 microspheres due to low molecular weights.

Methods We used a W/O/W double-emulsion technique to prepare rhGH microspheres. Briefly, 100 μ L of 40 mg/mL rhGH was dissolved in 2 mL of acetone/methylene chloride solution (0.8:1.2) containing PK3/PLGA blends and homogenized at 6000 rpm for 120 s in an ice bath. The primary emulsion was injected into an aqueous solution containing 0.5% (w/v) PVA and 3% (w/v) NaCl and homogenized at 6000 rpm for 120 s. Microspheres were obtained by evaporating the organic solvents and centrifuging at 5000 rpm. We investigated the effects of different PK3/PLGA ratios (10:0, 8:2, 6:4, 5:5, 4:6, 2:8, 0:10) and the buffer pH value (pH 4.5, pH 7.4) on the in vitro release of rhGH microspheres. We studied the structural stability of rhGH in release medium and inside the microspheres.

Results Native PAGE results revealed the microspheres displaying enhanced structural stability of rhGH with a neutral microenvironment compared with PLGA microspheres. With an increase in PK3 ratios, the microspheres showed reduced incomplete release and increased total release of rhGH. When the PK3/PLGA ratios were above PK3-PLGA mass ratio 5:5, the mixing microspheres had a low balling rate and irregular form.

Conclusions The optimal ratio of PK3/PLGA was 3:7, producing significant rhGH stability and an in vitro release profile with less burst release and extended sustained release.

23 USING A HYBRID PSO-BP MODEL TO PREDICT SURVIVAL RATE AFTER PARTIAL HEPATECTOMY

¹Zhenling Liu*, ²DE GE JI RI FU, ³Huajun Tu. ¹Henan University of Technology, Zhengzhou, China; ²The Fourth Affiliated Hospital of Nanchang University, Nanchang, China; ³Department of Neurology, the Second Affiliated Hospital of Nanchang University, Nanchang, China

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Objectives Hepatocellular carcinoma (HCC) is the fifth most common cancer worldwide, and is the second most frequent cause of death from cancer. Partial hepatectomy is the standard curative treatment for HCC and has a 5-year survival rate of over 50%. However, given a high 5-year postoperative recurrence rate of approximately 40–70%, it is important to accurately predict survival rate after partial hepatectomy so that high-risk patients can be screened and decisions made on adjuvant therapy. Therefore, this study proposed a hybrid PSO-BP model for the prognosis of early HCC after partial hepatectomy.

Methods Data on patients who were operated on between 2006 and 2015 were collected and prospectively studied. These data were randomly divided into a training set (75%) and a validation set (25%). Using the risk factors significantly related to survival in a multivariable Cox analysis model, the hybrid PSO-BP model which integrates BP's non-linear capability and PSO's global search ability was employed to predict survival rate after liver resection, the results were compared with the traditional Cox proportional hazards model, and their performances were evaluated using the area under curve (AUC) and CI (indicates confidence).

Results Six factors including tumor size, tumor number, alpha-fetoprotein (AFP), microvascular invasion (MVI), tumor capsule and survival time were identified as significant risk factors based on linear regression analysis using the Cox model and were selected as input variables for the proposed hybrid PSO-BP model. Model evaluation results show that the proposed PSO-BP model demonstrates better performance with a larger AUC (0.887, $p = 0.0102$) and higher 95% CI: (0.771 to 0.845) than that of the traditional Cox proportional hazard model (AUC: 0.816; 95% CI: 0.667 to 0.794) during the training period. This finding was confirmed by the validation set.

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Healthcare Informatics

24 MICROWAVE ABLATION THERAPY FOR HEPATOCELLULAR CARCINOMA

Ningning Yang, Yongsong Guan*, Qing He, Fei Xiong. Department of Oncology, West China Hospital of Sichuan University, Chengdu, China

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Objectives Hepatocellular carcinoma (HCC) is the fifth most common cancer and the second leading cause of cancer-related deaths worldwide. Microwave ablation is regarded as a safe and effective therapy for the treatment of HCC and has gained considerable attention as a rapidly expanding curative ablation