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Frontier Research in Drug Design and Medicinal Chemistry

This supplement on Frontier Research in Drug Design and Medicinal Chemistry carries selected abstracts presented in the International Conference on Biomedicine and Pharmaceutics (ICBP 2017), held in Zhuhai, China during Dec.15-17, 2017. The conference aimed to provide an opportunity for researchers, practitioners, and educators to exchange research evidence, practical experiences, and innovative ideas on issues related to biomedicine and pharmaceutics. It was a multidisciplinary conference that brought together academic and industrial scientists from medicine, biology, chemistry, Bio-informatics, and statistics.

The purpose of this supplement is to provide a forum for presenting current research to help generate future research directions in Drug Design and Medicinal Chemistry for developing academically challenging. In response to Call for Papers for this supplement, 325 abstracts within the topic were received and out of those 201 abstracts were accepted. The selection criteria were originality, relevance and technical and practical contribution. The submissions are thus formally refereed, in the final format and would not be published elsewhere.

The ICBP committee hopes that the papers published in this issue would be of value to academic research and clinical practice and would provide a clearer sense of direction for further research, as well as inspiring researchers in the related research fields to explore more creative contributions. The committee would like to place on record their sincere thanks to the publisher and IJPS for this very special opportunity to contribute to a special supplement.

The committee wish to thank all the referees for their kind support and help. Finally, the committee would like to thank the authors for their contribution to this supplement. Without the support of the authors and the referees, it would have been impossible to prepare this supplement for our readers.

The Organizing Committee of ICBP

Column 1: Natural Medicines

1

ZINC (II)-EMODI COMPLEX: SYNTHESIS, SPECTRAL CHARACTERISATION, AND ANTIOXIDANT ACTIVITY

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Objectives Flavonoids are important natural antioxidants and free radical scavengers, and have been extensively studied because of their numerous biological activities. In addition, most of flavonoids are strong metal chelators which can chelate many metal ions to form different complexes. Those complexes are reported to have various important biological activities, and most of them exhibit higher antioxidant abilities than the ligand flavonoids.

Methods The complex formation between Emodi (E) and Zinc chloride ($ZnCl_2$) was studied using UV-Vis, IR and 1H NMR spectroscopic techniques. The scavenging effect on the superoxide radical ($O_2\cdot$), hydroxyl radical ($\cdot OH$), 1, 1-diphenyl-2-picrylhydrazyl (DPPH \cdot) were compared.

Results Zinc(II)-Emodi complex $ZnL_2\cdot 2H_2O$ [L=Emodi (1-OH group deprotonated)] has been synthesized and characterized by IR, 1H NMR, TG-DSC and UV-Vis spectroscopic techniques. It was shown that metal complexes are stronger than free Emodi for antioxidant activity.

Conclusions According to the studies above, both Emodi and Zinc (II)-Emodi complex have strong antioxidant activities, and the antioxidant ability of the complex is comparatively stronger than Emodi. Emodi mainly acts as a hydrogen atom transferring antioxidant in an oxidative process. However, after chelating Zn (II) ion, the ionization potential of the complex is obviously declined, indicating that the Zn (II) ion has more impact on the electron donating ability than on the hydrogen atom transferring ability of the complex. The complex will exert its antioxidant function through a way of combining hydrogen atom transferring and electron donating mechanism together.

Acknowledgements This research was financially supported by the Characteristic Innovation project of Ordinary Colleges and Universities in Guangdong in 2016 (Grand No. 2016KTSCX174) and Preponderant Discipline Program of Zhuhai city (Grand No. 2015YXXK08)..

2

SEPARATION AND IDENTIFICATION OF COMPOUNDS FROM ETHYL ACETATE EXTRACTION OF RUBIA ALATA ROXB

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Objectives The compounds from ethyl acetate extraction of *Rubia alata* Roxb. Were separated and identified to further investigate the bioactivities such as antioxidant, antibacterial, anticancer, and antiinflammatory etc. of the Chinese herb.

Methods Eight compounds from *Rubia alata* Roxb. Were effectively separated using the methods of adsorption column chromatography and thin layer chromatography. Then, the compounds were analyzed and identified using high performance liquid chromatography (HPLC), UV-Vis absorption spectrometry, Fourier transform infrared (FTIR) spectroscopy, mass spectrometry (MS), nuclear magnetic resonance spectroscopy (1H -NMR, ^{13}C -NMR) and element analysis.

Results The identified 8 compounds consist of 3 naphthoquinones including rubilacton, mollugin, and 3,4-dihydromollugin, 3 anthraquinones including 1,2-dihydroxy-anthraquinone, 1,3-dihydroxy-2-methyl anthraquinone, and 1-hydroxy-2-methyl anthraquinone, and 2 triterpenes including rubifolic acid and 3-O-acetyloleanolic acid. Among these compounds, naphthoquinones were the main components of the ethyl acetate extraction of *Rubia alata* Roxb.

Conclusions In this work, we have separated and identified 8 compounds from ethyl acetate extraction of *Rubia alata* Roxb. By instrumental analysis, including 3 naphthoquinones, 3 anthraquinones, and 2 triterpenes. It is useful to research the bioactivities of *Rubia alata* Roxb.

Acknowledgements This research was financially supported by the fund of the Key Laboratory for Processing of Sugar Resources of Guangxi Higher Education Institutes (Grant No. 2016TZYKF01)

3

IMMUNOMODULATORY EFFECT OF CAULIS SPATHOLOBI EXTRACTION IN CYCLOPHOSPHAMIDE-INDUCED IMMUNOSUPPRESSED MICE

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Objectives *Caulis Spatholobi* extraction (CSE), a multicomponent biochemical healthy herbal medicine, performs potential immunomodulatory effects in immune dysfunction. The present study was performed to evaluate the immunomodulatory effect of CSE in cyclophosphamide (CY)-induced immunosuppressive mice and investigate its underlying mechanisms.

Methods CSE was orally administrated every day for 28 days while CY (100 mg/kg) was intraperitoneally injected in every 7 days. The bodyweights, organ indices were measured after cervical dislocation. Cytotoxic activity of natural killer (NK) cells, lymphocyte proliferation, ELISA assay as well as Western blot assay were performed to test the immunomodulatory effect of CSE.

Results CSE significantly increased the bodyweights, spleen indices and thymus indices in CY-induced immunosuppressive mice in a dose-dependent manner. Otherwise, the increased transformation of T lymphocyte and cytotoxicity of NK cells were observed in spleen after CSE treatment. Furthermore, CSE apparently upregulated

the serum levels of IL-2, 6, 10 and IFN- α , γ and markedly enhanced the phosphorylation of IKK γ and NF κ B and which was completely reversed by pyrrolidine dithiocarbamate, one of NF κ B inhibitors, in spleen.

Conclusion Our data demonstrated that CSE possesses immunomodulatory effect and effectively regulates immunity-related cytokines through NF κ B signaling pathway.

Acknowledgements This work was supported by the collaborative innovation center Project of Zhuhai city (Grant No. 2015XTCX08).

4

COLD AND WARM NATURE OF ARECA CATECHU

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Objectives The ancient physicians have different view on the property of areca. Through literature review, this article discusses the theory of areca's property, so as to better serve clinical medication.

Methods To further explore the properties of areca through reference documentation and clinical application.

Result In clinical, areca has the most prescriptions for the treatment of thermal diseases, and the least prescription used to treat cold disease.

Conclusion Combined with the clinical application of areca and compatibility of prescription, and the author thinks that the property of areca may be cold which needs to be further discussion.

Acknowledgements This research was financially supported by National Natural Science Foundation of China (Grant No.: 8177140036).

5

A NOVEL FORMULATION OF WEILEXIN

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Objectives Active ingredient of Weilexin is prepared from *Herichium erinaceus* by deep fermentation and extraction. It has the function of regulating production of stomach acid and protecting gastric mucosa. The main ingredient in this medication is small-thorn *Herichium* polysaccharide. At the normal temperature of its water solubility is poor. Meanwhile, at 100°, its dissolution is slow. In the current formulation, the main ingredient of the granules is sucrose, which is not suitable for diabetic patients. Therefore, this project will modify the formulation of Weilexin by removing sucrose as an excipient.

Methods In this study, sucrose was replaced with a sweetener such as stevia, xylitol, or saccharin sodium for taste masking. The formulation was optimized based on the final taste of oral liquid, production cost, and the selection of excipients. Production process was also optimized.

Spray drying was used on polysaccharides extracts of *Herichium erinaceus*. To optimize the solubility of the drug, physical factors such as the shape and surface area of polysaccharide granules, the wettability, dispersion, stacking density and solubility of the granules were used as indexes, and the effects of choice of emulsifiers on the solubility were investigated.

Conclusions In the optimized process, the extract was spray-dried into powder and added to stevia at a ratio of 3:1. Meanwhile, 2-3 % phospholipids were used as emulsifiers to improve the solubility of drugs. The new granules dissolve in the water completely in <1 min. The new formulation is likely to expand the clinical application of Weilexin.

Acknowledgments This research was supported by Jilin Province Science and Technology Development Program (No. 20150520141JH) and the Special Projects of Cooperation between Jilin University and Jilin Province (No. SXGJSF2017 -1-1-(11)).

6

DETERMINATION OF TOTAL FLAVONOIDS IN HUSK OF PASSIFLORA EDULIS SIMS. BY HPLC

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Objectives To establish an effective method for the determination of total flavonoids in husk of *Passiflora edulis* Linn.

Methods A high performance liquid chromatography method was applied for the determination of total flavonoids in husk of *Passiflora edulis* Linn. Rutin was used as reference substance, Shimadzu Wondasil C18 (4.6×250 mm, 5 μ m) was used as chromatographic column, and anhydrous methanol (0.01 %), phosphoric acid (60:40, V/V) was used as the mobile phase with 1.0 ml/min of flow rate. In addition, the detection wavelength was set at 358 nm, and the injection volume was 10 μ l. Results Under the above conditions, regression equation of rutin standard curve was $Y=16.735x-13.208$ ($R^2=0.997$). Linear regression was good over a range of 2.0-50.0 μ g/ml. The average recovery rate was 97.5 % with 1.5 % of RSD. Total flavonoids in husk of *Passiflora edulis* determined using this method was 136.4 μ g/g.

Conclusions The developed HPLC method is characterized by simple, efficient, rapid, accurate, and repeatable. Thus, it is suitable for the determination of total flavonoids.

Acknowledgments This research was financially supported by the fund of the Key Laboratory for Processing of Sugar Resources of Guangxi Higher Education Institutes (Grant No. 2016TZYKF01).

7

ALPROSTADIL-LIPID NANOPARTICLES PREPARED THROUGH MICROFLUIDIC

CHIP-BASED TECHNOLOGY

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Objectives Alprostadil is a kind of prostaglandin, which is widely used in myocardial infarction, occlusive arteriosclerosis embolism. But the alprostadil intravenous injection can produce local irritation, some patients are difficult to tolerate. At the same time, because of its rapid metabolism in the body, the use of ordinary intravenous administration cannot effectively play a drug effect. Lipid nanoparticles, as a novel drug delivery system, can protect drugs, delay their degradation in the body, reduce dosage and reduce side effects. Microfluidic technology is a novel preparation approach for drug delivery, which can precisely control and manipulate the flow of liquids in micron size.

Methods In this study, we developed alprostadil-lipid nanoparticles using microfluidic chip-based technology. Alprostadil-lipid nanoparticles were prepared by a microfluidic method. The desired amount of alprostadil and egg phosphatidylcholine were dissolved in t-butanol (lipid ratio 1:50) at 30°. And the weak acid aqueous phase (pH 4.0) was made by 0.01 g of NaOH dissolved in 100 ml of water, 10 % sucrose as a freeze-dried protective agent was added and pH was adjusted with acetic acid. As shown in fig. 1, an alprostadil-lipid solution was injected at inlet 1 and aqueous phase were injected through inlets 2 and 3, with mixing occurring with the “Y”-juncture. Then the resulting alprostadil-lipid nanoparticles will pass through a S-channel.

Results Alprostadil-lipid nanoparticles made by microfluidic method had an excellent mean particle size (100 nm), which were smaller in particle size and had narrower size distribution compared to nanoparticles formed by bulk mixing. At the same time, the degradation products of prostaglandin were detected by high performance liquid chromatography with the contents of prostaglandin A1 and prostaglandin B1 below 1 %. With the free alprostadil significantly reduced, the alprostadil-lipid nanoparticles could reduce the vascular irritation, accelerate lipid metabolism and reduce the level of plasma triglyceride.

Conclusions In conclusion, nanoparticles prepared through microfluidic chip-based technology are promising vehicles for alprostadil delivery and warrant further investigation.

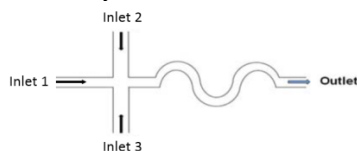


Fig. 1: Preparation of alprostadil-lipid nanoparticles using microfluidic chips

Acknowledgments This research was supported by Jilin Province Science and Technology Development Program (20170414039GH) and National Natural Science Foundation of China (No. 81502999).

8

HPLC ANALYSIS OF ORGANIC ACIDS IN THE LEAVES OF *AVERRHOA CARAMBOLA* L.

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Objectives To establish an effective method for the simultaneous analysis of organic acids from ethanol extraction of the leaves of *Averrhoa carambola* L.

Methods A high performance liquid chromatography (HPLC) method was used for the simultaneous analysis of 3 organic acids including oxalic acid, malic acid, and tartaric acid in the leaves of *Averrhoa carambola* L. The chromatographic column was Shimadzu Wondasil C18 (4.6×250 mm, 5 μm), mobile phase was 0.01 mol/l KH₂PO₄:acetonitrile (95:5, V/V), pH was adjusted to 3.0, flow rate was 1.0 ml/min, detection wavelength was 210 nm, and injection volume was 10 μl.

Results Good linear relationship between peak area and concentration was observed for each organic acid with a correlation coefficient $r > 0.999$, and the detection limits of oxalic acid, malic acid, and tartaric acid were 0.0002, 0.0003 and 0.0005 mg/ml, respectively. The content of oxalic acid was higher than that of the other two acids.

Conclusions The developed HPLC method is characterized by simple, reliable, and high precision. It is feasible for determination of organic acids in the leaves of *Averrhoa carambola* L.

Acknowledgments This research was financially supported by the fund of the Key Laboratory for Processing of Sugar Resources of Guangxi Higher Education Institutes (Grant No. 2016TZYKF01).

9

CAMPTOTHECIN-LOADED MAGNETIC NANOSPHERES FOR TARGETED CANCER THERAPY AND MAGNETIC RESONANCE IMAGING

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Objectives Magnetic targeting and rapid response to pH changes are often utilized for efficient intracellular drug delivery towards cancer therapy. In this work, ferrihydrous oxide nanoparticles-chitosan core-shell structured nanospheres with encapsulated camptothecin were fabricated for targeted cancer therapy and magnetic resonance imaging.

Methods Ferrihydrous oxide nanoparticles stabilized by oleic acid were synthesized using a one-pot synthetic method, which were reacted with N-hydroxysuccinimide and then conjugated with chitosan at amino sites. The

camptothecin was added into the aqueous acetic acid solution of ferrihydrous oxide nanoparticles-chitosan and was encapsulated via hydrophobic interaction, resulting in ferrihydrous oxide nanoparticles-camptothecin-chitosan nanospheres.

Results The ultralow toxic magnetic nanospheres had an average size of 36.3 ± 0.2 nm. The drug loading content and drug loading efficiency for the camptothecin was 4.73 ± 0.9 and 55.8 ± 3.6 %, respectively. The camptothecin release half-life was 4.2 h under conditions similar to intracellular environment of cancerous cells. The excellent superparamagnetic performance qualifies the nanospheres for magnetic targeting and magnetic resonance imaging.

Conclusions Magnetic ferrihydrous oxide nanoparticles-camptothecin-chitosan nanospheres capable of releasing camptothecin under acidic conditions and magnetic resonance imaging have been synthesized and evaluated. The nanospheres can be magnetically targeted to cancerous tumors and inhibit tumor growth. This study gives new insights into developing nanocomposite drug carriers for cancer therapy.

Acknowledgments This research was financially supported by Taizhou Science and Technology Project (1017GY15) and collaborative innovation center Project of Zhuhai city (Grant No. 2015XTCX08).

10 EXPANDED THE SCALE OF POLYETHYLENE GLYCOL-RECOMBINANT HUMAN GROWTH HORMONE (PEG-RHGH)

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Objectives A limitation of current recombinant human growth hormone treatment is the fact that it must be administered by daily injection because of its short circulating half-life. While conjugation with polyethylene glycol (PEGylation) is a widely used approach for improving the stability of recombinant human growth hormone, and also prolonged the half-life from 2 to 33 h. Polyethylene glycol-recombinant human growth hormone (PEG-rhGH) was made by GeneScience Pharmaceuticals Co., Ltd. However, the demand for this product exceeds the supply. Thus, the aim of our study was to increase the purification of PEG-rhGH and production to meet market demand.

Methods Briefly, the mixture of recombinant human growth hormone and activated polyethylene glycol were stirred at 100 rpm at 4° for 18 h to react completely. Branched polyethylene glycol (MW 40 Kd) was selected to decorate recombinant human growth hormone. The receptor binding rate was controlled to be less than 20 times of existing product. About 55 % of the product was coupled to N-terminals. The half-life was increased by 2 to 33 h.

Results The production of PEG-rhGH increased from 2000 per batch to 12 000 per batch through expanding production. The *in vivo* activity and purity of PEG-rhGH were improved to 6 IU/mg and above 96 %, respectively.

Conclusions Through optimization of production technique and expanding production, the production must have great market competitive strength.

Acknowledgements This research was financially supported by Jilin Province and Jilin University construction project (Grand No. SXGJSF2017-1-2(06)).

11 NANOSCALE BIOMATERIALS CA₁₀Na(PO₄)₇: INVERSE MICROEMULSION FABRICATION AND ANTIBACTERIAL PROPERTY

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Objectives Recently, it was found that the nanoscale Ca₁₀Na(PO₄)₇ (CNP) shows the low cytotoxicity and strong antibacterial characteristics in comparison with the conventional biomaterial hydroxyapatite (HA). The current work demonstrates a novel synthetic method to prepare CNP nanoparticles with low production cost, which can be a good candidate for drug delivery and surgical implants.

Methods CNP precursor has been prepared via an inverse microemulsion processing route, which uses cyclohexane as the oil phase, mixed butanol, cetyl trimethyl ammonium bromide as the surfactant phase, and the aqueous CaCl₂ solution, (NH₄)₂HPO₄ solution and NaOH solution as the water phase. The microemulsion-derived precursor was calcined at 800° and 1000° for some time, respectively. The X-ray diffraction and scanning electron microscopy further confirmed the composition, structure and morphology of the obtained CNP. The antibacterial attachment property of CNP and HA was investigated, *Escherichia coli* is used as a template.

Results X-ray diffraction analysis demonstrates that a high-purity crystalline CNP powder was obtained after calcination at 800°. The as-synthesized CNP is thermally stable without new phase after calcination at 1000°. Scanning electron microscopy analysis shows a significant refinement in the particle size with 100-200 nm. The antibacterial results indicate that the CNP has strong antibacterial characteristics compared with the HA.

Conclusions Our work exhibits that the microemulsion method results in the formation of a more homogeneous ultrafine CNP powder with low production cost. CNP with the better anti-*E. coli* property can be a potential biomaterial in orthopedics.

Acknowledgements This research was financially supported by Guangdong Provincial Department of Education Innovation Strong School Project (Grand No.2015KTSCX174), Zhuhai College of Jilin University Innovation Ability Cultivation Project (Grand No.2015KYKJXJ014) and Preponderant Discipline Program of Zhuhai city (Grand No. 2015YXXK08).

Column 2: Pharmaceutical Analysis

12

SEPARATION AND DETERMINATION OF PHENOLIC COMPOUNDS IN *PHYLLANTHUS NIRURI* LINN. BY CAPILLARY ELECTROPHORESIS

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Objectives To establish an effective method for the detection of phenolic compounds in *Phyllanthus niruri* Linn.

Methods A capillary electrophoresis (CE) method was employed for the simultaneous separation and determination of 5 phenolic compounds including corilagin, brevifolin, caffeic acid, ellagic acid, and gallic acid in *P. niruri* Linn. The effects of the buffer pH value and concentration; cetyl trimethyl ammonium bromide (CTAB) concentration; organic solvents concentration; and separation voltage on separation efficiency were investigated, respectively using reverse polarity mode, i.e. the anode was placed in the outlet side of the capillary and the cathode was in the inlet.

Results A good baseline separation of 5 phenolic compounds was produced using a background electrolyte of 0.4 mmol/l CTAB, 25 % acetonitrile, and 20 mmol/l sodium borate-phosphate buffer (pH 6.5), and -20 kV of the separation voltage. The calibration curves were linear from 1.0×10^{-6} to 2.0×10^{-4} mol/l for 5 phenolic compounds with relative standard deviations (RSDs) of less than 4.0 %.

Conclusions The developed CE method with reverse polarity mode is characterized by high efficiency, high precision, and short analysis time. Hence, it is feasible for assessment of phenolic compounds in *Phyllanthus niruri* Linn.

Acknowledgements This research was financially supported by Key Laboratory for Processing of Sugar Resources of Guangxi Higher Education Institutes (Grant No. 2016TZYKF01)

13 PREPARATION OF FERROUS SULFATE COATED SUSTAINED-RELEASE DROPPING PILLS

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Objectives Study on the formulation and preparation process of ferrous sulfate coated sustained-release dropping pills.

Methods Taking roundness, pill weight variation, coefficient of variation, cumulative release and appearance quality of dropping pills as an evaluation index, the optimum preparation technology of ferrous sulfate

coated sustained-release dropping pills were optimized by single factor and response surface method.

Results The proportion of drug and matrix of 1:4, the temperature of material to liquid was 85°, dropping distance was 8 cm for the best technical conditions of the dropping pills. The Film coating film forming agent for the ethyl cellulose, its concentration was 3 %; plasticizer dibutyl phthalate concentration was 0.6 %; induced pore forming agent was PEG4000, concentration of 0.15 %, with the coating weight of 3 %.

Conclusions The method of preparing ferrous sulfate coated sustained-release dropping pills was simple, practical, and the preparation had obvious sustained-release effect.

14 THE INVOLVEMENT OF MITOCHONDRIA-MEDIATED PATHWAY IN PROTECTIVE ACTION OF 18-GLYCYRRHETINIC ACID AGAINST GLUTAMATE-INDUCED PC12 CELLS APOPTOSIS

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Objectives The purpose of this study was to investigate the protection and mechanisms of 18-glycyrrhetic acid in glutamate-induced apoptosis of PC12 cells.

Methods In this study, PC12 cells were exposed to glutamate (20 mmol/l) to mimic apoptotic model. MTT assay kit was taken to evaluate the cell injury degree. Fluo 4 AM as the fluorescent probe was used for measuring the changes in the intracellular calcium concentration (Ca^{2+}). The lipophilic dye JC-1 can be used to evaluate the mitochondrial membrane potential (MMP). Western blot analysis was performed to detect the expression of Bcl-2 and Bcl-Xl in PC12 cells.

Results 18-Glycyrrhetic acid could remarkably exhibit a reduced ability to inhibit apoptosis in glutamate-induced PC12 cells. Moreover, 18-glycyrrhetic acid significantly reduced lactate dehydrogenase (LDH) leakage and promoted the cell viability. Particularly, 18-glycyrrhetic acid also stabilized MMP and intracellular Ca^{2+} , thus up-regulated Bcl-2 and Bcl-Xl expression.

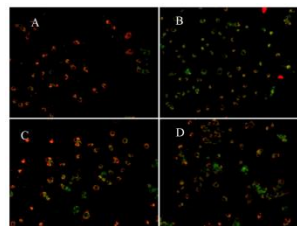


Fig. 1: The glycyrrhetic acid influence on mitochondrial transmembrane potential caused by Glu in PC 12 cells

A: Control; B. Glu; C. Glu+1 μ M GA; D. Glu+1 μ M GA

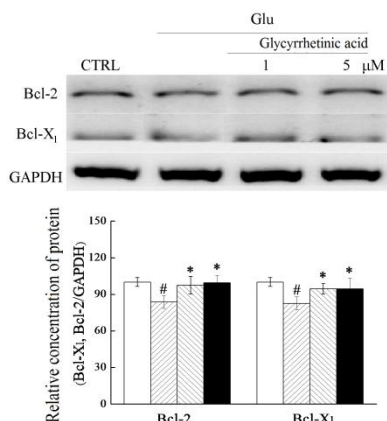


Fig. 2: The increasing effect of glycyrrhethinic acid on the expression of Bcl-2 and Bcl-X1 in PC 12 cells caused by Glu

□ Control; ▨ Glu; ▩ Glu+1 μM GA; ■ Glu+ 5 μM GA

Conclusion The results indicated that mitochondrial dependent pathway is one of the major mechanisms of 18-glycyrrhethinic acid on glutamate-induced apoptosis of PC12 cells.

Acknowledgements This research was financially supported by Zhuhai City Key Laboratory of novel drug delivery system (Grant No. 2015ZDSYS13)..

15 OPTIMIZATION OF EXTRACTION PROCESS OF TOTAL FLAVONOIDS FROM *SPATHOLOBUS SUBERECTUS* USING RESPONSE SURFACE METHOD

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Objectives To optimize the extraction technology of total flavonoids from *Spatholobus suberectus* dunn. by response surface method, and to get the optimal extraction technology, extraction technology conditions of total flavonoids from *Spatholobus suberectus* dunn.

Methods With the extraction rate of total flavonoids from *Spatholobus suberectus* dunn as the research index, effects of different factors on the extraction rate of total flavonoids were researched, such as extraction method, extracting agent, liquid-solid ratio, extraction temperature, ethanol volume fraction, extraction time, and diameter of the sample. Based on extraction method, extracting agent, single factor test, research results were analyzed by response surface method.

Results Optimal extraction technology, extraction technology conditions of total flavonoids from *Spatholobus suberectus* dunn were as follows: reflux extraction, ethanol as extracting agent, liquid-solid ratio- 65:1, extraction temperature- 75°, ethanol volume fraction- 88 %, extraction time- 2 h, 100 mesh sieve. The significant factors were

liquid-solid ratio, extraction temperature, ethanol volume fraction, the diameter of the sample. The order of the main factors and secondary factors was: liquid-solid ratio>ethanol volume fraction>the diameter of the sample>extraction temperature>extraction time. The actual extraction rate was 3.546 %, which was close to the theoretical value.

Conclusion The optimal extraction process conditions of flavonoids from *Spatholobus suberectus* dunn by response surface method were precise and feasible.

16 PLGA-BASED TOLTERODINE MICROSPHERES: OWN HIGH DRUG-LOADING AND LONG RELEASE PERIOD

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Objectives Tolterodine, a muscarinic acetylcholine receptor antagonist, is a primary drug for the treatment of overactive bladder. The conventional drug delivery method of oral administration has a "liver first pass effect". Tolterodine can be metabolized by the P450 enzyme in liver, so the individual difference is obvious. Overactive bladder as a chronic disease requires long-term treatment, which will bring great pain to the patients. Tolterodine microspheres can not only improve efficacy, but also reduce side effects and prolong the administration time. The goal of this study was to develop a microsphere for sustained release of tolterodine over the course of one month with about 10 % drug-loading.

Methods Oil in water emulsion-solvent evaporation method was used to fabricate microspheres. Drug loading and release was measured both *in vitro* and *in vivo* with high-performance liquid chromatography. The Beagle dogs were used for pharmacokinetic study. Microspheres were prepared with poly(lactic-co-glycolic acid) (7525 7E) and additional butyl stearate was added to adjust drug release behavior.

Results The drug loading of tolterodine in microspheres can get to 9.66 %. When adding 1 % butyl stearate, the overall release period was unchanged, while the sudden release was slowed down and the overall release behavior was much gentler. However, the same change was not appeared with 3 % butyl stearate. The pharmacokinetics of microspheres with 1 % butyl stearate indicated that there was a lag phase of nearly one week of microspheres, subsequently enter the rapid release period followed the plasma concentration reached the peak. If remove the previous week's hysteresis, the release period of microspheres was still up to 3 weeks.

Conclusions We successfully prepared tolterodine microspheres with drug loading about 10 %, which could sustain release *in vivo* over 3 weeks.

Acknowledgements This work was supported by the collaborative innovation center Project of Zhuhai city (Grant No. 2015XTCX08).

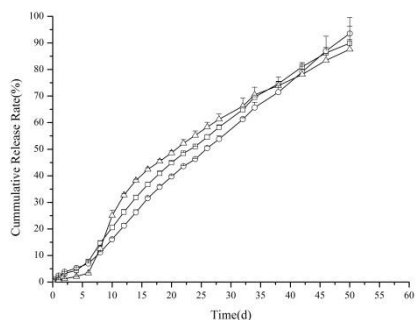


Fig. 1: In vitro release of tolterodine microspheres
 —□— Non butyl stearate; —○— 1 % butyl stearate;
 —△— 3 % butyl stearate

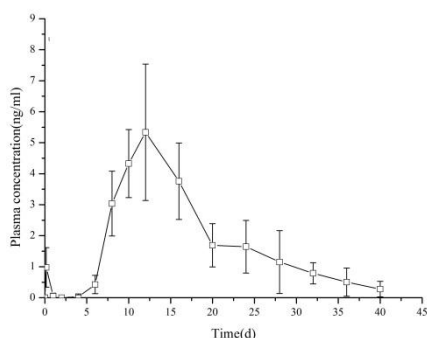


Fig. 2: The pharmacokinetics of tolterodine microspheres
 —□— Tolterodine microspheres

17 A METHOD FOR FUNGAL DISEASE DETECTION BASED ON MICROFLUIDIC CHIP

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Objectives As for the problem that fungal disease could spread around within a short time, and until now there haven't been any effective detection and prediction methods. It is of significance to detect the fungal disease due to the main route of transmission is airflow.

Methods A microfluidic chip was designed with a set of sample inlet, injection channel, enrichment detection area and electric pumping interface to collect the fungal disease in the air flow according to the principle of dynamic spore enrichment under micro scale. Meanwhile, then, a photoelectric detection system including light source, spectrometer, light emitting fiber probe and light receiving fiber optic probe is established to detect the microfluidic chip.

Results The enriched detection zone has an optimal enrichment effect when the diameter is 2000 μm . The condition parameters of the detection system mainly include light intensity and wavelength with best detection performance were respectively determined as 1.1×10^4 and 650 nm. Finally, take the fungal disease of rice false smut

as detecting sample to perform the automated microfluidic enrichment and photoelectric detection experiments, and build a detection model with the correlation coefficients of 0.9953.

Conclusion The detection accuracy rate of the detection method we proposed in this study could be larger than 82.4 % and is relatively higher when compared with microscopic detection method, which proves this detection method can provide the basic theory for the development of portable fungal disease detection equipment.

Acknowledgement This work was supported by the Priority Academic Program Development of Jiangsu Higher Education Institutions(PAPD), The Chinese National Natural Science Foundation (grant numbers 31701324, 61673195) and Primary Research & Development Plan (Modern Agriculture) of Zhenjiang (NY2015026).

18 MAPK SIGNALING PLAYS CENTRAL ROLE DURING DEPROTEINIZED CALF BLOOD EXTRACTIVES INJECTION MEDIATED THE ANTIFATIGUE EFFECT

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Objectives Deproteinized calf blood extractives injection (DCBEI) is extracted from calf serum including a variety of bioactive components, which has been used in the clinics for cerebrovascular disease.

Methods In this study, we aimed to assess the antifatigue effect of DCBEI (10 and 20 mg/kg) and its underlying mechanisms in BALB/c mice. After 28 d intraperitoneal injection of DCBEI, the animal behavior tests and exercise tolerance of mice were studied. The open field test showed that there was no effect of DCBEI on the autonomous behavior of mice indicating its safety on central nervous system.

Results The obtained results from running, loading swimming and rotary rod test of mice confirmed its enhancement on the exercise tolerance of mice. DCBEI strongly enhanced the levels of adenosine triphosphate (ATP) in serum, liver glycogen and muscle glycogen of mice. Furthermore, compared to control mice, DCBEI significantly enhanced the phosphorylation levels of Erk, and reduced the phosphorylation levels of p38 and c-Jun N-terminal kinases, which confirms that mitogen-activated protein kinase (MAPK) signaling showing important roles during ATP synthesis and tissue regeneration.

Conclusions Altogether, our present study successfully confirms that DCBEI possesses an antifatigue effect on BALB/c mice, which is mainly related to the phosphor activation of MAPK pathway.

Acknowledgement This work was supported by the Special Projects of Cooperation between Jilin University and Jilin Province (SXGJSF2017-1).

19 PREPARATION OF ANTIFUNGAL PEPTIDES NANO-LIPOSOMES AND THE DETERMINATION OF CONTENT AND ENTRAPMENT EFFICIENCY

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Objectives Antifungal peptide nanoliposomes were prepared, and the quality standard to determine the content and entrapment efficiency was developed.

Methods Antifungal peptide liposomes were prepared by film dispersion method, high-performance liquid chromatography assay for determination of small peptides was developed. Free peptides and liposomes were separated by protamine aggregation for the entrapment efficiency determination.

Results The liposomes were large unilamellar vesicles and the mean diameter was 161.1 nm, Zeta potential was -0.0382 mV. The calibration curve of small peptides was: $A = 11.8125 \times C - 6.9729$ ($r=0.990$), within the concentration range of 5.0 to 100.0 $\mu\text{g}\cdot\text{ml}^{-1}$. The recovery were 102.8, 93.2 and 95.6 %, with RSD of 9.89, 9.03 and 6.25 % ($n=3$). The RSD of intra-day and inter-day precisions were 4.28 and 3.05 % ($n=3$), respectively. The content and entrapment efficiency of small peptides were 93.6 and 82.3 % for the three batches of liposomes, respectively.

Conclusion The preparative method can be well used to prepare antifungal peptides liposomes with high entrapment efficiency and high quality, the determination method of drug content and entrapment efficiency were effective and rapid and can be used to quality evaluation for liposomes.

20

PREPARATION AND PHARMACOKINETICS OF GAMBOGIC ACID LONG-CIRCULATING LIPOSOMES

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Objectives To prepare the long-circulating liposomes of gambogic acid and investigate its release *in vitro* and pharmacokinetics.

Methods Optimization of liposome preparation was done by Box-Behnken experiment. The morphology of liposomes of gambogic acid was observed by electron microscopy. Demonstration of the *in vitro* release of liposomes by dialysis method and the stability of gambogic acid in 15 d was done. The plasma concentration was determined by ultra-performance liquid

chromatography-tandem mass spectrometer method after injection with 1 mg/ml gambogic acid and its liposomes, respectively.

Results The percent liposome encapsulation was up to 92.3 by Box-Behnken method. The results of *in vitro* release suggested that the liposomes can be released gently and stably within 15 d. The *in vivo* half-life of gambogic acid liposomes was 9.97 h, which is 4.43 times of that of gambogic acid. The $AUC_{0-24\text{h}}$ of gambogic acid in the liposomes was 22.55 $\mu\text{g}\cdot\text{h}/\text{ml}$, which was 4.73 times of that of gambogic acid.

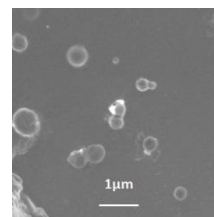


Fig. 1: Scanning electron micrographs of gambogic acid liposomes ($\times 10\ 000$)

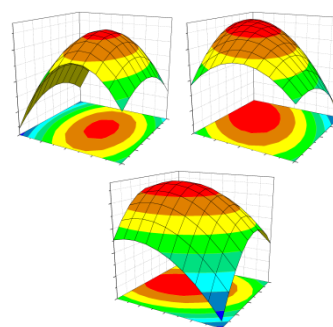


Fig. 2: Response surfaces and contours

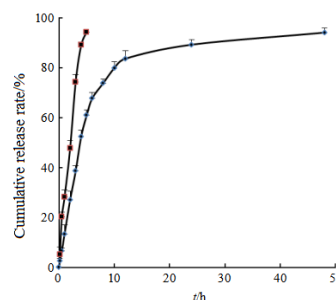


Fig. 3: Release of GA liposomes *in vitro* ($\bar{x} \pm s$, $n=6$)

—○— Long-circulating liposome of gambogic acid;
—■— gambogic acid solution

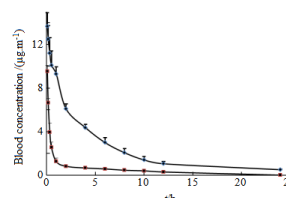


Fig. 4: Concentration-time curves of rats after administration with gambogic acid liposomes or gambogic acid in rats ($n = 6$)

—○— Long-circulating liposome of gambogic acid; —■— gambogic acid solution

Conclusions In this study, we have demonstrated that the long-circulating liposomes of gambogic acid were well

encapsulated, released stably *in vitro* and obtained longer circulation time *in vivo*, and thus had a good clinical prospect.

Acknowledgements This research was financially supported by Zhuhai City Key Laboratory of novel drug delivery system (Grant No. 2015ZDSYS13).

21

DETERMINATION OF CONTENT AND ENTRAPMENT EFFICIENCY OF DAPTOMYCIN LIPOSOMES BY HPLC

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Objectives To establish a high-performance liquid chromatography (HPLC) method for determining the content and entrapment efficiency of daptomycin liposomes.

Methods The separation as performed with a DiamonsilTM C₁₈ column (220×4.6 mm, 5 μm), the mobile phase was acetonitrile-water (45:55), the drug was detected at 220 nm wavelength and the flow rate was 1.0 ml/min, with column temperature of 30°. Protamine aggregation method was applied to separating the free drug and liposomes, for determining the entrapment efficiency of daptomycin.

Results The results suggested that daptomycin can be well separated with a good linear relationship in the ranges of 5.0-100.0 μg·ml⁻¹ (r=0.9993), their average recovery was between 104.3 and 105.6 %. The recovery were 105.5, 105.59 and 104.3 %, with RSD of 4.3, 2.8 and 5.1 % (n=3). The RSD of intra-day and inter-day precisions were 4.13 % and 3.09 % (n=3), respectively.

Conclusion This method is accurate and simple, and can be well used to determine the content and entrapment efficiency of daptomycin liposomes. The lyophilized form of liposomes prepared by freeze-drying showed stable quality characteristics during storage.

22

INFLUENCE AND COMPARISON OF DIFFERENT GINGER PROCESSING METHODS ON MAGNOLIA OFFICINALIS VOLATILE INGREDIENTS

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Objectives To study the differences in chemical

components of volatile oil from *Magnolia officinalis* when respectively using ginger dipping, ginger cooking and ginger roasting methods.

Methods *M. officinalis* was processed by ginger dipping, ginger cooking and ginger roasting methods to get the volatile oil extract from raw ginger and raw *M. officinalis* by using steam distillation. Volatile oil components were identified and analysed by gas chromatography-mass spectrometry (GC-MS) technology. Relative percentage of each volatile oil component was determined by area normalization method.

Results Volatile oil from raw *M. officinalis*, *M. officinalis* processing by ginger dipping, ginger cooking and ginger roasting methods, respectively identified 56, 63, 74 and 70 species of chemical components. Among the four, the common components accounted for 29 species. α-eucalyptol content was the highest one of all components in the volatile oil from raw *M. officinalis* (up to 62.86 %); The content of β-eucalyptol in the volatile oil from *M. officinalis* processing by ginger dipping, ginger cooking and ginger roasting was the highest on (respectively 51.59, 33.48 and 31.43 %).

Conclusions There are some differences in the component types and contents of volatile oil from *M. officinalis* processed by different ginger processing methods. The pharmacological effects of different components should be considered in practical application. In addition, the results suggested that low-temperature operation should be considered in the processing of *M. officinalis*, which aims to avoid the loss of chemical components of volatile oil.

Acknowledgements This research was financially supported by Zhuhai City Key Laboratory of novel drug delivery system (Grant No. 2015ZDSYS13).

23

NOVEL BIODEGRADABLE STAR COPOLYMER 2PLA-(TRIMESIC ACID)-1PEG AS HYDROPHILIC DRUG CARRIER

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Objectives As excellent biomaterials with biodegradable, non-toxic, and decent mechanical strength properties, poly (lactic acid) is often inferior with its poor hydrophilicity. To avoid the weakening on mechanical strength in the PLA-PEG copolymer, we introduced a three-armed star polymer with a whole PLA backbone and a short PEG branch to improve the hydrophilicity, and/or function as the hydrophilic drug carrying region.

Methods The synthesis scheme is shown in fig. 1. Firstly, the trimesic acid and PEG1000 were combined by normal esterification. The excessive amount of trimesic acid was added to ensure the 1:1 reaction rate. Secondly, excessive amount of lactic acid were reacted with (trimesic acid)-1PEG with polycondensation to form two PLA chains on the trimesic acid core, and therefore yield the 2PLA-(trimesic acid)-1PEG star copolymer. The hydrophilicity was characterized by the water contact angle test (ASTM D5946).

Results Since the PLA chain was synthesized much longer than the PEG chain, which was 1000 by our raw materials

selection, while the PLA chains were with the degree of polymerization of ~6000 (estimated by the polycondensation of pure PLA with identical reaction condition), the final product can be treated as normal PLA chain with a small hydrophilic parts attached on the backbone, and it should not affect the mechanical properties too much. The impact strength and tensile tests showed almost non-reduced results comparing to the pure polycondensed PLA. However water contact angle test gives a better hydrophilicity of 84.5° comparing to the 101.9° of the pure PLA.

Conclusions We successfully synthesized a three-arm star copolymer with two long PLA chains and one short PEG chain, the product showed a significantly improved hydrophilicity while the mechanical strength were well maintained.

Acknowledgements This work was supported by the Characteristic Innovation project of Ordinary Colleges and Universities in Guangdong in 2016 (Grant No. 2016KTSCX175) and the Innovation Cultivation Project of Zhuhai College of Jilin University (Grant No. 2016XJCQZD06) and collaborative innovation center Project of Zhuhai city (Grant No. 2015XTCX08).

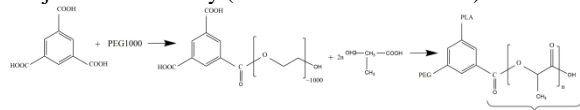


Fig. 1: The synthesis scheme of star copolymer 2PLA-(trimesic acid)-1PEG

24

BACTERIOSTATIC EFFECT OF *SENECIO CANNABIFOLIUS* LESS. *IN VITRO*

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Objectives *Senecio cannabinifolius* Less. is perennial herbs. It is distributed in the northeast, northwest and north China. *S. cannabinifolius* has high medicinal value, can treat cough, asthma and other diseases.

Methods Most of the drugs from *S. cannabinifolius* in the market are water-soluble extracts. Their effective constituent is phenolic acids, such as *Feining granula*. However effective constituent is not only water-soluble extract, but also alcohol extract. According to reports in the literature, alcohol extract and water-extraction alcohol-precipitation extract have a certain therapeutic effect. We studied on bacteriostatic effect of water-extraction alcohol-precipitation extract from *S. cannabinifolius in vitro*. The test bacterial strains are *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. Concentration of bacterial suspension is 10⁸ cfu/ml; concentration of water-extraction alcohol-precipitation extract from *S. cannabinifolius* is 50 and 80 %. According to filtering paper method, we used Trypticase Soy Agar medium to determine the inhibition of bacterial strains.

Results The results showed in the test of 50 % water-extraction alcohol-precipitation extract from *S. cannabinifolius* by using *S. aureus*, *E. coli* and *P. aeruginosa*

as test strains, the inhibition zone diameters were 24, 21 and 15 mm, respectively. However in the test of 80 % water-extraction alcohol-precipitation extract from *S. cannabinifolius* the results respectively are 28, 25 and 18 mm.

Conclusions It follows that the capacity of water-extraction alcohol-precipitation extract from *S. cannabinifolius* is unquestionable. We should have further research.

Acknowledgement

This work was supported by Jilin Jice Detective Technical Co. LTD.

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CLONING OF PRAIRIE RED BULL ADPN PROMOTER

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Objectives The prairie red bull is for dual-purpose of meat and dairy. Characterized by strong adaptability, tolerance to crude feed, strong stress resistance and stable heritability, it is suitable for feeding by extensive management in grassland region. However, in recent years, content of adiponectin is low in descendants of prairie Red Bull, resulting in the abnormal secretion of insulin in bull and abnormal quality index of bull. Hence, cloning research of adiponectin promoter of Prairie Red Bull is needed.

Methods Promoter is an important cis- element regulating gene expression. Cloning of the promoter requires the use of promoter-probe vector to screen the promoter to PCR. The promoter is screened by this technique. Gene promoter was cloned by chromosome walking technology of vector and linker. The vector has appropriate restriction enzyme cutting site, the linker of the chromosome may be double-stranded or single-stranded. Then, universal primer for specific primer and vector was designed according to the genomic DNA sequence and amplified to complete the cloning process.

Results By cloning of adiponectin promoter of Prairie Red Bull with the above method, the cloned gene was stable with high success rate. The adiponectin promoter transplanted into prairie cattle can play the original role to improve the insulin secretion of cattle.

Conclusion Cloning of the adiponectin promoter of Prairie Red Bull has been completed to ensure the quality of beef meat products and dairy products, which provides a reliable basis for the related cloning technology for Prairie Red Bull.

Acknowledgement The 2015 Jilin province science and technology development project - Cloning and functional analysis of adiponectin promoter in Red Steppe (No. 201501088jc); The 2015 research project of jilin agricultural science and technology university - Cloning and functional analysis of ADPN promoter in Red Steppe – (No. Jinong [2015] No. 230).

26

ANTIFATIGUE ACTIVITY OF *ZHENQI FUZHENG* GRANULES

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Objectives Fatigue is a biological phenomenon involving a feeling of extreme physical or mental fatigue that can lead to some serious chronic diseases. *Zhenqi Fuzheng* formula, a popular Traditional Chinese compound formula containing *Astragalus membranaceus* and glossy privet fruit, has been widely used in clinics for improving human immune functions and protecting bone marrow and adrenal cortex functions. The study was aimed to evaluate the antifatigue effect of *Zhenqi Fuzheng* granules in BALB/c mice.

Methods Mice were orally treated with *Zhenqi Fuzheng* granules at dose of 0.1, 0.3 and 0.9 g/kg for three weeks. *Zhenqi Fuzheng* granules had no effect on the spontaneous activities of mice indicating its safety on central nervous system. *Zhenqi Fuzheng* granules significantly improved the exercise tolerance of mice in weight-loaded forced swimming test, rotary rod test and exhausted running test. Biochemical indicators analysis showed that these effects were correlated with the increased levels of glycogen and adenosine triphosphate in liver and muscle.

Results Further data obtained from western blot analysis revealed that *Zhenqi Fuzheng* granules strongly enhanced the levels of phosphor-phosphatidylinositol 3-kinase (PI3K), phosphor-protein kinase B (Akt) and phosphor-glycogen synthase kinase-3 β (GSK-3 β) in liver of mice.

Conclusions Our present data successfully confirmed the antifatigue activity of *Zhenqi Fuzheng* granules and found that this function may be mainly related to its regulation on PI3K/Akt/GSK-3 β pathway.

Acknowledgement This work was supported by the Special Projects of Cooperation between Jilin University and Jilin Province (SXGJSF2017-1).

27

AMPHIPHILIC DRUG-POLYMER ASSEMBLED MICELLES CONTAINING ACID-CLEAVABLE LINKER FOR ANTICANCER DRUG DELIVERY

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Objectives Nano-scaled drug delivery is attracting extensive interest due to their unique properties. Self-assembled micelles are ideal drug carriers. Enhancing the drug-loading content has been a research focus. Here, novel drug-polymer assembled micelles for anticancer drug delivery towards cancer therapy are reported. The structure, properties and anticancer effect of the micelles were investigated.

Methods A hydrophilic drug 5-fluorouracil and a hydrophobic biopolymer polylactic acid (PLA, MW=2000) were conjugated via an acid-cleavable linker containing ketal group, producing amphiphilic macromolecules. The macromolecules aggregated to form micelles in aqueous phase. The micelles were characterized by various testing

methods and the *in vitro* release of 5- fluorouracil was studied by UV-Vis spectroscopy. Cell assay was performed to examine the anticancer efficacy of the micelles.

Results The prepared 5-fluorouracil-PLA micelles had an average size of 74.6 \pm 9.2 nm. The 5-fluorouracil content in the micelles was 6.9 wt %. The micelles kept stable under physiological conditions (37 $^{\circ}$, pH 7.4), but were decomposed to release 5-fluorouracil under acidic conditions typical of the environment in cancer cells, as the linker was cleaved in response to the lowered pH. *In vitro* cell experiments showed that the micelles are capable of killing cancer cells efficiently.

Conclusions The amphiphilic 5-fluorouracil-PLA macromolecules have been successfully synthesized, and self-assembled into drug delivery micelles. Relevant experimental results demonstrate that the micelles can be decomposed in cancer cells and release 5-fluorouracil for cancer therapy.

Acknowledgments This work was supported by the Characteristic Innovation project of Ordinary Colleges and Universities in Guangdong in 2016 (Grant No. 2016KTSCX175), the Innovation Cultivation Project of Zhuhai College of Jilin University (Grant No. 2016XJCQZD06) and collaborative innovation center Project of Zhuhai city (Grant No. 2015XTCX08).

28

DESIGN AND ACTIVITY STUDY OF A MELITTIN-THANATIN HYBRID PEPTIDE

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Objectives Antimicrobial peptides, because of their unique antimicrobial mechanism, have become a promising substitute for antibiotics for fighting drug resistant bacteria. Both melittin and thanatin have antimicrobial bioactivity. However, thanatin does not inhibit the growth of *Staphylococcus aureus*; melittin is able to inhibit *S. aureus* but also has a strong hemolytic activity. So a specific hybrid antimicrobial peptide has both of advantages is urgently needed.

Method Mutant fragments of melittin and thanatin were combined by flexible peptides to form a novel hybrid peptide, which was synthesized on the basis of secondary and tertiary structure prediction. And based on the hybrid peptide, the further explorations on its antimicrobial, hemolytic, anticancer and other activities were carried out.

Result The hybrid peptide was able to inhibit *S. aureus*, with a hemolytic concentration of above 45 μ mol/l. Meanwhile, the hybrid peptide shows strong inhibited effect to the microorganism, its inhibiting ability were very obvious to *Escherichia coli*, *S. albus*, *S. aureus*, *Salmonella typhi* (minimal inhibitory concentration, MIC: 1.2 μ mol/l) and *Bacillus subtilis* (MIC: 2.5 μ mol/l). In the cancer suppressive experiments, the inhibition rate of the hybrid peptide in SMMC-7721 cells was 19.14 % compared with the control group.

Conclusion Through alteration on the amino acid sequence of the hybrid peptide, the hybrid peptide retained the inhibiting ability to the growth of *S. aureus*, simultaneously,

it also can be inhibited the growth of *S. typhi* and *S. albus*. The hybrid peptide also has the tumor-suppression activity. Based on the structure of both α -helix type and β -lamellar type of antimicrobial peptides, this kind of hybrid peptide did not interact one another either on spatial structure or biological activities, providing ideas for the design of artificial antimicrobial peptides.

Acknowledgement Huzhou science and technology planning project - The bioassay method establishment and platform construction of environmental androgen material (No. 2016GY04).

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CATTLE THYMUS GLAND POLYPEPTIDE SHOWS ANTIFATIGUE EFFECT VIA KEAP1/NRF2 SIGNALING

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Objectives Fatigue includes mental fatigue and muscle fatigue, which seriously affects people's normal life. In the course of muscle fatigue, a great deal of reactive oxygen species are produced, which can induce injury on body. Cattle thymus gland polypeptide (CTP) is a water-soluble polypeptide extracted from thymus gland of cattle. This study aims to investigate the antifatigue and antioxidative effect of CTP in exhaustive swimming BALB/c mice.

Methods Mice were treated with 20, 40 and 80 mg/kg of CTP for 28 d, animal behaviors tests were performed. After exhausting swimming, blood and liver tissues were collected. CTP strongly enhanced the exercise tolerance of mice in loading swimming and rotary rod tests. Compared with the normal control mice, CTP strongly enhanced the levels of ATP in serum of exhausting swimming mice.

Results CTP at 80 mg/kg significantly decreased the levels of reactive oxygen species, and enhanced the levels of superoxide dismutase and glutathione peroxidase in serum and liver of exhausting swimming mice. Furthermore, the increased levels of phosphor-Keap1 and expressions of Nrf2 in the liver nucleus were noted in CTP-treated mice.

Conclusion Altogether, CTP has antifatigue activity, which is related to Keap1/Nrf2 pathway.

Acknowledgement This work was supported by the Special Projects of Cooperation between Jilin University and Jilin Province (SXGJSF2017-1)

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INTELLIGENT CONTROL OF QUALITY OF CHINESE HERBAL PIECES UNDER NEW INFORMATION TECHNOLOGY ENVIRONMENT

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Objectives The quality control process of Chinese herbal

medicine is unique, which frequently leads to over-control and less intelligent control, and the NP problem of model between the production efficiency and the quality of drugs.

Methods An intelligent control method for the quality of Chinese herbal pieces under the new information technology environment was proposed. The control model of this method adopts the method of multi constraint adaptive equalization, which can flexibly adjust the constraint relationship between quality and efficiency, limit the fault current, the soft start in the control process, and restrain the NP crash in the control process.

Results The principle and system control strategy of the quality controller for Chinese herbal pieces were analyzed in this paper. A three-phase experimental system was established, and the experimental results prove the effectiveness of the intelligent control of the quality of Chinese herbal pieces under the new information technology environment.

Conclusion This method can be used in actual production, and the effect is better.

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CHIDAMIDE INDUCES G0/G1 ARREST AND APOPTOSIS IN PROSTATE CANCER CELL LINES

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Objectives Prostate cancer is the second common non-skin cancer among men in developed countries. The principle treatment for patients with prostate cancer is hormone therapy, also called androgen deprivation therapy (ADT) or androgen suppression therapy. However, hormone therapy can cause side effects. Thus, development of new targeted therapies is necessary for the successful treatment of these patients.

Methods Chidamide, a novel oral benzamide class of histone deacetylase (HDAC) inhibitor, which has a board therapeutic range against carcinoma. The study of Chidamide in prostate cancer is not clear so far.

Results In the current study, we analyzed the *in vitro* and *in vivo* effects of chidamide on prostate cancer cell lines. At a low concentration (<500 nM) of chidamide, inhibited the cell proliferation and delayed the G0/G1 cell cycle progression, which was down-regulated the cyclin dependent kinase 2 (CDK2) and regulating the protein expression of p-P53 and P21. It also induced the cell apoptosis by down-regulating the Bcl-2 and up-regulating the cleaved poly (ADP-ribose) polymerase (PARP), cleavage of caspase-3 (fig. 1) and Bax protein expression.

Conclusion The results of present study demonstrates the potential utility of chidamide for the treatment of prostate cancer.

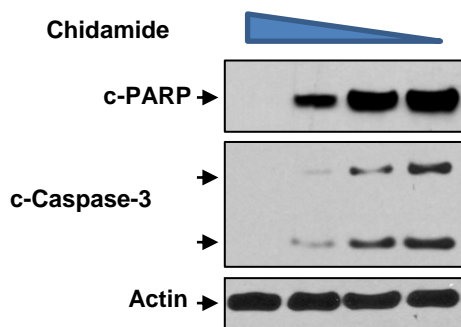


Fig. 1: Chidamide-induced apoptosis in LNCaP cells

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ANALYSIS OF THE EFFECT OF TRADITIONAL CHINESE MEDICINE ON CARDIOVASCULAR DISEASE

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Objectives The development of society and the progress of the times, the rapid development of modern medicine makes the research level of traditional Chinese medicine, especially cardiovascular disease prevention and control of research is changing, but many diseases and medical problems remain unresolved due to lack of effective methods for some difficult and complicated, failed to fully adapt to the change of the disease, some disease diagnosis therapy are clear but single, efficacy uncertain or the side effects of chemical drugs to limit its wide application.

Methods Patients (n=100) with cardiovascular disease, were randomly divided into groups A and B, with 50 of each group. The treatment of group A was performed in western medicine, and the treatment of group B was performed, and the other factors were identical except for the treatment methods. The duration of the experiment was two months, and the patient's current condition was recorded daily, and the condition could be detected from blood pressure, blood lipids, blood sugar and other aspects to record the changes of the disease.

Results After two months of treatment, the patient was significantly improved. Patient's recovery process was analyzed. In the western medicine treatment method of group A, the recovery rate of the patients was faster and the effect was more obvious, but the recovery rate of the patients began to decline in the later treatment. However, in the treatment of group B, the improvement of the patient's condition was not obvious within a month, but all the health indicators were recovering. In the second half of the experiment, the treatment of traditional Chinese medicine played a significant role, and the patient's health index was improved significantly.

Conclusions Compared with western medicine, Although Chinese medicine for the treatment of cardiovascular diseases is slower, but long-term treatment can not only enable the patient to recover completely. And the treatment of traditional Chinese medicine can make the patient completely recover, the body index can be restored; can enhance the human body immunity more.

Column 3: Pharmaceutics & Drug Delivery Research

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INHIBITORY EFFECT AND MECHANISM OF BARBALOIN ON TYROSINASE

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Objectives Barbaloin is an active ingredient in aloe used in skin-whitening cosmetics. Tyrosinase inhibitory effect could be an important effective indicator for skin-whitening agent. Thus, the inhibitory effect and mechanism of barbaloin on tyrosinase were investigated to elucidate mechanisms of barbaloin for the skin whitening function in this study.

Methods To evaluate whether barbaloin has ability to inhibit tyrosinase activity, we carried out extensive research to investigate its inhibitory efficacy on tyrosinase and explore the molecular mechanism of this interaction by means of fluorescence and molecular docking.

Results The results showed that barbaloin had inhibitory effect on tyrosinase with an IC₅₀ value of 4.41 mg/ml. The interaction of barbaloin with residues in the hydrophobic pocket of tyrosinase was the mechanism of quenching by barbaloin. Barbaloin was bound to tyrosinase by forming hydrogen bonds with residues near the catalytic core domain (His42, Asn205, and Val218); in addition, hydrophobic forces might occur in the binding interaction. Moreover, the binding of barbaloin to tyrosinase could increase polarity and decrease hydrophobicity of the micro-environment around tryptophan residues, which means the tyrosinase tends to be a looser structure.

Conclusions Barbaloin could inhibit tyrosinase activity. According to the quenching of fluorescence and the calculated binding sites with number of one, we conclude that the interaction with residues in the hydrophobic pocket of tyrosinase is the mechanism of quenching by barbaloin. The application of barbaloin as a tyrosinase inhibitor will be a significant advance for the exploitation of aloe in fields of depigmentation.

Acknowledgment This study was funded by Natural Science Foundation of Shenzhen Polytechnic(6017/22k200249991).

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ANALYSIS OF FRESH USE OF CHINESE MEDICINE

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Objectives Fresh use of traditional Chinese medicine is one of the characteristics of treatment and its clinical application runs through the whole process of the origin

and development of traditional Chinese medicine. Through the analysis of the characteristics of the fresh use of Chinese medicine, the status quo and so on, we provide a scientific basis for the rational development and utilization of the fresh drug resources of the Chinese medicine in the future.

Methods Through statistical analysis of the varieties of traditional Chinese medicine, the chemical components and pharmacological effects of fresh and dry Chinese herbal medicine, the present situation and deficiency of traditional Chinese medicine fresh use were summarized, so as to better play the role of fresh traditional Chinese medicine in clinical application.

Results The traditional Chinese medicine maintains the natural activity of the medicine, and has the characteristics of rich active ingredients, good quality and quick curative effect. By comparing the fresh use and dry use of traditional Chinese medicine, it is pointed out that fresh medicine contains a large amount of natural juice, and the effect of clearing away heat and nourishing Yin is better than that of dry products. It is not only used for general diseases, but also for difficult and critical diseases. To use fresh main content and direction of modern research of traditional Chinese medicine were discussed, think it is necessary for dry and fresh herbs were studied in composition, pharmacological activities, and to strengthen the research on preservation technology of fresh herbs, fresh Chinese medicine in the treatment of difficult miscellaneous diseases showed the potential therapeutic effects, is worthy of research and development. In the protection and utilization of fresh medicinal resources, standardize the production of fresh medicine, and promote its industrialization and modernization direction, so as to ultimately make the application of fresh medicine more widely, more scientific and more reasonable.

Conclusions The application prospect of fresh traditional Chinese medicine is very promising. We should try our best to excavate and inherit, so that the unique therapy of traditional Chinese medicine can be carried forward and benefit mankind.

35 EXTERNAL USE OF CHINESE PATENT MEDICINE

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Objectives External use of traditional Chinese medicine originated in ancient times, with the development of Chinese medicine and the continuous development of modern medicine. The external dosage forms include plaster, patches, powder, suppository, eye drop, aerosol, liniment, lotion apply to plaster, and washing and other topical treatments of disease. To provide basis for clinical external use, the present situation and characteristics of external use of Chinese patent medicine were explored.

Methods Through statistics of the Chinese Pharmacopoeia in 2015 edition of Chinese Pharmacopoeia for external use and analysis of clinical efficacy of proprietary Chinese medicines can be summarized, the role of traditional Chinese medicine and external application rules were

analysed.

Results In the 2015 edition of Chinese Pharmacopoeia, there are 108 kinds of proprietary Chinese medicines for external use. There are 23 kinds of Chinese patent medicines, which can be used orally or externally. Only 85 kinds of proprietary Chinese medicines are used for external use. These products are mostly derived from the classic decoction or clinical experience prescription. Dosage form for plaster, powder, suppository, eye drops and other traditional forms, only a small amount of spray and other modern forms; effective fraction, not clear, lack of control and effect of corresponding quality control standards; mechanism of action in animal the test, only to observe the pharmacodynamic indexes simple, not in-depth study; clinical research on curative effect research, lack of safety evaluation system.

Conclusions By analyzing the characteristics of external use of Chinese patent medicine, we should increase the varieties and dosage forms of Chinese patent medicines. It is suggested to increase the research on the mechanism of action, so as to further improve the clinical efficacy.

36 CLINICAL OBSERVATION OF ESSENTIAL HYPERTENSION OF TANYUQING DECOCTION COMBINED WITH SHUGANJIANGHUO DECOCTION

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Objectives Observation of *Tanyuqing* decoction combined with *Shuganjianghuo* decoction in the treatment of essential hypertension of phlegm and blood stasis and liver fire syndrome clinical curative effect.

Methods 100 cases were randomly divided into control group and treatment group of 2 cases, 50 cases in each group. The control group was given amlodipine besylate tablets (Norvasc), and the dose was adjusted according to the severity of disease. The treatment group of 50 patients was given *Tanyuqing* decoction combined with *shuganjianghuo* decoction. The dizzy, heaviness of head, chest tightness and other TCM symptoms, syndromes and 24 h ambulatory blood pressure were observed before and after treatment.

Results The improvement of blood pressure, TCM symptoms and syndromes was better in the treatment group than in the control group ($p < 0.05$).

Conclusions *Tanyuqing* decoction combined with *shuganjianghuo* decoction in the treatment of clearing fire hypertension of phlegm and blood stasis and liver fire syndrome is better than the control group.

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37 PHARMACODYNAMIC STUDY OF QINGNAO TABLET ON MICROCIRCULATION OF CEREBRAL ISCHEMIA MICE

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Objectives To observe the effects of Qingnao tablet on the microcirculation and microcirculation of the auricles in mice.

Methods Sixty mice were randomly divided into six groups. The mice were drenched with Qingnao tablet, Naoluo tong capsule suspension and the same volume of normal saline for 10 consecutive days. On the 10th day, the average of the perfusion amount of 110 to 120 s before the ligation of the bilateral common carotid artery was recorded as the average perfusion amount before the common carotid artery ligation and the average perfusion amount of 230 to 240 s was taken as the post-ligation the average perfusion volume. Another 50 mice of body weight 18~22 g, were randomly divided into 5 groups and were fed with large, medium and small doses of Qingnai suspension, capsules brain Luo Tong, and the same volume of saline, each day. Auricle arterioles (A), fine vein (V) diameter, blood flow velocity and the number of open capillaries of each group of mice were observed with an automatic image analyzer.

Results Both the Naoluo tong group and Qingnao tablet groups could reduce the decrease of cerebral blood perfusion in mice induced by bilateral common carotid artery ligation, and could antagonize the effects of epinephrine-induced mouse ear slender arteriolar diameter of the contraction, can also to improve adrenergic mouse auricle microcirculation blood flow.

Conclusions Qingnao tablet can significantly improve the mouse meninges microcirculation and auricle microcirculation.

Acknowledgements This research was supported by National Natural Science Foundation of China (Grant No: 81274154)

38 MICROFLUIDIC HYDRODYNAMIC FOCUSING SYNTHESIS OF LIPOSOMES FOR VITAMIN D₃ DELIVERY

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Objectives Vitamin D₃, a fat-soluble vitamin, is a hormone precursor acting on calcium and phosphorus metabolism. Vitamin D₃ has a variety of effects, such as regulation calcium balance and bone metabolism; immune regulation-induced cell differentiation, inhibition of cell growth; reduce cancer and some autoimmune diseases; improve cardiovascular and cerebrovascular function and so on. Vitamin D₃ effectively prevents skin photo aging. However, due to vitamin D₃ insoluble in water, which limits its efficacy. In order to improve the bioavailability of vitamin D₃, a more safe and efficient vitamin D₃ formulation is required. Liposomes, not only encapsulate the water-soluble and fat-soluble substances, but also have a good encapsulation efficiency and stability. Liposomes

are used in the skin local administration system, can effectively stay in the cortex, and have good drug release performance. Microfluidic technology (MF) is a novel nano-carrier preparation technique that enables stable and uniform nanoparticles for drug delivery.

Methods In this study, we developed a novel vitamin D₃ liposomes using microfluidic chip-based technology. Vitamin D₃ liposomes were prepared by a microfluidic method. The desired amount of vitamin D₃, egg phosphatidylcholine and cholesterol were dissolved in ethyl alcohol (ratio: 45:10:18, w/w/w) at 30°. And the phosphate buffer (pH 6.8) was made as aqueous phase. As shown in Fig. 1, a vitamin D₃-lipid solution was injected at inlet 1 and aqueous phase were injected through inlets 2 and 3, with mixing occurring with the “Y”-junction. Then the resulting vitamin D₃ liposomes will pass through a S-channel (in ice-bath) and stored at 4° in the dark.

Results Vitamin D₃ liposomes made by microfluidic technology had an excellent mean particle size (110 nm), a uniform, narrow distribution and the entrapment efficiency increased to 88 %. At the same time, the thermal stability and light stability compared with the free vitamin D₃ have improved. Finally, vitamin D₃ liposomes could significantly improve skin appearance and repair damage in histology of the photo aging.

Conclusions In conclusion, vitamin D₃ liposomes prepared through microfluidic chip-based technology are a potential skin care cosmetic for preventing photo aging.

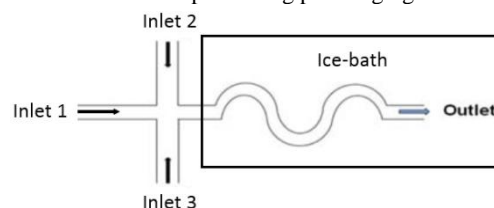


Fig. 1: Preparation of Vitamin D₃ liposomes using MF chips

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39 A NEW TEMPERATURE CONTROL METHOD FOR PENICILLIN PRODUCTION BY VIRTUE OF PARAMETER OPTIMIZATION

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Objectives The conventional temperature of penicillin growth is 30°, and the appropriate temperature for the secretion of penicillin is 20° approximately. This requires the production to use a variable temperature control method. Primary seed culture temperature is 27±1° or so; secondary seed culture temperature is 25±1° or so; pre-fermentation

temperature is 26°; during fermentation, the temperature is 25°; in late fermentation, the temperature is lowered to 24°. The way of conventional control brings a lot of difficulties in attempt to precisely control the temperature of penicillin production process. In this paper, a new non-linear Proportion Integration Differentia (PID) controller is designed in order to get the precisely temperature control of penicillin production process; and the controller parameters would be optimized by chaos optimization again. Finally, the temperature control is verified through experiments. The experimental results showed that such non-linear PID approach could be quite effective in the temperature control of penicillin production process with error less than 10 %.

Methods A kind of temperature control system for penicillin production process is developed based on STM32 microcontroller. The control algorithm includes: design, parameter optimization, controller modeling and simulation, a total of four steps for the controller. Firstly, Bang-Bang control is used to improve the system's quickness in the initial stage. Secondly, the nonlinear PID control with parameter optimization is used to obtain better system stability in the middle and end of the control. Finally, the validity and scientificity of the control algorithm are verified by simulation experiments.

Results The penicillin production process may vary, the temperature control system shows the following control effects: primary seed culture temperature is $27\pm 0.5^\circ$ or so; secondary seed culture temperature of $25\pm 0.5^\circ$ or so; the temperature before, during and after fermentation are 26°, 25°, and 24°, respectively. The system requirements were fully satisfied.

Conclusions Experimental results showed that the non-linear PID control algorithm could effectively solve the problem in the temperature control of penicillin production process.

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40 WASTEWATER PRETREATMENT EXPERIMENT IN PHARMACEUTICAL INDUSTRY BASED ON FENTON OXIDATION PROCESS

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Objectives The complexity of the pharmaceutical wastewater and the high consumption and inefficiency of the conventional biochemical treatment process are the most direct reasons for the current large amount of pharmaceutical wastewater, that is difficult to handle and difficult to reach the standard. Therefore, prior to the traditional anaerobic and aerobic biochemical combination process, the effective pretreatment of pharmaceutical

wastewater can eliminate its inhibitory effect on microorganisms and improve the biodegradability of wastewater, thereby greatly reducing the difficulty of subsequent biological treatment. Fenton oxidation is a kind of advanced oxidation technology. It has the advantages of simple equipment, mild reaction conditions, convenient operation and high efficiency. It has strong application advantages in dealing with toxic and harmful biodegradable organic wastewater. In this paper, Fenton oxidation process is used for the pharmaceutical industry wastewater pretreatment to provide technical reference for the pretreatment of pharmaceutical wastewater.

Methods The water samples taken from a pharmaceutical factory wastewater treatment station, the raw water pH is 2.41, the color is orange, raw water chemical oxygen demand (COD) is 38119.2 mg/l. The main purpose of this study is to pretreat this kind of wastewater so that its COD and chroma will be greatly reduced. The COD is less than 4000 mg/l, which can meet the requirement of subsequent biochemical treatment to influent concentration. Among them, the analytical test method is using PHS-3C digital pH meter for the pH and COD using standard potassium dichromate method. The main reagents are 30 % hydrogen peroxide (AR), ferrous sulfate heptahydrate (AR), sulfuric acid (AR), sodium hydroxide (AR). The experimental program was to first take 100 ml wastewater, which was adjusted to a certain pH. And then add a certain amount of 15 % FeSO₄ and 30 % H₂O₂ solution, and placed in the magnetic stirrer reaction for a certain period of time, and adjusting the pH to 10. After 10 min reaction, the pH is adjusted to 9, and after 5 min reaction, the residual H₂O₂ was removed. After standing for 30 min, the supernatant is taken to measure the COD.

Results Within the experimental data, the removal rate of COD increases with the increase of the dosage of H₂O₂. When the dosage is above 35 ml, the removal rate of COD increases slowly. Considering the pharmaceutical cost and treatment target, the optimum H₂O₂ dosage is 350 ml/l. Within a certain experimental range, the COD removal efficiency increases with the increase of FeSO₄ dosage. When the dosage of FeSO₄ is 30 ml, the COD removal rate reaches the highest, and then the COD removal rate begins to decrease. Therefore, the optimal dosage of FeSO₄ is 300 ml/l, and the effect of pH=3 on removal rate of COD is better. Within a certain reaction time, the COD removal rate increases with the increase of reaction time. The COD removal rate is the highest at the reaction time of 100 min, and the COD removal efficiency is 94.53 %, which reaches the pretreatment target.

Conclusions In this experiment, Fenton oxidation was used to pretreat high concentration pharmaceutical wastewater. The experimental results showed that the optimal parameters of pretreatment of pharmaceutical wastewater by Fenton oxidation method were as follows: FeSO₄ dosage was 300 ml/l, H₂O₂ dosage was 350 ml/l, the pH value of 3, the reaction time of 100 min and the COD removal efficiency of 94.53 %, to reached the pretreatment target, which meet the requirement of follow-up biochemical treatment to influent concentration, in order to solve the problem of high concentration pharmaceutical wastewater pretreatment to provide technical reference.

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APPLICATION OF OZONE PHOTOCATALYSIS TECHNOLOGY FOR VOCs TREATMENT IN PHARMACEUTICAL INDUSTRY

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Objectives It is unavoidable to use a large amount of volatile organic solvents and biological agents in various production processes of the pharmaceutical industry to produce a large amount of volatile organic compounds (VOCs). The VOCs emitted by the pharmaceutical industry are complex and include alkanes, alkenes and aromatics as well as various oxygenated hydrocarbons, halogenated hydrocarbons, nitrogen-containing hydrocarbons, sulfur-containing hydrocarbons, low-boiling polycyclic aromatic hydrocarbons and so on. These are not only toxic and "tripartite (carcinogenic, teratogenic, mutagenic)" effect, but also produce chemical reactions with NO_x or atmospheric photochemical reactions under certain conditions, which leads to the formation of secondary organic aerosol, causing damage to the atmosphere and the ecological environment. We have achieved good results after developing ozone photocatalytic technology to strengthen the oxidation treatment, which provides guidance for VOCs governance and reduction in the pharmaceutical industry.

Methods There are three main steps in ozone photo catalysis: First, using deep UV to act on VOCs to produce photochemical reaction. At the same time, a small amount of ozone molecules from air, which is photolysed by ultraviolet continue to degrade organic matter in the subsequent oxidation. Second, the formation of oxygen radicals interacting with VOCs under ultraviolet irradiation by adding ozone and photolysis ozone molecules in the front. Third, making the rest of ozone decomposition of oxygen free radicals, hydroxyl radicals under the action of the catalyst and further oxidized and decomposed the remaining VOCs, which improve removal efficiency and eliminate residual ozone, so as to avoid excessive emissions of ozone into the atmosphere, causing other pollution.

Results Take the organic waste gas discharged by a pharmaceutical company as an example, the main components contain pyridine, n-butyric anhydride, ether,

methylene chloride and other components, especially pyridine, n-butyric anhydride and other substances accounted for a large proportion, accompanied by malodorous odor, which is difficult to handle. After ozone photolysis treatment, the results showed that the efficiency of organic waste gas treatment is consistent with the change of its emission characteristics. With the input of reduction material, there is a high value of exhaust gas concentration, and the processing efficiency of equipment also increased accordingly, which processing efficiency at 70~80 %; after the end of the feed, the exhaust concentration is very low, which processing efficiency gradually decreased and stabilized at 20 to 30 %. On the other hand, when the concentration of VOCs is low, the rate of ozone oxidation slows down. The higher the peak of high concentration, the trend of decreasing the removal rate will slow down. Compared with the single use of activated carbon adsorption treatment, or low temperature plasma treatment, the use of multi-stage ozone photocatalytic technology is the most efficient and low operating costs.

Conclusions According to the characteristics of waste gas in pharmaceutical industry: intermittent emissions, concentration time coefficient of variation and the presence of foul odor. We first use the activated carbon bed of VOCs adsorption homogenization, then use ozone photo catalysis technology to decomposition and removal by enhanced oxidation, to ensure that VOCs and malodors in the pharmaceutical industry reach a stable standard. The operational data in this case showed that ozone photo catalysis has been successful in the organic waste gas treatment of the chemical pharmaceutical industries and can be promoted.

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RHODIOLA EXTRACTION INDUCES APOPTOSIS IN A549 CELLS VIA ROS-RELATED MITOCHONDRIAL PATHWAYS

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Objectives Studies have proved the antifatigue, antianoxia, antiaging, enhanced immunity, antiviral and hypoglycemic effects of Rhodiola. Our present study aims to explore the apoptotic activity in human lung cancer cell line A549.

Methods Cell viability, migration ability, mitochondrial membrane potential (MMP) determination, DCFH-DA

staining *in vitro* and A549-xenografted tumor model in Male BALB/c nude mice were applied to test the cytotoxic and apoptotic effects of Rhodiola extraction. In addition, Western blot assay were utilized to detect the relative expressions of proteins.

Results Rhodiola extraction significantly inhibited the cell viability and migration of A549 cell but not effected in human normal lung epithelial cell line BEAS-2B. Meanwhile, the obvious change of MMP, DNA damage and improved intracellular ROS level were observed after Rhodiola extraction treatment for 24 h. Furthermore, Rhodiola extraction inhibited the A549-xenografted tumor growth in nude mice without variety in bodyweights. The expressions of antioxidant proteins including catalase, superoxide dismutase, Nrf2 and biomarkers of apoptosis including Caspase-8, Caspase-3, Bax, Bad were remarkably increased after Rhodiola extraction treatment both *in vitro* and *in vivo*.

Conclusions Rhodiola extraction induces cell damage, apoptotic transformation of mitochondrial and apoptosis in A549 and apparently suppressed the growth of A549-xenografted tumor in nude mice. And all these data suggest that oxidative stress is highly involved in the apoptotic effect of Rhodiola extraction.

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PREVENTION AND TREATMENT MECHANISM OF FUNCTIONAL OLIGOSACCHARIDE INTESTINAL MUCOSAL BARRIER TO HEPATIC ENCEPHALOPATHY

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Abstract: As a non-digestible carbohydrate, soybean oligosaccharides have important clinical significance in reducing the catabolism of protein in the large intestine. For the first time using the forefront of molecular biology techniques, to investigate the effects of soybean oligosaccharides on cirrhotic rats induced by carbon tetrachloride after oral 28d *in vitro* in terms of monomer structure from each group, including the growth of beneficial bacteria in the intestine, the proliferation of propionic acid, butyric acid and other short chain fatty acids and inhibiting the growth of harmful bacteria, reducing harmful nitrogenous metabolites, systematic evaluation and reticular Mete analysis are used to accurately assess the effectiveness of the intestinal mucosal biological barrier to prevent hepatic encephalopathy. For the first time from the development of biologics height, animal models of hepatic cirrhosis rats induced by carbon tetrachloride, which are injected with endotoxin to produce hepatic encephalopathy, are systematically studied. In the treatment of lower blood ammonia to improve the ecological environment of the gut, the soybean oligosaccharides and acetic acid intestinal suppository are combined and the effect of the treatment is evaluated and the effect of the treatment was evaluated.

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CHITIN FIBRE MAY SERVE AS A BETTER CARRIER FOR COLLOIDAL GOLD AND SUBSEQUENT GOLD-PROTEIN CONJUGATES

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Objectives Chitin fiber is the only natural polymer with positive charges. Considering the colloidal gold nanoparticles are suitable to label the biomacromolecules, e.g. protein or nucleic acid, because of holding negative charges, it can be expected that the positive chitin fiber may form a well bondage with colloidal gold nanoparticles. In this work, we prepared electrospun chitin fiber and tested its loading properties for the colloidal gold-antibody conjugates, for the potential use in gold immunochromatography assay.

Methods The chitin particles are solved in hexafluoroisopropanol and electrospun to form nanofibers with an average radius of 120 nm. The fibers are fabricated to be fibrous membrane by the non-woven fabrics processing. Synthesized colloidal gold nanoparticles were conjugated with Bt-Cry1Ab/Ac monoclonal antibody (it is taken as a model protein). The protein content percent was characterized by UV spectrophotometry.

Results The amount of protein loaded on the fiber films, with the comparison to normal glass fiber film with identical loading process was tested. The initial results showed nearly the same signal strength of both products. Then the samples were washed by distilled water one and two times, and then tested again. It shows that for the chitin fiber film, the signal strength is 60±7.5 % of the initial signal after one time washing, and 35±4.0 % after twice washing, while for the glass fiber film the corresponding values are 32±6.0 and 5 %.

Conclusions The results clearly showed that the chitin fiber with positive charges can form a well bondage to the colloidal gold-protein conjugates, and hence may serve as better candidate materials comparing to the glass fiber, which is commonly employed in nowadays product.

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EXPLORED THERAPEUTIC MECHANISM OF CHINESE MATERIAL MEDICA EXTERNAL APPLICATION

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Objectives Regulating the local micro ecology and local micro environment of the skin are the two aspects involved in the mechanism of external treatment of Chinese Material Medica to treat the disease.

Methods Through combing domestic and international literature research, clinical research, related experimental research. we put forward the point of view of two aspects regulating.

Results Regulate the body "micro ecology", the occurrence of the disease is related to the local microecological imbalance (the imbalance of quality and proportion of the bacteria). External use of Chinese Material Medica work a cure by regulating the local micro ecological imbalance, namely to regulate and assist microbial systems biological barrier body repair was weakened. The micro ecological system is transformed from "xieqi" state to the "healthy atmosphere (zhengqi)" state, so as to achieve the purpose of "eliminating pathogenic factor". Regulate the body "micro environment", Chinese Material Medica directly acts on the local lesion and plays a direct and minor role, such as analgesia, relieving itching, removing decay, myogenic, local anesthesia and so on; Chinese Material Medica is absorbed by small amount of local absorption, such as promoting inflammation absorption, quickening local blood circulation, alleviating tissue adhesion, improving local nutrition and so on; Chinese Material Medica on the body of local micro adjustment (On the point of micro stimulation), namely it stimulate (regulation) the response of the immune system (an important factor of righteousness), This is conducive to the maintenance of "When the healthy atmosphere is kept, the evil cannot be invaded", so as to achieve the effect of "strengthening the body resistance".

Conclusions The mechanism of Chinese Material Medica is divided into two aspects. on the one hand, It can regulate the body's micro ecology or ecological balance of local skin. On the other hand, It can regulate the body micro environment through a variety of different ways to achieve the purpose of cure. It is to stimulating the body's immune response by direct and indirect effects.

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SYNTHESIS OF A NOVEL POLYETHYLENIMINE DERIVATIVE AND ITS APPLICATION AS A GENE DELIVERY CARRIER

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Objectives Hyperbranched polyethylenimine-polyethylene glycol (hPEI-PEG) was synthesized and characterized as gene delivery systems. The preparation procedures were

mainly divided into three steps: (1) the synthesis of hPEI was through the polymerization reaction using HMDI as connection molecule. Formed hPEI had high molecular weight and thus charge density, greatly increasing the gene load. (2) The hPEI was processed into uniform spherical nanocrystals with a particle size of 100 nm. (3) PEG modification improved the hydrophilicity of nanocrystals, at the same time increased the biocompatibility and lowered the cytotoxicity. After entering into tumor cells, hPEI-PEG nanocrystals could rapidly release siRNA owing to proton sponge effect.

Methods The hyperbranched polyethylenimine were synthesized using Methylene-bis(4-cyclohexylisocyanate) (HMDI) as connection molecule. The connection of -NH groups between PEIs (Mw 25 kDa, branched) was conducted in chloroform at room temperature using 50-fold HMDI. Formed hPEI was used to prepare hPEI nanocrystals by mechanical ball milling method. After ball-milling dispersion for 12 h, the sizes of particles were controlled at around 100 nm. Subsequently, mPEG (Mw 2000 kDa) was activated using HMDI. Excessive HMDI was removed through repeated precipitation in diethyl ether. The connection between mPEG-HMDI and hPEI was conducted in chloroform at 80° for 4 h. The collection of hPEI-PEG was through repeated precipitation in diethyl ether. For the preparation of drug-loaded hPEI-PEG nanocrystals, siRNA solution was added into hPEI-PEG solution followed by vortexing for 30 s, where the mass ratio of siRNA/hPEI-PEG was 1/12. The resulting siRNA hPEI-PEG nanocrystals were dialyzed against HEPES buffered saline (20 mM, pH 7.4) using a MWCO 10 000 Da dialysis bag at room temperature for 2 h.

Results The connection ratio of hyperbranched hPEI and PEG was measured as 1:50. The particle size and zeta potential of blank hPEI-PEG nanocrystals were 104.3 nm and 62.3 mV, respectively. The Transmission electron microscopy images displayed multilateral sphere and compact complexes. After loading siRNA, the z-potential of siRNA/hPEI-PEG was neutral. hPEI-PEG nanocrystals possessed higher gene load (8.3±0.23 %), lower cytotoxicity (91.4±2.41 %) and higher cellular affinity than free PEI (p<0.01). Cellular uptake results indicated hPEI-PEG nanocrystals could effectively deliver vascular endothelial growth factor A (VEGFA) siRNA into HepG2 cells, which had high transfection efficiency over free PEI (p<0.001).

Conclusions Hyperbranched PEI-PEG were synthesized and then used to prepare hPEI-PEG nanocrystals with increased load capacity of gene and decreased toxicity compared to PEI. The hPEI-PEG nanocrystals could effectively load siRNA with a particle size about 100 nm and zeta potential of 0 mV. These nanocrystals could deliver VEGFA siRNA into HepG2 cells *in vitro* to down-regulate the expression of VEGFA gene.

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COMPARATIVE STUDY OF TRADITIONAL CHINESE MEDICINE GRANULES AND TRADITIONAL CHINESE MEDICINE DECOCTION

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Objectives This paper reviewed the advantages and disadvantages of traditional Chinese medicine dispensing granule and traditional Chinese medicine decoction, and discussed and analyzed its application prospect.

Methods By comparing the four aspects of drinking, storage, transportation and clinical efficacy of traditional Chinese medicine granules and traditional Chinese medicine decoction, the advantages and disadvantages of traditional Chinese medicine prescription granules have been summarized.

Result There is no significant difference in clinical efficacy between traditional Chinese medicine granules and traditional Chinese medicine pieces. The traditional Chinese medicine dispensing granule has more advantages in terms of storage and transportation.

Conclusions Through sorting out the literature, we can know the traditional Chinese medicine granule is better than traditional Chinese medicine decoction. Traditional Chinese medicine formula granule has the advantages of small dosage, high curative effect, quick onset, convenient taking, convenient carrying and convenient storage, so it can be widely used. Chinese medicine dispensing granule is still in the supplementary role of the market, but we have reason to believe that it is imperative to replace the traditional Chinese medicine decoction.

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48 STUDY ON THE EXTRACTION CONDITIONS OF POLYPHENOL IN MANGO LEAVES

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Objectives Polyphenols are rich in many of the plants, however, the study of polyphenol in mango leaves is very limited yet. In our work, we aim to establish polyphenol compounds extraction method from mango leaves and improve the extra value of mango leaves and its utilization, avoid environmental resource waste. In this work, the extraction conditions of mango polyphenol in mango leaves have been optimized and studied.

Methods Ultrasonic assisted method was used to extract mango polyphenol, based on a single-factor test, three factors are the ethanol concentration, ultrasonic time and solid-liquid ratio. And on the basis, the orthogonal test was carried out to get respective optimal conditions.

Results The results showed that through single factor and orthogonal test, the best extracting conditions for the ultrasonic assisted extraction method is : 40% alcohol as extracting solvent with asolid/solvent ratio of 1: 20 , and the extraction times was 20 min .

Conclusions This study by ultrasonic assisted extraction of polyphenol compounds in mango leaves, and through the orthogonal experiment a mango polyphenol extraction method was established, which provide a potential for mango polyphenol of industrialized production.

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49 RESEARCH STATUS OF CHINESE MEDICINE FACIAL

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Objectives Through the analysis of the treatment methods and characteristics of Chinese medicine facial, this paper elucidated the advantages of the Chinese medicine facial, and provided a reference for the clinical research and development, and laid the foundation for its development.

Methods By the literature retrieval and collected relevant information, the research status of Chinese medicine facial was reviewed, and its research progress was understood, and the current situation and application prospect of Chinese medicine facial was revealed.

Results Through the literature retrieval and the data analysis, the research was found that the main methods of Chinese medicine facial has beauty of Chinese medicine, acupuncture cosmetology, beauty of massage and beauty of qigong. Chinese medicine beauty includes medicine for internal and external. The medicine for internal, always has a single taste, like the tuber of multi-flower knotweed and Chinese yam. The methods of external use traditional Chinese medicine mainly include: fumigating, hot baking, bath and facial mask. Acupuncture cosmetology mainly has acupuncture, moxibustion, auricular acupuncture and other methods, by activating meridian and collateral, subsiding swelling to dissipate indurated mass, and regulate Qi and blood, thus achieve the purpose of beautifying beauty. Massage beauty belongs to a kind of Chinese medicine external treatment, mainly through dredge meridian, and promote the sebaceous glands, sweat gland secretion, accelerate the metabolism of skin cells, and others, so as to achieve nutritional skin, postpone skin aging. *Qigong* beauty is mainly through the coordinating emotional, and maintain the physical beauty. Compared to modern chemical beauty, plastic surgery and cosmetic, the advantages of Chinese medicine facial were mainly emphasizes the integration concept, green natural, safe and reliable, diverse methods, effected and stable, and it also could adjusted according to different constitution, fully show a person's natural beauty, health and beauty as a whole.

Conclusions The core of Chinese medicine facial is outstanding the whole of concept, treating both principal and secondary aspect of disease, adjusted according to different constitution. Security and ease of the methods which was widely praised by society and the attention of the medical profession, it has a wide prospect of market. In the future the theoretical research of Chinese medicine facial should strengthen, in order to satisfy people's pursuit of beauty.

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50 SELECTION OF THE OPTIMAL LOGISTICS

TRANSFER NODE FOR MEDICAL SUPPLIES

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Objectives The current logistics distribution takes the lowest cost as the Objectives function, but in logistics distribution of medical supplies, the cost cannot be considered alone, which leads to the failure of the selection of the traditional node model. So the multi-constraint is needed.

Methods An improved TSP genetic ant colony algorithm is designed to solve the optimal logistics transfer node for medical supplies. Considering the change of node attribute in the logistics phase of medical supplies, the optimization model of transfer logistics routing with triple attributes nodes is established, and an ant colony algorithm with multi-constraint Objectives function is designed to solve the problem.

Results In the logistics of medical supplies, the combination of city ring and multi-vehicle can achieve the path optimization and cost reduction.

Conclusions In the medical drug transfer logistics, the selection of logistics network transfer point and optimization of transfer logistics route based on product flow is the optimal.

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51 PREPARATION AND QUALITY EVALUATION OF TROXERUTIN LIPOSOMES AND THE LYOPHILIZED PREPARATION

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Objectives To prepare troxerutin long-circulating liposomes, establish the determination method of content and entrapment efficiency, and prepare it into lyophilized preparation to improve its stability.

Methods Liposomes were prepared by film dispersion method, high-performance liquid chromatography (HPLC) assay for troxerutin determination was developed. Free drugs and liposomes were separated using protamine aggregation method. Freeze-drying method was used to

prepare lyophilized preparation of liposomes.

Results The liposomes were homogeneous and the mean diameter was 174.0 ± 9.2 nm, Zeta potential was -17.4 ± 3.5 mV. The content and entrapment efficiency of troxerutin were 96.6 % and 87.1 % for the three batches of liposomes, respectively. The lyophilized form of liposomes showed stable quality characteristics during storage.

Conclusions The formulation and preparative method can be used to prepare troxerutin long-circulating liposomes with high entrapment efficiency and high quality, the determination method of drug content and entrapment efficiency were effective and rapid and can be used to quality evaluation for liposomes. Lyophilized preparation of liposomes can be stored stably for a long time under freezing conditions.

52 DISCRIMINATION OF POPLAR GUM FROM PROPOLIS-A METHOD BASED ON CHROMATOGRAPHIC FINGERPRINTS COUPLED WITH MULTIVARIATE STATISTICAL ANALYSIS

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Objectives Poplar gum is often used as propolis by mistake due to the similarity. In order to easily separate poplar gum from propolis, an experiment was taken out with fingerprint profile coupled with statistical analysis.

Methods Chromatographic fingerprints were established with a novel approach using ultra high performance liquid chromatography (UPLC) coupled with multivariate statistical analysis for distinguish poplar gum from propolis. A batch of 15 propolis and 15 poplar gum samples collected all over China was analyzed. Then the datasets of retention time, peak height and sample number were subjected to a combination of supervised statistical analysis composed of neural network analysis and partial least squares discrimination analysis (PLS-DA).

Results Chromatographic fingerprints were successfully profiled. Through neural network analysis, two-layer feed-forward network was established, and mean squared error was considered as prediction index. Results showed a supervised model was successfully set up for the prediction of unknown samples. Original data were processed through data dimension reduction before PLS-DA. Samples from poplar gum and propolis were clearly separated on score plot. Results of permutation verification showed good fitting. Salicin is screened out and identified on the loading plot as the characteristic component in distinguishing poplar gum from propolis.

Conclusions In this research, fingerprints coupled with multivariate statistical analysis has been successfully applied in discrimination of poplar gum from propolis. The established mathematical model is valuable in evaluation and quality control of propolis.

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FINANCIAL SERVICE MODE OF SUPPLY CHAIN IN PHARMACEUTICAL CIRCULATION

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Objectives Medical finance is the service activity relying on and promoting the development of medical industry. With the rapid development of medical industry, the development of financial service in pharmaceutical circulation is gradually paid more attention.

Methods The financial service mode of supply chain in the pharmaceutical circulation is discussed. The logical framework is researched based on credit consumption theory in the process of medical financial service and analyzed with the combination of value chain theory and game theory. The pharmaceutical supply financial service mode to promote the development of the pharmaceutical industry is taken as the main line and runs through the design and operation of the pharmaceutical financial service mode. Based on the quantitative analysis of Grainger's causality test, the quantitative indexes of the balance of medical consumption credit, sales volume, household savings and disposable income in the financial ecological environment are empirically tested to obtain the design basis of the optimal financial mode.

Results Under the conditions of empirical results and game analysis, the pharmaceutical financial service mode is designed.

Conclusions Finally, the analysis of cases is carried out to obtain the conclusion, limitation and prospect of the research.

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PREPARATION AND DRUG-LOADING PROPERTY STUDY OF MESOPOROUS SILICA NANOPARTICLES AS A NOVEL NANO-DELIVERY VECTOR

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Objectives This study aims to prepare mesoporous silica nanoparticles (MSNs) modified by targeted ingredients, to improve the tumor cell lethality of antitumor drug.

Methods MSNs were prepared by template-hot water method, then were respectively reacted with (3-aminopropyl) triethoxysilane (APTEs) and polyethyleneimine (PEI) to afford two kinds of modified

MSNs (MSNs-NH₂ and MSNs-PEI). The nanocarriers were characterized by their morphology, particle size, Zeta potential and infrared absorption. Meanwhile, doxorubicin (DOX) was loaded within these nanocarriers, the intracellular uptake and *in vitro* antitumor activity of MSNs carriers were evaluated on human breast carcinoma cell line (MCF-7).

Results Three kinds of nanoparticles, MSNs, MSNs-NH₂ and MSNs-PEI were all spherical, their mean diameter were 65±19, 86±27 and 107±34 nm, respectively. Infrared spectrum and differential thermal analysis (DSC) results indicated that the functional groups were successfully linked onto the surface of MSNs. The cellular evaluation results demonstrated that MSNs-NH₂ and MSNs-PEI displayed lower drug release rates than MSNs. Moreover, the cellular uptake of three nanoparticles were 2.05, 2.89, 2.63 times higher than free DOX, and the half maximal inhibitory concentration for MCF-7 cells were 1.77, 2.21, 2.19 times, respectively.

Conclusions The preparative method can be used to prepare MSNs nanocarriers, MSNs-NH₂ and MSNs-PEI has the improved loading property and antitumor activity.

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MOLECULAR DETECTION METHOD OF RANA OIL AND RANA OIL PRODUCTS

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Objectives Rana oil, the oviduct of Chinese forest frog, can be used to ease fatigue and enhance immune function. But there are other species of frogs feigned to be the substitute for Rana oil in the market. In this study, we used the mitochondrial 12S rRNA gene to distinguish the Chinese frog from other frogs.

Methods Improved DNA extraction method for extraction was used. About 20 mg of Rana frog oil dry powder or Rana oil capsules were incubated at 50° using lysate. And then 200 µl of incubation solution, QIAamp quick DNA purification kit was used for purification and concentration. Finally, a pair of primers was used to amplify the mitochondrial 12S rRNA gene, and the amplified fragment was designed to be 430 bp.

Results We successfully obtained a partial sequence of the 12S rRNA gene from two different Rana oil products, Rana oil and Rana oil capsules. Through the NCBI database comparison, we obtained this part of the sequence to distinguish the Chinese Rana from other frogs including *Heilongjiang Rana*.

Conclusions The molecular detection method of Rana oil or Rana frog oil was successfully established to distinguish the Chinese frog from other frogs.

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LI SHIZHEN'S RESEARCH REPORT ON PHARMACEUTICAL CULTURE AND INDUSTRIAL DEVELOPMENT STRATEGY

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Objectives The traditional Chinese medicine is the quintessence and treasure of China and it is the people of all ethnic groups in China for thousands of years to fight disease in the process of forming and development of the unique theoretical system and clinical practical experience. For the Chinese nation has made a tremendous contribution to the development of breeding, has important influence on world civilization.

Methods Literature data, logic analysis, investigation and interview were used.

Results Team on how to better reveal Li Shizhen and compendium of *Materia Medica*, a unique, only my unique economic and cultural value of the study, as well as to push forward the industrialization of traditional Chinese medicine in the problems are analyzed.

Conclusions Since the 1990s, Huanggang Qichun County around the intangible assets, "Li Shizhen" begin "Medical Xingxian" as the strategic goal of economic development, medical herbs; selling medicine became the initial model of development. After more than 10 y of efforts, we have preliminarily formed scale planting, processing, trade and industrialization. Li Shizhen medicine culture and industrialization, must by Li Shizhen medicine culture for idea, take the market as the guidance, take enterprise as the main body, structural adjustment as the main line, supported by advances in technology, brand as the core, combining traditional Chinese medicine (TCM) modernization and biological medicine. Chinese medicine circulation as the carrier, rely on scientific and technological innovation, system innovation and brand innovation, formation of Li Shizhen medicine culture as the leading, planting base of Chinese herbal medicine, medicine industry advantage, advantage pharmaceutical products series of coordinated development pattern.

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57 THE SELECTION AND COUNTERMEASURES OF COLD CHAIN LOGISTICS MODE IN THE PERSPECTIVE OF INDUSTRIAL SYMBIOSIS

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Objectives The implementation of the new medical reform plan and the basic drug system, the new rural cooperative medical care and the construction of urban residents' medical insurance, all of them put forward higher and newer requirements for cold chain logistics. The management level of cold chain logistics and the operation efficiency of pharmaceutical supply chain are directly related to the development of pharmaceutical industry and the benefit of enterprise operation. It is also an important

task to support the reform of health care and guarantee the demand of medicine for the people.

Methods Based on the actual situation of cost sharing and benefit distribution of pharmaceutical industry chain, this paper analyzes the current situation and problems of medical cold chain logistics. By adopting the method of combining qualitative analysis with quantitative analysis, paper studies from the perspective of industry deep motivation and competition and cooperation relations based on pharmaceutical products cold chain logistics operation mode and management system.

Results From the three dimensions of industrial symbiosis unit, industrial symbiosis model and industrial symbiosis environment, this paper puts forward the innovative ideas of constructing the symbiotic system of pharmaceutical industry.

Conclusions The overall optimization scheme of cold chain logistics system based on the symbiosis of the pharmaceutical industry, the stage research results applied to specific business practice, from industry, industries and enterprises with multiple layers of resource integration and information fusion in pharmaceutical cold chain, is conducive to the sustainable development path of pharmaceutical cold chain logistics. The overall optimization scheme of cold chain logistics system based on industrial symbiosis is put forward, and the phased research results are applied to specific enterprises for practical inspection, it is beneficial to explore the sustainable development of cold chain logistics in medicine by integrating resources and information of medicine cold chain from multiple aspects of industry, and enterprise.

58 SYSTEM DESIGN OF SPECIAL DRUG DELIVERY ROBOT BASED ON SENSOR NODE LOCALIZATION

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Objectives Since the special requirements of aseptic demand are higher, it is difficult to complete the artificial delivery.

Methods In this paper, a system design method of special drug delivery robot based on the sensor node localization is proposed. The robot control system carrying special drugs is generally composed of main controller, motion controller, and several modules, in which it needs to exchange the information between these modules. Introducing sensor node localization algorithm can effectively grasp the location of the robot. In the software algorithm, a multi-machine serial communication method based on partition control is proposed, which is applied to the multi-CPU control system of the delivery robot.

Results The experimental results showed that the system can effectively complete the drug delivery, the error was

very low, and the energy consumption was low.

Conclusions The machine can be used in asepsis room of large hospital, and the application effect would be better.

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DEVELOPMENT STRATEGY OF MEDICINE REVERSE LOGISTICS BASED ON SWOT ANALYSIS METHOD

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Objectives China's current medicine reverse logistics is still in its primary stage. Although the theory has been recognized by the medical system, there are still many problems in operation. By studying the ways of returning surplus and expired drugs from hospitals, pharmacies and other sales terminals to manufacturing enterprises, through SWOT analysis method, the medicine reverse logistics of the medical system in China is improved.

Methods The multi-objectives programming, dynamic programming, graph theory and network flow theory were adopted to establish the analytic hierarchy model. The computer simulation method and SWOT analysis method were used to analyze the current situation of the medicine reverse logistics in China, and then put forward measures to promote the development of China's medicine reverse logistics.

Results This study can more specifically put forward the development measures of China's medicine reverse logistics, so as to promote the construction, improvement and development of China's medicine reverse logistics system.

Conclusions By analyzing the current situation of China's medicine reverse logistics, and improving the deficiencies, the long-term development of China's medicine reverse logistics can be promoted, so as to achieve the sustainable development strategy of China's medical system.

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APPLICATION OF 0-1 INTEGER PROGRAMMING METHOD IN MEDICAL DISTRIBUTION CENTER SITE SELECTION

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Objectives The medical distribution needs to be implemented in terms of timeliness, rapidity and safety of distribution, which plays a positive role in strengthening the function and value of the medical industry. In order to achieve the goal of the rationalization construction of medical distribution center and the maximization of distribution efficiency, the site selection of it is discussed.

Methods The dynamic programming, graph theory and network flow theory, and the 0-1 integer programming method were used to construct the mathematical function model, and the site selection and implementation of the medical distribution center were studied.

Results The site selection scheme design and model application have basically realized the promotion and reconstruction of the economic effect and the distribution rapidity of the medical distribution center.

Conclusions The mathematical function model was fully utilized to select the site of the medical distribution center, which has a positive effect on the design of the site selection scheme and the promotion of the function, and has certain reference value for the location planning of medical distribution center and the application of integer programming method.

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DRUG DELIVERY AND SUPPLY WAY BASED ON CLUSTER ANALYSIS

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Objectives The Objectives of this paper is to study the drug delivery and supply way through the cluster analysis method, and design the drug delivery and supply scheme with less cost and better therapeutic effect.

Methods This paper takes the cholera epidemic caused by polluted water source of Haiti earthquake in 2010 as the research object. Firstly, the cluster analysis was carried out for the drug production and demand place. The different drug delivery schemes of 1~5 airplanes were assumed, and the clustering results were analyzed, and then the optimal drug delivery scheme with minimal cost was selected. Secondly, we should establish an improved SIR model to make a simulation analysis for the drug delivery methods, and select the most suitable drug delivery method to inhibit the spread of the disease virus.

Results According to the cluster analysis of the local situation, the best way of drug delivery and supply is to

send an airplane to transport, and when there is a big gap in the extent of the disease disaster in different areas, we should choose the key distribution of drugs and when the gap is small, we choose the uniform distribution of drugs.

Conclusions In this paper, the cluster analysis was used to study the cholera caused by the polluted water source of Haiti earthquake. Finally, the mode of transport by using an airplane and the way of providing the key distribution and uniform distribution of drugs according to the disaster situation were selected.

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Column 4: Biochemical Pharmacy

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TEMPERATURE CONTROL SYSTEM OF CHEMICAL PHARMA REACTION KETTLE

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Objectives The temperature of a chemical pharma kettle is associated with the quality of drug products and the patient's life, health and safety. Therefore, it is significant to control the temperature of chemical pharmacy kettle. As the kettle temperature control comes along with large time delay, time-varying, non-linear characteristics, therefore being more difficult to obtain an accurate mathematical model. In this paper, the genetic algorithm was used to optimize the controller parameters of the adaptive fuzzy Proportion Integration Differentia (PID), and the optimized controller is used to precisely control the temperature of the chemical reaction kettle.

Methods First, when chemical pharmacy kettle had a temperature deviation less than or equal to 80 % of the absolute value, the adaptive fuzzy PID control was used; when the change in the kettle temperature deviation was greater than 80 % of the absolute value, the fuzzy control strategy was used to complete the kettle system design for temperature control. For the fuzzy control, a comprehensive list of its analysis of the algorithm process and theoretical research were given to obtain a combination of adaptive fuzzy PID control and fuzzy control of the control strategy. Secondly, the design of the power supply system was completed for the system. Finally, the configuration and programming of WinCC of the control system were finished with the configured system monitoring interface and related programming; and the advanced algorithms were combined to complete the system design of intelligent temperature control.

Results Through experiments, temperature curve of the chemical pharmaceutical kettle could be achieved in accordance with process requirements. Overshoot was 86 % less than that under traditional control, and the adjustment time was reduced by two times than under the traditional control. The system was quite impressed by dynamic performance, it good time variability presented good control effect on purely lagged and nonlinear systems.

Conclusions Practice has proved that the system improved the system steady-state performance in addition to the temperature control accuracy. The method can also realize online self-tuning and self-tuning of parameters, which is still applicable even if the system model structure has changed. Therefore, the proposed method will help to improve the performance and quality of the temperature control system of the chemical pharmaceutical kettle.

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PREPARATION AND CHARACTERIZATION OF HYDROXYAPATITE-AVERMECTIN NANOCOMPOSITE

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Objectives In order to reduce the amount of pesticide use and reduce environmental pollution, it is a good strategy to make pesticides as slow-release agents. In this paper, the nanocomposites for sustained release of avermectin have been prepared using hydroxyapatite as carrier via *in situ* synthetic reaction.

Methods The hydroxyapatite-avermectin nanocomposites were characterized by X ray diffraction, the infrared spectrum and scanning electron microscope. The amount of avermectin loading, encapsulation efficiency and release from the nanocomposites were determined with HPLC-UV method.

Results The results showed that according to scanning electron microscope graphs, the surface morphology of the hydroxyapatite-avermectin nanocomposites was flocculent. The nanocomposites were uniform in size, and the average size was 100 nm. The amount of avermectin loading was 291.3 mg/g, and the entrapment efficiency was 41 %. The amount of avermectin released from the nanocomposites less than 30 % within 2 h, and avermectin was released slowly into a bulk solution for about 12 h, thus exhibited a typical sustained release pattern without burst effect.

Conclusions The hydroxyapatite-avermectin nanocomposite prepared via *in situ* synthesis displayed good sustained-release performance. Therefore, it shows that the hydroxyapatite has a promising future in applications of sustained pesticide release.

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PEPTIDE SYNTHESIS USING SBA-15 IMMOBILIZED A-CHYMOTRYPSIN

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Objectives We mainly aim to study the possibility of using SBA-15 immobilized α -chymotrypsin as a catalyst for peptide synthesis in ethyl acetate almost nonaqueous media.

Methods Immobilization of α -chymotrypsin in SBA-15 was carried out via vacuum adsorption. The activity of immobilized α -chymotrypsin was measured using the Hummel method. To follow the course of reaction, samples were analyzed by means of thin-layer chromatography performed on silica gel G precoated plates. Quantification of the substrates or the peptide products was carried out by high-performance liquid chromatography.

Results It can produce the immobilized enzyme of high activity around 90 % of free enzyme by vacuum adsorption. In the reaction, the conversion of BOC-Phe and Arg-OMe into BOC-Phe-Arg-OMe catalyzed by immobilized α -chymotrypsin increased with temperature, reaching highest 53.3 % at 45°, while for free enzyme 11.5 % at 34°, which shows that the thermal stability and activity of immobilized α -chymotrypsin are much higher than that of free α -chymotrypsin. The result of conversion with time shows that the conversion reaches highest at 40 h for immobilized α -chymotrypsin.

Conclusions The α -chymotrypsin immobilized in silica mesoporous material SBA-15 can be used as an effective catalyst for peptide synthesis in organic media.

Acknowledgements This research was financially supported by Development and Reform Commission of Jilin province (Grand No.2014Y091).

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CELL PENETRATING PEPTIDES AND TRASTUZUMAB MODIFIED PROTAMINE-SIRNA MULTIFUNCTIONAL LIPID NANOPARTICLES TARGETING HER2 IN BREAST CANCER

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Objectives We constructed cell penetrating peptide oleoyl-nonaarginine (OA-R9) and trastuzumab modified protamine-siRNA multifunctional lipid nanoparticles (sTO-LNP). sTO-LNP was composed of a protamine-siRNA core, OA-R9, cationic and active lipids and trastuzumab as targeting ligand. All formulations were optimized in detail regarding their potential cytotoxicity and ability to penetrate and enter into HER2-positive breast cancer cells. Flow cytometry analysis and confocal laser scanning microscopy (CLSM) were performed to compare the transfection efficiency of sTO-LNP.

Methods Ethanol dilution method was used to prepare sO-LNP. Briefly, OA-R9 and a mixture of cationic and active lipids were dissolved together in ethanol. Protamine was dissolved in citrate buffer (20 mM, pH 4.0). Then, the

lipid solution was added into the protamine solution under stirring. The siRNA solution was injected into above mixture with vortexing for 30 s. Second, trastuzumab was incubated with the suspension of sO-LNP for 1.5 h at room temperature at a 1/20 to form sTO-LNP.

Results sTO-LNP from DOTAP and DSPE-PEG2000-Mal displayed excellent gene silencing effect with high cell membrane permeability and significant human epidermal growth factor receptor-2 (HER2) targeting in BT474 cells, where the optimizing mass ratio of siRNA/protamine/lipid was 2/0.8/25. Furthermore, sTO-LNP showed higher cellular uptake efficiency and gene silencing activity in BT474 cells than sO-LNP, sT-LNP and sLNP.

Conclusions Multifunctional lipid nanoparticles with dual-target design are promising delivery vehicles for siRNA delivery in clinical applications.

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SYNTHESIS AND CHARACTERIZATION OF TbL_{1.5}(OH)_{1.5} LUMINESCENT COMPLEX

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Objectives Rare earths with unique biological activity belong to lanthanide in the chemical periodic table. They can form rare-earth compounds with the ligand which has a specific physiological activity.

Methods Rare earth terbium [Tb(III)-benzoic acid [HL] binary luminescent complex has been synthesized by precipitation method.

Results The chemical constitution of the complex has been demonstrated as TbL_{1.5}(OH)_{1.5} by a combination of elemental analysis, inductively coupled plasma-atomic emission spectroscopy and Fourier-transform infrared spectroscopy. X-ray diffraction analysis has shown that the complex is a new kind of crystal whose structure is totally different from two ligands. The morphology of the complex has been investigated by scanning electron microscopy and transmission electron microscopy. The results have shown that the complex has a flake crystal structure and the diameter of the rod is about 1-2 μ m.

Conclusions Thermogravimetric analysis has indicated that the luminescent complex is thermally stable below 400°. Photoluminescence spectra have revealed that the complex can emit Tb³⁺ characteristic green fluorescence under ultraviolet excitation.

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THE INFLUENCE OF LIPID SELF-ASSOCIATION IN POLYSACCHARIDE MATRIX ON CONTROLLED-RELEASE OF BUTYL HYDROXY ANISD

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Objectives The phenomenon of lipid self-association arises when the lipid blend with hydrophilic substance. The hydrophobic force leads to the aggregation of small lipid particles into bigger ones and form micelles with different sizes at last. Nevertheless, some modified methods, for example homogenization and ultrasonic treatment can effectively prevent the lipid self-association, affect the final internal microstructure of the matrix, and then improve the release performance of the lipid-polysaccharide drug loading matrix. The aim of this work was to indicate the influence of lipid self-association in the oleic acid (OA)/carboxymethyl cellulose (CMC) emulsions on the controlled-release of butyl hydroxy anisid (BHA).

Methods BHA were grounded into powder and dissolved in OA with the weight ratio of 1:4 (BHA/OA). Then, the oily solution and the phospholipid-glycerol solution were both added into CMC aqueous solution. To obtain different lipid particle sizes, samples except control were carried out using a Fluko FA25 homogenizer with different rotor speed (13000, 16000, 19000 and 22000 rpm). The particle size distribution was measured and statistics immediately using a OMEC JS-900 laser particle sizer. Then, all the samples were air dried into solid state and carried on water solubility test and drug dissolution rate test, respectively. The whole experiment process was under the indoor temperature (25°) in order to prevent OA from being oxidized.

Results The samples show various degree of lipid self-association, which lead to difference of the water solubility of CMC matrix and the dissolution rate of BHA. In the range of the experiment, with the lipid particle size reduces, the water solubility and the drug dissolution of samples were both progressively becoming steady and slow. For the release rate, the 22 000 rpm sample present a 19, 15 and 9 % promotion than the 13 000 rpm sample at the time point of 3, 6 and 9 h.

Conclusions As an oil-soluble antioxidant, the controlled-release behavior of BHA is notably affected by the lipid particle size in the polysaccharide matrix. The smaller lipid particle size is providing longer lasting control-release.

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68 SECONDARY DEVELOPMENT OF LONG-ACTING PEGYLATED RECOMBINANT HUMAN GROWTH HORMONE

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Objectives Pegylated recombinant human growth hormone (rhGH) is administered once a week, which greatly improves patients' compliance. However, the limited product capacity is insufficient to meet the increasing market demand. Therefore, it is urgent to carry out technological upgrading and industrialization research.

Methods We developed a special PEG coupling technology. GH coupled with PEG through the particular coupling technology. By a series of purification steps including gel chromatography and ion exchange chromatography, we can obtain PEGylated rhGH solution more than 96 % purity. To determine the product expansion process, laboratory research and pilot expansion research and process validation of pegylated rhGH have been researched.

Results The input amount of GH was amplified to 450 g scale. The product quality indicators and others were consistent with the original products as followed: (a) the amount of relative protein is no more than 6 %; (b) the level of residual polymer keeps less than 4 %; (c) the unmodified GH can't exceed 1 % of total; (d) the biological activity of endotoxin should less than 5 EU/mg.

Conclusions Through the validation of production processes ensures the optimized process for pegylated rhGH amplification scale production process was stable. Technological upgrading and industrial research on the existing production process was researched, which can not only improve product quality but also increase production capacity.

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6-ETHOXY-2-BENZOTHAZOLESULFONAMIDE-LOADED PLGA MICROSPHERES FOR THE TREATMENT OF GLAUCOMA

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Objectives Glaucoma is a leading cause of irreversible blindness worldwide. For the treatment of glaucoma, lowering of intraocular pressure (IOP) is an effective method in clinic. 6-Ethoxy-2-benzothiazolesulfonamide (ETOX), a kind of carbonic anhydrase inhibitor, which could restrain aqueous humor generation and then reduced the increased IOP. PLGA (poly (D, L-lactide-co-glycolide)), a biodegradable polymer which approved by FDA, was widely used in the field of controlled drug delivery systems. 6-Ethoxy-2-benzothiazolesulfonamide (ETOX), a kind of carbonic anhydrase inhibitor, which can restrain aqueous humor generation, thus reduced the IOP.

Methods In this study, We designed and characterized microspheres loaded with ETOX, the amount of the released ETOX was measured by HPLC, and the efficacy of the microspheres were evaluated *in vivo* in rabbit eyes after subconjunctival injection. *In vivo* study, after injection the microspheres into the conjunctiva, we measured the IOP at 4 h, 1 d, 2 d, 4 d, 6 d.....22 d by icare TONOVET.

Results As shown in Fig.1, the SEM analysis showed that

the microspheres exhibited smooth surface and a good spherical shape, with an average particle size of 25 μm . The drug loading of the microspheres was 12.6 %, and ETOX was released from the microspheres over more than 28 d, besides, *in vivo* study, IOP could sustained reduce for 16 d in rabbits. Hence, the prepared microspheres showed promising application for the treatment of glaucoma.

Acknowledgements This work was supported by the collaborative innovation center Project of Zhuhai city (Grant No. 2015XTCX08).

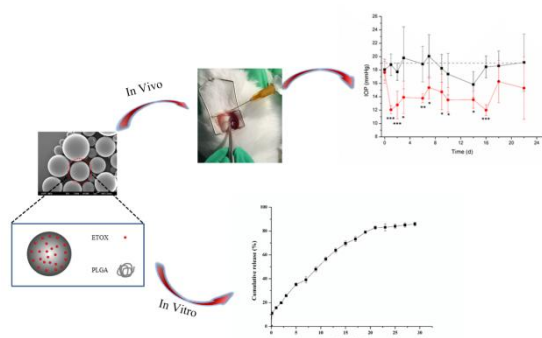


Fig. 1: *In vivo* and *in vitro* study of ETOX Microspheres
 —■— Control; —●— PLGA MS; --- base line

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CARNOSIC ACID EXHIBITS ANTITUMOR PROPERTIES IN PITUITARY ADENOMA CELLS VIA ROS-DEPENDENT MITOCHONDRIAL SIGNALING PATHWAYS

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Objectives The present study aims to evaluate the antitumor activities of carnosic acid (CA) in pituitary adenoma (MMQ and GH3 cells) *in vitro* and GH3-xenografted nude mouse model.

Methods Cell viability, apoptosis rate, cell cycle, mitochondrial membrane potential (MMP) and intracellular reactive oxygen species (ROS) level were determined by 3-(4,5)-dimethylthiazolium propidium iodide double staining, propidium iodide staining, 2',7'-dichlorofluorescein-diacetate and 5,5',6,6'-tetrachloro-1,1',3,3'-tetraethylbenzimidazolylcarbo cyanine iodide staining, respectively. The expressions of pro-apoptosis and antiapoptosis proteins were detected by western blot. A GH3-xenografted nude mouse model was applied to further confirm the antitumor activities of CA.

Results CA remarkably reduced cell viability, caused G1 phase arrest, initiated apoptosis in pituitary adenoma cells. 12-h exposure to CA strongly caused increment on ROS levels and apoptotic alternations on mitochondria functions. Furthermore, the enhanced levels of cytosol cytochrome C and Bax, and the reduced expressions of Ras, B-cell lymphoma 2 (Bcl-2) and B-cell lymphoma-extra-large (Bcl-xL) were noted in 24-h CA treated pituitary adenoma cells. CA strongly suppressed tumor size without influence bodyweight in GH3-xenografted mice.

Conclusions CA effectively induces pituitary adenoma cells apoptotic death through ROS-dependent mitochondrial pathways.

Acknowledgements This research was financially supported by Preponderant Discipline Program of Zhuhai city (Grand No. 2015YXXK08).

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ANTIBACTERIAL MECHANISM OF ANTIMICROBIAL PEPTIDE EXTRACTED FROM EPIDERMIS OF RANA CHENSINENSIS

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Objectives Antimicrobial peptides provide cell-free immunity to plants and animals. They have low molecular weights, good thermostability, and low antigenicity. Antimicrobial peptides from *Rana chensinensis* have been shown to have significant bacteriostatic effect. In this study, the antibacterial mechanism of antimicrobial peptides was studied by ultraviolet spectrophotometry.

Methods For peptide extraction, 6 % acetic acid was used on *Rana chensinensis* with ultrasound. The extraction solution was mixed with *Candida albicans* at 1:4 ratio. Then, absorbance values at 260 and 280 nm were measured on a UV spectrophotometer at 0, 0.5, 1 and 2 h.

Results When the antimicrobial peptides extract was added to bacteria culture for 0.5 h, absorbance value was significantly increased. Indicating that *Rana chensinensis* antibacterial peptides could destroy the cell membrane structure and trigger the release of intracellular nucleic acid and protein from the cell.

Conclusions In summary, we studied the antibacterial mechanism of antimicrobial peptides. *Rana chensinensis* antibacterial peptides primarily act on the microbial cell membrane, through increasing membrane permeability. Therefore, the antimicrobial peptide is not easy to induce drug resistant and may become a new class of anti-infective drugs.

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DEVELOPMENT AND VALIDATION OF LC-MS/MS METHOD FOR QUANTIFICATION OF PSEUDOLARIC ACID B FROM THE ROOT BARK OF PSEUDOLARIX KAEMPFERI IN RAT PLASMA

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Objectives Pseudolaric acid B (PAB), which is the main biologically active diterpene acid of *Pseudolarix kaempferi*, has presented antifungal, antitumor, antifertility, and antitubulin activities. To promote efficacy and to avoid toxicity, it is valuable to describe the pharmacokinetic properties of PAB. Several methods for the separation and analysis of PAB in raw herbs have been reported; however, to the best of our knowledge, none of these methods has been used for pharmacokinetic studies.

Methods Herein we employ a liquid chromatography–tandem mass spectrometry (LC–MS/MS) method for quantitation of PAB in rat plasma in support to a project to understand pharmacology feature.

Results The calibration curve was linear over the range of 0.86–288 ng/ml with correlation coefficient (*r*) greater than 0.995 for PAB, and the lower limit of quantification was 0.86 ng/ml in rat plasma. The accuracy of PAB was between –9.1 and 7.0 % relative error, and precision ranged from 1.2 to 10.6 % relative standard deviation.

Conclusions This method was successfully applied to the pharmacokinetic studies of PAB in Sprague-Dawley rats. After single intravenous administration of 2.0, 4.0, and 8.0 mg/kg PAB to rats, the $t_{1/2}$ were 16.1 ± 5.6 , 30.0 ± 13.7 , and 27.4 ± 5.3 min, respectively. The pharmacokinetics ($C_{2\text{min}}$, AUC) of PAB within the used dosage range were in accordance with linear pharmacokinetic characteristics.

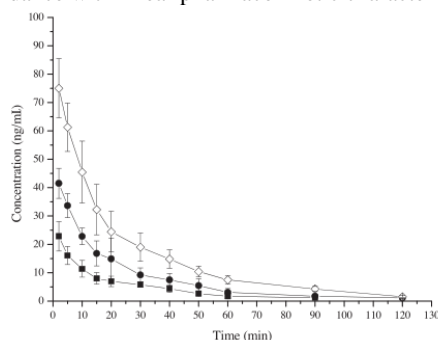


Fig. 1: Mean plasma concentration-time curves of PAB following intravenous bolus injection of PAB at doses of 2.0, 4.0 and 8.0 mg/kg to rats

—■— 2 mg/kg; —●— 4 mg/kg; —◇— 8 mg/kg *n*=6, mean±SD

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CATIONIC LIPOSOMAL DELIVERY OF NIFEDIPINE TO IMPROVES SOLUBILITY AND ORAL BIOAVAILABILITY

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Objectives Nifedipine is commonly used to treat

cardiovascular disease as a calcium channel blocker agent. But nifedipine exists several disadvantages in clinical application: including low solubility, photo-instability, and low bioavailability.

Methods There are two major barriers for nifedipine absorption in intestinal. (1) Hydrophobic nifedipine is difficult to penetrate hydrophilic intestinal mucus of intestinal tract. (2) If improving the hydrophily of nifedipine, epithelial cells also block the oral bioavailability of hydrophily agent.

Results In this study, we developed a novel cationic liposomal nifedipine delivery system (nifedipine proliposomes), which was based on polyetherimide-2000 conjugated stearic acid (PEI-STA), egg PC, cholesterol and PEG2000-DSPE to form liposomes. Liposomes were freeze-dried with freeze-drying protective additive to prepare precursor liposomes (pro-liposomes). The hydrophilic PEG layer could improve the fusion ability of liposomes with mucus, in addition the cationic PEI-STA could enhance the epithelial cells penetrability of nifedipine.

Conclusions The pharmacokinetics of nifedipine and nifedipine proliposomes after oral administration in rats were shown in fig. 1. Proliposomes significantly improved the bioavailability of nifedipine. The AUC_{last} of nifedipine proliposomes was 10.2 times comparing with nifedipine. Nifedipine proliposomes could prolong the plasma half-life of the nifedipine (6.30 h vs. 1.39 h). In conclusion, nifedipine proliposomes was a promising delivery vehicle to improve oral bioavailability of nifedipine.

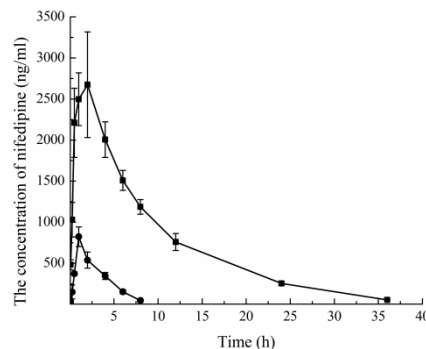


Fig. 1: The concentration-time profiles of nifedipine after oral administration nifedipine and nifedipine proliposomes in rats

—■— Nifedipine; —●— Nifedipine proliposomes

Acknowledgements This research was supported by Science and Technology Planning Project of Jilin Province in China (Grant No. 201587).

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WAN-NIAN-QING FORMULA INDUCES GASTRIC CANCER CELL APOPTOSIS VIA CASPASE-DEPENDENT MITOCHONDRIAL PATHWAY

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Objectives Gastric cancer is one of the most common digestive tract cancers in Japan, South Korea and China. *Wan-nian-qing* formula, a traditional Chinese compound formula mainly containing *Ornithogalum Caudatum*, has been used for gastric cancer treatment in clinics for years in China; however, its underlying mechanisms are still not clearly explored. The present study aims to investigate the antigastric cancer effects of *Wan-nian-qing* formula in cells and tumor-xenografted mouse models.

Methods *Wan-nian-qing* formula significantly decreased cell viability, inhibited cell proliferation and migration, enhanced apoptosis, and increased caspase-3, -8, and -9 activities in MGC-803 and BGC-823 cells, *in vitro*. Specifically, *Wan-nian-qing* formula led to a decreased mitochondrial membrane potential (MMP) and increases in intracellular reactive oxygen species (ROS) levels and apoptosis-related protein expression.

Results In *in vivo* experiments, 14-d *Wan-nian-qing* formula administration strongly suppressed tumor growth in MGC-803 and BGC-823-xenografted nude mice without influence on their body weights. Moreover, *Wan-nian-qing* formula increased the levels of cleaved poly-ADP-ribose polymerase (PARP), Bad, and Bax and reduced the expressions of B-cell lymphoma 2 (Bcl-2) in treated cells and tumor tissues.

Conclusions All aforementioned results suggest that caspase-dependent mitochondrial apoptotic pathways are involved in *Wan-nian-qing* formula-mediated antigastric cancer.

Acknowledgement This work was supported by the Special Projects of Cooperation between Jilin University and Jilin Province (SXGJSF2017-1).

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PHYLOGENETIC RELATIONSHIP OF LEPISTASORDIDA JZ01 AND ANTIMICROBIAL ACTIVITY OF ITS FERMENTATION BROTH EXTRACT

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Objectives Natural antimicrobial agents were widely investigated from animals, plants and microbial sources as alternatives used in food and cosmetics. The objectives of this investigation was determined, the phylogenetic relationship between *Lepistasordida* strain JZ01 and other strains and fruit bodies. And further research its antimicrobial activity.

Methods *Lepistasordida* JZ01 was collected from Zhuhai College of Jilin University. Phylogenetic relationship of fruit bodies and strains collected different areas was investigated using internal transcribed spacer (ITS) sequences approach. Fermentation broth extracts were prepared using ethyl acetate and n-butyl alcohol. The filter paper method was used to test antimicrobial activity.

Results The neighbor joining phylogeny tree constructed from the similarity of the nucleotide sequence of 5 isolates clustered them into two major groups including strains and fruit bodies. *Lepistasordida* JZ01 and *Lepistasordida* strain

collected from Heilongjiang was closest. The results showed >99 % similarity during blast analysis. And extract from ethyl acetate phase extracted from *Lepistasordida* JZ01 fermentation broth has best inhibition effect on the growth of the selected strains. The diameter of inhibition circle was *Serratia marcescens* (G-, 12 mm), *Escherichia coli* (G-, 8 mm), *Pseudomonas aeruginosa* (G-, 10 mm), *Bacillus subtilis* (G+, 9 mm) and *Staphylococcus aureus* (G+, 9 mm), respectively. The result showed ethyl acetate phase extracted has strong inhibitory effect to *Serratia marcescens*. And the antibacterial effect of n-butyl alcohol extract was not obvious.

Conclusions The inhibition effect on G+ and G- of *Lepistasordida* JZ01 fermentation broth extract was illustrated. It is very value to further develop the *Lepistasordida* JZ01 as a natural antibacterial agent.

Acknowledgments The research was supported by Department of Education of Guangdong Province "Innovation Strong School Project"(Research on submerged fermentation of *Lepistasordida* JZ01 and its activities 2016KQNCX208) and collaborative innovation center Project of Zhuhai city (Grant No. 2015XTCX08).

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SUSTAINED DRUG RELEASE ATTAINED BY TARTARIC ACID CROSS-LINKED POLY (LACTIC ACID)

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Objectives Physical entrapment of inert drugs into the poly (lactic acid) resin matrix, in various forms, e.g. nanoparticle, fiber and scaffold, is a crude yet practical method of the drug carrying. Nevertheless, the convenience and low-cost methodology is accompanied with unstable drug release rate and initial burst release. We aim to develop a trapping process to improve the release performance by tartaric acid cross-linking, which does not involve delicate processing or complex manipulation.

Methods The lactic acid monomer and esterified aspirin (as model drug) were mixed with the weight ratio of 100:1 and direct melting poly-condensation was done under conventional conditions to synthesize the eigen drug-loaded polylactic acid (PLA). Various amount of tartaric acid (1, 3, 6, and 10 %) were introduced in the raw mixture to cross-link the linear PLA chains to obtain a rubber-like resin matrix. Mechanical characterizations and release experiments in phosphate-buffered saline (pH=7.4; 37°) has been done to determine the optimal tartaric acid addition percent.

Results All the samples showed various degrees of cross-linkage, and the viscosity and elastic modulus increase with the amount of tartaric acid. Unstable and initial burst release can still be observed in the 1 and 3 % samples. The 6 and 10 % samples present a steady sustained drug release behavior, while the 10 % one only provides a slightly lower release rate, which may not compensate for the sacrifice on processing.

Conclusions The tartaric acid is efficient to cross-link the PLA matrix and stabilize the physically entrapped drug particles. The addition of 6 % was found to be an optimal option to achieve the balance of sustained releasement and processing properties.

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PHOTOTHERMAL COPPER SULFIDE -MONOCLONAL ANTIBODY NANOSPHERES FOR TARGETED THERAPY OF CANCER

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Objectives Developing novel high-performance nanospheres is indispensable for cancer theranostic application. Herein, low-biototoxicity photothermal copper sulfide (CuS) nanoparticles have been coupled with a nimotuzumab, a monoclonal antibody drug, via a facile bioconjugation strategy to prepare bifunctional CuS-nimotuzumab nanospheres for gastric cancer therapy.

Methods CuS nanoparticles capped by mercaptopropionic acid were synthesized by hydrothermal method using copper chloride and sodium sulfide as the precursors, which were then reacted with amino-modified polyethylene glycol (PEG). Nimotuzumab was reduced by dithiothreitol (DTT) and purified by gel filtration. Meanwhile, CuS-PEG nanoparticles in borate saline buffer (pH 8.4) was activated by sulfo-SMCC and then purified. Subsequently, the reduced nimotuzumab was reacted with the activated CuS-PEG nanoparticles, producing the CuS-nimotuzumab nanospheres.

Results The bifunctional CuS-nimotuzumab nanospheres had spherical profile and an average size of 44.3 ± 5.1 nm. Under irradiation of 980 nm laser, the nanospheres were heated efficiently, as evidenced by temperature increase from room temperature to 47° . The conjugated nimotuzumab is tumor-targeting and able to inhibit tumor growth. The nanospheres had synergistic treating effect on cancer by combined targeted therapy and photothermal ablation.

Conclusions The low-biotoxic CuS-nimotuzumab nanospheres have been prepared, characterized and successfully applied to combined targeted therapy of gastric cancer. This work has expanded the fabricating strategies of theranostic nanospheres and may contribute to the development of nanotheranostics.

Acknowledgements This research was financially supported by Preponderant Discipline Program of Zhuhai city (Grand No. 2015YXXK08).

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A NOVEL SYNTHETIC COMPOUND INDUCES HEPATOCELLULAR CARCINOMA CELL APOPTOSIS VIA MITOCHONDRIAL PATHWAY

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Objectives The present study aims to evaluate the cytotoxicity activities of a novel synthetic compound in HepG2 and SMMC-7721 cells and their-xenografted nude mouse models.

Methods A series of novel compounds contained furan rings were synthesized, and one of them named NC09 was confirmed to show antitumor effects in cells. MTT assay, flow cytometry assay, JC-1 staining and western blot were used to detect the changes of cell viability, apoptosis rate, mitochondrial membrane potential (MMP) and the expression of pro-apoptotic and antiapoptotic protein expressions after 24-h NC09 incubation in HepG2 and SMMC-7721 cells. SMMC-7721- and HepG2-xenografted tumor mouse models were applied to confirm its pro-apoptotic effects.

Results NC09 strongly reduced the cell viability, increased apoptosis rate, and caused apoptotic alternations on mitochondrial dysfunction in both HepG2 and SMMC-7721 cells. Data obtained from western blot showed that NC09 significantly enhanced the levels of Bax, cleaved caspase-3, -8 and caspase-9, and reduced the expressions of B-cell lymphoma 2 (Bcl-2). In both SMMC-7721- and HepG2-xenografted tumor mice models, 14-d NC09 treatment significantly inhibited the tumor growth.

Conclusions NC09 showed significantly antihepatocellular carcinoma effects in HepG2 and SMMC-7721 cells, and their 2-xenografted tumor mouse models, which may be related with its modulation on mitochondrial pathway.

Acknowledgements This research was financially supported by Zhuhai City Key Laboratory of novel drug delivery system (Grant No. 2015ZDSYS13).

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A POROUS ZN-AMINOTRIAZOLATO-OXALATE METAL ORGANIC FRAMEWORK AS A HIGHLY EFFECTIVE CATALYST FOR CO₂ CONVERSION

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Objectives A porous Zn-aminotriazolato-oxalate metal organic framework (MOF), with a formula $Zn_2(C_2O_4)(C_2N_4H_3)_2 \cdot (H_2O)_{0.5}$, has been investigated its catalytic activity by CO₂ conversion (fig. 1), considering its strongly interacting with CO₂.

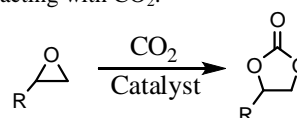


Fig. 1: CO₂ cycloaddition with epoxides to cyclic carbonate

Methods The catalyst is synthesized referring to the literature, and is dried at 353 K for 6 h under vacuum prior to reaction. The catalytic reaction is pressurized with CO₂ (99.999 %) to 1.0 MPa, and heated to 100°. The product

was analyzed by gas chromatography–mass spectrometry (GC-MS).

Results The powder X-ray diffraction (PXRD) pattern of the catalyst (fig. 2) indicates the as-synthesized catalyst is coincident with the simulated one, and the desolvated catalyst maintains its structure. As seen in Table 1, the conversion of propylene oxide increases with prolonging the reaction time (entry 1-3), and the substrate of epichlorohydrin and epibromohydrin reach a high conversion in 24 h (entry 4, 5).

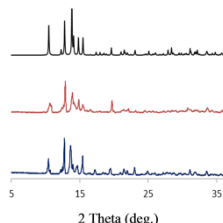


Fig. 2: The PXRD pattern of the catalyst
— Simulated; — as-synthesized; — desolvated

Table 1 Reaction of various epoxides with CO₂

Entry	Substrate	Time/h	Conversion/%
1		4	71
2		8	90
3		24	99
4		24	95
5		24	98

Reaction conditions: epoxides (20 mmol), catalyst (0.11 mmol), KI (0.1 mmol)

Conclusions Catalytic activity of the MOF was confirmed by remarkably high efficiency on CO₂ cycloaddition with epoxides, which was supposed to the attribution of its strongly interacting with CO₂.

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80 THE ANTIFATIGUE EFFECT OF CALF SPLEEN EXTRACTIVE INJECTION AND ITS UNDERLYING MECHANISM

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Objectives Calf Spleen Extractive Injection (CSEI), a small peptides enriched extraction from healthy cows

(within 24 h of birth), possesses immunomodulatory and platelet enhancement activities. This study aims to evaluate the antifatigue effect of CSEI (2.25, 4.5 and 9 mg/kg) and its underlying mechanism in C57BL/6 mice.

Methods After 28 d intraperitoneal injection of CSEI, the open field test and exercise tolerance tests of mice were studied. Moreover, the fatigue related biochemical indices in serum and tissues were detected after 30 min swimming.

Results The open field test showed that there was no effect of CSEI on the autonomous behavior of mice. The running and loading swimming time of mice were significantly enhanced in a dose-dependent manner compared to the control group. Additionally, the concentration of serum ATP and liver glycogen as well as the muscle glycogen were improved especially in 4.5 mg/kg and 9 mg/kg-injected CSEI mice. The western blot assay of liver tissue indicated that the phosphorylation level of AMPK was significantly promoted.

Conclusions Taken together, our results revealed that CSEI displayed an antifatigue effect on mice and the AMPK pathway was related to this function.

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81 DEVELOPMENT AND PHARMACODYNAMICS OF GASTRODIA ELATA PEPTIDE GYNECOLOGICAL ANTIBACTERIAL GEL

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Objectives *Gastrodia elata* peptide, a macromolecule substance, which derived from *Gastrodia elata*, has various pharmacological bioactivities. The present study aims to develop a compound gel agent regarding *Gastrodia elata* peptide as main drug ingredient for prevention and treatment of gynecological inflammatory diseases. In addition, the gel was further evaluated systematically and deeply from physical and chemical properties, stability, safety and antibacterial activity *in vitro*.

Methods The optimal drug formula was used to prepare the compound gynecological antibacterial gel. The quality of the preparation was evaluated by the shape observation, pH value test, heat resistance, cold tolerance, heavy metal and peptide content. The stability of the gynecological antibacterial gel was investigated by accelerating experiment, room temperature sample observation and centrifugal test. The safety was assessed by mouse acute oral toxicity test, multiple vaginal mucosal irritation test, skin irritation and eye irritation test. *In vitro* antibacterial test was used to detect the inhibitory rate of bacteriostatic gels against *Candida albicans*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*, accompanying with the diameter of the inhibition zone.

Results The gynecological antibacterial gels prepared in this experiment were light yellow, translucent viscous gel and non-irritating odour. pH values in the range of 3.0-5.0. Its quality standards in line with the 2015 version of the

"People's Republic of China Pharmacopoeia" requirement. The stability test showed that the gynecological bacteriostatic gels were even and transparent, no stratification, pH values and peptide content have no obvious change after long-term preservation. Cold and heat-resistant test results also further identified that the bacteriostatic gels were stable after 24 h of storage, without significantly difference. Toxicological safety test of gynecological bacteriostatic gel results indicated that the gels were safe and consist with mucosal preparations owing to have no obvious irritation on vaginal mucosa, skin and eye in rabbit. *In vitro* bacterial suspension sterilization test results showed that 100 % *Gastrodia elata* peptide gels affected for 2 min, the killing rate of *Candida albicans* was 90.7 %, *Staphylococcus aureus* was 98.9 %, *Escherichia coli* was 94.5 %, *Pseudomonas aeruginosa* was 94.7 %. At the same time, the results of the filter paper diffusion method demonstrated that the bacteriostatic gels have obvious inhibition zone and the entire average diameter more than 8 mm. The toxicology test report from Shanxi Provincial Institute of Traditional Chinese Medicine Food Cosmetics Inspection and Testing Center, which is authorized by MOH (Ministry of Health), is a qualification. **Conclusions** Preparation of *Gastrodia elata* gynecological antibacterial gel was light yellow, transparent, uniform texture, without irritating odour, with stable physical and chemical properties, low toxicity, no irritation and high security. The preparation process is practicable, stable and reliable. It has effective antibacterial activity against four common pathogens and suitable for the prevention and treatment of gynecological inflammation in clinic. Our data will also provide theoretical basis for the development of new antibiotics.

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Column 5: Healthcare Informatics

82 ELECTROENCEPHALOGRAPHY OF BRAIN MAINTAINING INFORMATION BASED ON THE RTMS

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Objectives By studying the brain's mechanism of information retention, this paper can find the location of brain regions that play a key role in information retention.

Methods This research using rTMS (Repetitive Transcranial Magnetic Stimulation, rTMS) intervenes key regions, combining with electroencephalography (EEG), to acquire subjects' brain electrical signal, by extracting energy and phase characteristics of relevant frequency bands brain electrical signal and studies the activity and the connection of the brain interval while the brain stays at the phase of information retention.

Results Under the effect of rTMS, the changes in the parietal cortex were more obvious, and the connection between the left parietal lobe and the frontal lobe was enhanced.

Conclusions The left frontal lobe and parietal lobe are the key brain regions involved in "information retention". With the increase of memory load, the relationship between the two brain regions of the left prefrontal lobe and parietal lobe is strengthened, which plays a positive role in the efficiency of "information retention".

83 EEG PERCEPTION MODEL

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Objectives In this paper, we study the local and global perception patterns by analyzing scalp brain signals, and propose a new single channel EEG pattern recognition algorithm to analyze the brain perception patterns.

Methods The algorithm based on total empirical mode decomposition (EMD) and recursive quantitative analysis is applied to the study of single channel hypoxia EEG model, which can detect the early hypoxia in brain, and can also describe the change of the degree of hypoxia through the EEG model

Results The multi-mode empirical mode decomposition (EMD) is used to extract the common modes of multiple channels and analyze the synchronization, which can clearly describe the changes of connectivity of whole brain functional networks in hypoxia environment.

Conclusions The use of multivariate empirical mode decomposition not only avoids the complicated optimization process of the carrier wave band, but also reduces the influence of individual differences among the subjects. The improved algorithm is also used in EEG analysis. The improved feature extraction algorithm is more suitable for the analysis of scalp EEG signals, and can better distinguish the spatial and temporal patterns of EEG after different fingers are stimulated

84 RESOURCE ACQUISITION MODE OF CLOUD MEDICAL SERVICE BASED ON DISTRIBUTED THOUGHT AND CLOUD STORAGE

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Objectives Reveal the mechanism of cloud e medical service resource acquisition; construct the resource acquisition model and its implementation system of cloud medical service based on distributed thought and cloud storage; design the framework and implementation mechanism of cloud medical service resource acquisition system based on cloud computing and cloud storage.

Methods The system theory and its method is used to reveal the acquisition mechanism of cloud medical service resources; distributed thinking and cloud storage methods are used to design the cloud medical service resource

acquisition system; cloud computing method is used to implement the cloud medical service system.

Results Cloud medical service resource acquisition process consists of resource discovery, resource sharing, resource dissemination and resource acquisition and other steps; the cloud medical service resource acquisition system is consists of subsystems such as resource discovery subsystem and resource sharing subsystem; the effective application of cloud computing and cloud storage is conducive to the acquisition of cloud medical service resources.

Conclusions The resource acquisition mode of cloud medical service based on distributed thought and cloud storage is highly effective for realizing the sharing of medical service resources. The new mode of cloud medical service based on distributed thought and cloud storage is helpful to solve the contradiction between demand and supply of medical service capacity in China, and to achieve the green medical service.

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ENVIRONMENTAL EFFECT EVALUATION OF INDUSTRY CONVERGENCE OF MEDICAL DEVICE INDUSTRY AND MEDICAL SERVICE INDUSTRY AND ITS INFLUENCING FACTORS

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Objectives Construct the environmental effect evaluation index system and evaluation model of industry convergence of medical device industry and medical service industry; reveal the mechanism and influencing factors of environmental effect of industry convergence of medical device industry and medical service industry; measure the influence strength and direction of influence factors of industry convergence of medical device industry and medical service industry.

Methods The system theory method is used to construct the evaluation system of environmental effect of industry convergence of medical device industry and medical service industry; modeling method and AHP method are used to construct its evaluation model; empirical research method and regression analysis method is used to measure the influence direction and intensity of influence factors on the environmental effects of industry convergence of medical device industry and medical service industry.

Results Established the comprehensive evaluation index system of environmental effect of industry convergence of medical device industry and medical service industry which consists of direct effect and indirect effect factors; constructed the comprehensive evaluation model of

environmental effects of industry convergence of medical device industry and medical service industry based on AHP method; measured the influence direction and intensity of influence factors on the environmental effects of industry convergence of medical device industry and medical service industry.

Conclusions The environmental effect of industry convergence of medical device industry and medical service industry is consists of direct effect and indirect effect factors; the industry convergence; the industry property, technology intensity, convergence level and convergence mode have positive effect on the environmental effect of industry convergence of medical device industry and medical service industry.

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SERVITIZATION PATHS OF CHINA'S MEDICAL DEVICE INDUSTRY BASED ON CLOUD MANUFACTURING MODE

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Objectives Reveal the mechanism and the influencing factors of servitization of China's medical device industry; design the servitization path system of China's medical device industry based on cloud manufacturing mode.

Methods The system theory method is used to design the servitization path system of medical device industry; the optimization method and case method are used to design the specific industry servitization path.

Results Revealed the mechanism of servitization of China's medical device industry based on cloud manufacturing mode from four aspects: motivation, conditions, process and results; measure the influence factors of servitization; designed four servitization paths based on cloud manufacturing mode.

Conclusions The servitization of China's medical device industry is helpful to expand the space of industry existence and development, and the enhance industry competitiveness; the servitization path is different from each other, and its selection is depend on the industry status and the environment; the servitization of China's medical device industry helps to realize the efficient sharing of medical device industry resources; in the process of implementation of the servitization, the role of influencing factors should be taken into full consideration.

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Foundation of training program for young creative talents of ordinary universities in Heilongjiang of 2017(Grant No. UNPYSCT-2017100).

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IMPROVED ANN MODEL AND ITS SIMULATION APPLICATION IN INDUSTRY CONVERGENCE OF MEDICAL DEVICE INDUSTRY AND MEDICAL SERVICE INDUSTRY

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Objectives Improve the classical ANN model, and establish a new artificial neural network based on pattern neuron—PNBANN; carry on the simulation research on industry convergence of medical device industry and medical service industry based on PNBANN model; reveal the influence of input factors of industry convergence of medical device industry and medical service industry on output factors.

Methods The optimization method is used to improve the classical ANN model; the modeling method is used to construct a new ANN model; the empirical research method is used to train the new ANN model; the simulation method is used to reveal the influence of input factors of industry convergence of medical device industry and medical service industry on output factors.

Results Designed a new artificial neural network model based on pattern neuron—PNBANN; formed a mature PNBANN network by thousands of training sessions with input and output data of industry convergence of medical device industry and medical service industry; revealed the influence of input factors of industrial convergence of medical device industry and medical service industry on output factors.

Conclusions The improved ANN model--PNBANN model has stronger perception and memory ability than the classical ANN model, and its learning and memory is more close to the human brain; the PNBANN model can effectively simulate the process of industry convergence of medical device industry and medical service industry; the simulation results of the PNBANN model showed that, the policy factors and human factors of the industry convergence input factors of medical device industry and medical service industry have more important influence on the industry convergence.

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IMPROVEMENT OF TRADITIONAL DEA MODEL AND ITS APPLICATION IN

INDUSTRY CONVERGENCE OF MEDICAL DEVICE INDUSTRY AND MEDICAL SERVICE INDUSTRY

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Objectives Reveal the mechanism and input output factors of industry convergence of medical device industry and medical service industry; improve the traditional DEA model in order to solve the problem that it is unable to distinguish the decision-making units effectively; verify the effectiveness of the improved DEA model; measure the efficiency of industrial convergence of medical device industry and medical service industry and its influence factors.

Methods The optimization method is used to improve the traditional DEA model; the modeling method is used to construct a new DEA model; the empirical research method is used to verify the effectiveness of the improved DEA model and measure the efficiency of industrial convergence and its influence factors.

Results An improve DEA model based on the virtual decision making unit is designed; the convergence level and efficiency of medical device industry and medical service industry is remarkable; the quality of personnel and the quantity of funds of industry convergence inputs have a significant positive influence on the convergence efficiency of medical device industry and medical service industry.

Conclusions The improved DEA model based on the virtual decision making unit has higher division efficiency for decision making units than traditional DEA model; the convergence of medical device industry and medical service industry promote the development of industries; increase the personnel input and capital investment in industry convergence will help to promote the industry convergence of medical device industry and medical service industry.

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DEVELOPMENT OF BIOPHARMACEUTICAL INDUSTRY IN GUANGXI OF CHINA

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Objectives The pharmaceutical industry is an industry with high technology content and great growth potential. In recent years, pharmaceutical industry in Guangxi has rapid development, but compared with the domestic and foreign

pharmaceutical industry large enterprises, Guangxi pharmaceutical enterprises have wide gaps in the size of enterprises, R&D capabilities and market control capabilities. Guangxi has medical resources, but Guangxi lags behind.

Methods Guangxi should basically form a biopharmaceutical industry cluster with local biological medicine resources and authentic Chinese medicinal materials as the main raw materials, and become an important pharmaceutical industry base in South China serving ASEAN. Guangxi should build Chinese southern Chinese herbal medicine industry base, breeding characteristics of Guangxi Chinese herbal medicine resources processing industry base, Chinese ASEAN International Trading Center of Chinese medicine and medicine logistics service center. Guangxi will form a high degree of Chinese medicine industrialization, with independent intellectual property rights, which are deep processing industry of local resources compound gel series, industry of series of amino acids, industry of drugs, industry of Chinese medicine with anticancer effects of gynecologic suppository, industry of small volume injection and topical drops, and industry of medicine and health products, such as gene medicine series of biopharmaceutical industry. Guangxi should form large biopharmaceutical industry group with 1 billion yuan, which are a number of pharmaceutical companies.

Results Guangxi biopharmaceutical industry will form one of the pillar industries of the national economy, and basically form a new pattern of biopharmaceutical industry, such as basic raw materials, biological drugs, anti tumor drugs, gynecological new drugs, gene drugs, health care drugs, acupuncture tablets and other biological medicine industry.

Conclusions This paper has a guiding role in the development of biopharmaceutical industry.

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90 MEDICAL IMAGE SEGMENTATION WITH HYBRID METHODS

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Objectives Image segmentation is a key step in medical image analysis. The principle organs can be determined for further classification and detection. This paper proposes a hybrid method for image segmentation by considering both low and high level features. This method has a relative low computational complexity and high segmentation performance.

Methods The method comprises of two steps. Firstly, the super-pixel is used to determine the initial organ regions with low feature. Meanwhile, a CNN model is constructed based on a large number of medical training images. Finally, these candidate regions are fed into the CNN model. The model is fine-tuned and the candidate can be re-estimated.

Results Compared with the state-of-the-art algorithms, the method can achieve a comparable performance. Through

the experimental results from the mammogram images of the left and the right breast, we get the average metric UM of 0.964, CM of 0.818, TM of 0.0626.

Conclusions This work indicates that the proposed algorithm has better performance due to the low and high features being considered. The method can also be used for segmentation of the other medical images.

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91 PROCESS IMPROVEMENT OF MEDICINE REVERSE LOGISTICS UNDER DMAIC METHOD

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Objectives In the new economic environment, this paper expands the relevant theories and demonstrates the practice based on the DMAIC process improvement method of 6σ , and uses DMAIC method to optimize the process of medicine reverse logistics and enhance the effect of process management.

Methods This paper mainly takes the DMAIC method theory as the breakthrough point, and takes the process of medicine reverse logistics in the improvement practice as the specific discussion object, so that the two can fuse with each other, so as to enhance the practical value of research.

Results Using DMAIC to improve the process of medicine reverse logistics is a development trend, which can enhance the rigor of the whole process, avoid the impact of some unnecessary links on the work efficiency, reduce the failure rate of the operation process, and enhance the process management effect.

Conclusions Under the promotion of DMAIC method, this paper not only provides ideas for the process improvement of medicine reverse logistics, but also contributes to the improvement of the medical related business level, which is of great significance.

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92 DECISION OF THE MEDICINE LOGISTICS IMPLEMENTATION MODE BASED ON THE LC-NPV METHOD

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Objectives So far, the existing medical logistics has made

great progress in the development of problem selection and implementation mode, but there are still some problems in logistics implementation mode, which need to be further explored. In order to improve the implementation mode of medicine logistics, this paper will combine the LC-NPV method to explore this problem.

Methods In this paper, we use the life cycle theory and integrate the net present value method into it to put forward the LC-NPV method, so as to form a new decision mode. According to the specific performance of the life cycle, it is regarded as the main basis for constructing the model so as to put forward the hypothesis, and meanwhile, the parameter calibration is completed and two kinds of logistics modes are put forward, namely, merger self-supporting logistics mode and logistics alliance mode. The two modes are used to analyze the present value of earnings of the pharmaceutical logistics enterprise, and various schemes are proposed for different conditions.

Results LC-NPV method can provide effective basis for the decision of the medical logistics implementation mode.

Conclusions LC-NPV method takes full account of the characteristics of life cycle and has high application value, and it is a good decision method for medical logistics implementation mode.

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DESIGN AND ANALYSIS OF THE MEDICINE REVERSE LOGISTICS NETWORK UNDER THE PROBLEMATIC DRUGS RECALL

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Objectives Nowadays, how to recall the problematic drugs is gradually paid close attention to by the public, and the medicine reverse logistics design is the main problem that the current pharmaceutical industry should face and improve. The main purpose of this study was to design a reasonable and efficient medicine reverse logistics network, so as to promote the rational recall of the problematic drugs.

Methods Through the analysis of the current situation of the pharmaceutical industry in China, this paper studies the recall methods of the problematic drugs. Through the reasonable risk assessment method, this paper determines the recall level, and uses the recall system to recall the problematic drugs, so as to deal with the problematic drugs and better improve the quality of the problematic drugs.

Results Through the design of the perfect medicine reverse logistics system, China's Drug Administration department will realize the effective recall of the problematic drugs, so as to ensure the people's medication safety to the greatest extent.

Conclusions Through the design of the medicine reverse logistics network, this paper studies how to promote the recall of the problematic drugs, which will improve the economic benefits of the pharmaceutical industry, so as to promote the overall development of the pharmaceutical industry in China.

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THE APPLICATION OF ABC CLASSIFICATION IN MEDICINE LOGISTICS DISTRIBUTION CENTER

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Objectives The medicine logistics distribution center must complete the scale procurement, purchase and storage management of drugs, according to the customer order, sales forecasting, and deliver the medicine to the customer in time according to the fixed number and demand of the customer. To satisfy the customer, the efficiency of drug delivery has to be minimized, and the management effect has to be optimized. These are the problems that the medicine logistics distribution center needs to solve. The purpose of this paper was to analyze the effect of the implementation of ABC classification by medicine logistics distribution center, so as to solve the above problems.

Methods The theoretical analysis method was used to study the application scope and application effect of ABC classification method in medicine logistics distribution center.

Results The ABC classification can realize the customer ABC classification and drug item ABC classification in order processing, and also has certain value in inventory management and return management.

Conclusions The effective application of ABC classification method in the medicine logistics distribution center can solve the primary and secondary contradiction problems in the process of the medicine logistics distribution, and make the daily operation of the distribution center get twice the result with half the effort.

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CONSTRUCTION OF DRUG RECOVERY LOGISTICS NETWORK SYSTEM BASED ON RESIDENTS' CHOICE BEHAVIOR

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Objectives In recent years, with the public health consciousness enhancement, family spare medicine residents become an integral part of life. Leading to the increase of drug reserves, especially those of expired drugs, which have caused environmental pollution to increase and affect public health. Therefore, the recycling of expired drugs has become an important activity of national and pharmaceutical enterprises.

Methods This paper analyzes the residents' travel behavior and the optional recycling outlets and runs the logit model to construct the behavior selection model. Then, according to the residents' choice decision, the logistics network model of drug recovery is constructed and the recovery

point is selected, with the aim of maximizing the personnel and minimizing the cost and the realization of the two objectives.

Results This paper takes a community group in a certain region as an example, by collecting the questionnaire and grasping the residents' travel and recycling intention, By means of statistical regression method, a logit model of multi-type recycling point is constructed to build a drug recovery network.

Conclusions This paper establishes the Logit model, analyzes the residents' choice behavior of the drug recovery point, and further enriches the planning of the terminal node of the drug reverse logistics network through the example verification.

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BIG DATA INTELLIGENT RECOMMENDATION OF HEALTH SYSTEM WITH BALANCE BETWEEN SUPPLY AND DEMAND

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Objectives The purpose of this paper is to introduce talent balance theory into the existing health system, and establish a healthy big data and user model in the field of supply and demand balance.

Methods This paper uses the balance between supply and demand to describe the big data in the field of talent health care, and realizes the balance between supply and demand. The current balance of supply and demand in the medical field are only conceptual classification, and there is no instance and big data, and mostly foreign balance of supply and demand, and large database structure is not conducive to the development and maintenance.

Results This paper has studied the intelligent recommendation model and key algorithm of personalized health system based on rules and case-based reasoning. Existing personalized intelligent recommendation algorithms based on rules and collaborative filtering seldom consider the relationship between big data, and the personalized recommendation of intelligent recommendation is not enough, and it is suitable for many fields such as e-commerce, and is also suitable for intelligent recommendation in the field of medical and talent health care.

Conclusions This paper implements a personalized recommendation system of health system based on rules and case-based reasoning, and builds a medical health ontology library using TDB storage method to mention operational efficiency. For the medical domain ontology, personalized big data search of medical and health big data is realized, which enables the computer to better understand the goals of big data, so as to make the retrieval be conducted on the precision and recall rate, so that users can be provided with more accurate health big data query service.

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DATA MINING TECHNOLOGY FROM THE PERSPECTIVE OF NATIONAL HEALTH

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Objectives The purpose of this paper is to systematically study the related technologies, architecture and implementation methods of big data, which is based on the demand for building a healthy big data platform for the talent data warehouse.

Methods In this paper, the concept and principle are analyzed for multi-dimensional data analysis and data mining techniques. The process and the steps of data mining are studied. The multidimensional data model of big data of human health files is analyzed and studied. By using the SQL server database OLAP, the function and association rules have enabled the mining of the health records of qualified personnel and obtained the expected results.

Results This paper has focused on the design and construction of big data for health records of professionals, and combed the business process and data characteristics of health records data, and divided five business topic areas and 31 sub-domains, and put forward the concept of big data for health records with logical model of the design, as well as personnel health file data cube design. In this paper, the SQL Server database system was used to create a fact table and a dimension table for storing health records of human resources personnel. The data cube of human health records was designed and realized, and the physical realization of big data of human health records was completed.

Conclusions This paper has used OLAP technology to conduct multidimensional data mining of health status of residents in city health record data, and concluded that chronic non-communicable diseases are the main cause leading to the death of residents in the city, which also matches the conclusion of clinical experience.

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MEDICAL GLASS DEFECT INSPECTION BASED ON OPENCV

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Objectives The rapid development of building, automobile, new energy and other industries, the demand for glass has increased year by year, all of these improve the quality requirements of glass products. However, due to technical and operational reasons, many types of defects will be produced in the production process of plate glass. This requires a high speed, accurate, stable detection system, in the glass production line. The computer vision system makes up for the labor intensity and low accuracy of the manual detect method, and avoids the potential safety hazard in the glass deep processing. But the glass has the characteristics of transparency, reflection and so on, it will cause some problems, such as the local weakening of image and other issues. Because of shape, size, transmittance and other characteristics of defects, it is difficult to classify

them, there are many errors in the classification of glass defects. When the existing system deals with the defects of slender and sharp points, there also exists misjudgment. In order to achieve high accuracy and high speed recognition effect, this paper developed a defect recognition system based on wavelet analysis.

Methods Base on cross platform visual library OpenCV, the functions of image graying, filtering, two valued and contour recognition were realized. The method of de fog is used to realize the enhancement of image. Wavelet transform is applied into image processing to preprocess the signal singularity which has important significance in the detection of cracks, sharp corners and other glass defects, which greatly improves the efficiency and accuracy of defect recognition. According to the recognition results, the defect characteristics are further identified, and the contour features, such as area, shape, length width ratio of defects to identified and classified the defects.

Results Four typical glass defects with bubbles, stones, impurities and crack defects were taken as examples to verify the results. The results show that the developed detection system effectively improves the efficiency of glass defect image processing, and provides a prerequisite for subsequent glass defect processing.

Conclusions The wavelet transform for image preprocessing can make up for the traditional algorithm for the glass defects such as cracks, sharp corners, and the singularity damage caused by the detection process. It can effectively suppress noise and improve the accuracy of defect recognition and classification.

99 METHOD OF PRE-PROCESSING ON CHEST CT IMAGE RECOGNITION SYSTEM

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Objectives The quality of chest CT image preprocessing directly affects the results of the identification. In order to improve the recognition accuracy, in this paper, a preprocessing algorithm for automatic recognition system of chest CT images is proposed. It includes image tilt correction, region segmentation and region filtering processing of chest CT image.

Methods To judge whether the chest CT image is inclined or not, and tilt correction. Extracting target region based on improved region growing method, on this basis, the texture feature is extracted as the feature vector of the image. Using feature vectors of target region to segment the chest CT image, and using region filtering to deal with the target chest CT image which has been segmented, then pretreatment of automatic recognition system for chest CT image is realized.

Results The proposed algorithm is compared with support vector machine (SVM) algorithm and threshold separation algorithm, the experimental results show that the recognition rate of chest CT image by proposed method is significantly higher than the other two methods, and the time consuming is shorter and the reliability is higher.

Conclusions It is necessary to preprocess the chest CT image before it is recognized. Based on the preprocessing of the proposed method, the proposed method has good image recognition effect. This method can be applied to the chest CT image recognition system, which can improve the doctor's diagnosis efficiency.

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100 MULTI MODALITY IMAGE IN CLINICAL MEDICINE PARALLEL CLUSTERING METHOD AND ITS APPLICATION

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Objectives Image clustering is a key technique for multimodal image recognition. Multimodal medical image recognition is an important part of medical image analysis and understanding, and plays an important role in medical clinical diagnosis. Therefore, it has great significance to study the parallel image clustering algorithm for multimodal image recognition. This paper attempts to study a parallel clustering method based on Gauss mixture density model for multimodal medical image clustering, and applies it to human abdominal medical images to achieve the classification of liver, kidney, spleen and other major organs.

Methods This paper randomly selects the pixel data of abdominal multimodal images in clinical medicine. Firstly, the local two valued method is used to detect the texture of the image, the space is divided according to the texture detection results, the eigenvalues are extracted from the texture in each space, a Gauss mixture density model for abdominal medical images is constructed based on eigenvalues, the pixel values of the abdominal image are divided into the corresponding model branches in the hybrid model, and the correct rate and misclassification rate of each organ pixel clustering are obtained.

Results Comparing the proposed method with the K mean algorithm, the average accuracy of the proposed algorithm is higher than 92 %, and the misjudgment rate is less than 5 %, which is better than the K mean algorithm.

Conclusions The research of medical image clustering algorithm is an important part of special domain image recognition. At present, multi-modality image in clinical medicine clustering algorithm has not achieved the desired recognition effect, and cannot fully meet the requirements of medical image analysis and understanding. The proposed method has good clustering effect and provides an effective theoretical basis for the accurate analysis of multi-modality image in clinical medicine.

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FABRICATION OF MICROFIBER DNA BIOSENSOR AND ITS APPLICATION IN BIOMEDICAL MATERIALS

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Objectives Deoxyribonucleic acid (DNA), as a carrier of genetic information, exists in almost all higher organisms. DNA with unique composition and spatial structure has good compatibility and biodegradability, thus suitable for biomedical materials research. Therefore, research of preparation of DNA functionalized materials and their applications in the field of biomedical materials is proposed.

Methods The complex formed by pyrophosphate and copper ion chelation was used as the substrate of enzyme. Copper ions were released using alkaline phosphatase's specific dephosphorylation to pyrophosphate. DNA-functionalized copper-silver nano-alloy clusters were prepared using sodium borohydride as reductant in the presence of DNA template and silver ions. Such nano-alloy cluster was applied to highly sensitive detection of hepatitis B virus, wherein the sensing mechanism was based on utilization of two molecular beacons (MB1 and MB2). By using this method, lowest detectable limit of HBV reached 0.97 nmol/l and HBV DNA could be detected in human serum.

Results Molecular beacons self-hybridized to Exo III shear-resistant hairpin structures in the absence of targets, and MB2 possessed a loop region rich in C basic group. The target DNA could bind with MB1 to form a partially hybridized double-stranded structure under the presence of targets.

Conclusion: The DNA functionalized material synthesized by this method has good stability and can be used to detect hepatitis B virus highly sensitively. Its detection precision is high, and it has good application in the field of biomedical materials.

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102 VISUAL DESIGN OF MEDICAL SERVICE INFORMATION BASED ON BIG DATA

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Objectives
To solve the problem of medical service information

visualization.

Methods This paper presents a visual design method for medical service information which introduces big data, classifies the medical service information by using association rules model, and proceeds with visual restoration through multimedia reconstruction method. In order to solve the problem of information redundancy, information interference was removed by big data evaluation to ensure information integrity and low interference. Through the web multimedia information reconstruction method, visual presentation was completed.

Results The experimental results show that after the introduction of big data, the visualization degree of data is more accurate and the capability of analyzing medical information is obviously increased.

Conclusions The related methods can be popularized in the medical field and combined with big data analysis to improve the medical service process.

103 DESIGN OF MEDICAL INTELLIGENT LIGHTING CONTROL SYSTEM BASED ON ZIGBEE TECHNOLOGY

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Objectives Most of the existing medical intelligent lighting systems use wired networks, which have poor mobility and complex implementation. Compared with the wired control mode, the wireless control mode has the advantages of flexible layout, good mobility, low cost and so on. In Bluetooth, Wi-Fi, Zigbee and other wireless communication technologies, Zigbee technology has an unparalleled advantage in large-scale ad hoc networks, power consumption and price, It is widely used in medical intelligent lighting system.

Methods Based on the Zigbee technology and the characteristics of the designed system, this paper optimizes and improves the tree routing algorithm in the network layer routing algorithm. On the one hand, the improved tree routing algorithm can effectively solve the problem of unbalanced energy distribution of tree network by setting up the way of horizontal connection, On the other hand, in the case of broken tree branches, the whole network can be repaired by breaking the branch into the network topology, which can effectively reduce the routing overhead.

Results Practical test and experimental show that, Zigbee medical intelligent lighting system based on improved tree routing algorithm can realize 50 light control nodes, the maximum network depth of 10 of the lighting control network, and can achieve 10 levels of lighting regulation.

Conclusions Compared with the traditional Zigbee tree based routing algorithm system, The designed system can reduce the transmission delay by 14.6%, and effectively reduce the routing overhead of the broken tree fusion, fully meet the design requirements, it can be used for further development of more perfect medical intelligent lighting system.

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for Building Lighting Based on Internet of Things (No.CXZK201702Y).

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CT IMAGE LOCALIZATION TECHNOLOGY BASED ON INTELLIGENT MINING

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Objectives the localization of CT image in small range is inaccurate.

Methods In order to solve the problem, in this paper, a CT image feature localization technology based on the fuzzy C mean (FCM) clustering algorithm is proposed, to make image denoising initialization. In order to overcome this problem, fuzzy C mean segmentation algorithm is used to avoid falling into local extremum. Firstly, the FCM clustering initialization is used, and then the improved genetic algorithm is used for fuzzy clustering; Multi-constraint conditions are used to suppress the generation of local extremum and the influence of background noise and texture details on image segmentation, so as to complete the localization by association rules.

Results The experimental results show that the proposed method can quickly locate the CT image features, and has good robustness. Using these advantages can effectively overcome the shortcomings of the traditional CT image localization algorithm. **Conclusion:** it has application value.

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THERMAL ERROR CLASSIFICATION COMPENSATION OF CN MACHINE TOOL FOR MEDICAL IMPLANTS

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Objectives In the precise manufacturing process of medical implants, thermal error compensation is one of the most economic and effective methods to resist the thermal error of NC machine tools which is the main influential factor for the processing accuracy of implantation workpiece. Normally, only a single piece and small batch is needed for medical implant production, which is easy to bring about a various working condition. However, the traditional thermal error model of NC machine tools was established on the basis of a constant working condition. When used for varied working conditions, it will have an undesirable performance in prediction accuracy and robustness. Therefore, this paper proposed a classified thermal error

compensation method which uses Bayesian classification algorithm to make classified prediction for the temperature field of the varied working condition.

Methods First, implantation workpiece are divided into several typical groups according to their shape features; next, thermal error experiments are respectively carried out based on the typical parameters of working condition, so as to build up the thermal error models for different typical working conditions; then, Bayesian temperature classification models are trained according to the experimental data of the temperature fields under several typical working conditions, so as to realize the classification of the temperature fields under different working conditions; finally, the temperature data classified by Bayesian model is respectively put into the typical thermal error prediction models, so as to realize the functions of classification prediction and compensation. The proposed model was verified by the experiment operated on a NC machine tool.

Results Under the varied working condition, the proposed error model makes the robustness improved remarkably, and weakens the influence that working condition variation impacts on prediction accuracy. Comparing with traditional model prediction of thermal error, the proposed model makes standard deviation and maximum residual error decreased respectively by 30% and 35%.

Conclusions The proposed method is especially suitable for the error compensation in the actual machining production under mixed working conditions.

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DESIGN OF SHIP MEDICAL RESCUE COMMUNICATION SYSTEM BASED ON MIMO PRECISE POSITIONING

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Objectives The ship medical rescue communication system needs to have the advantages of large communication coverage, long communication distance and easy to support integrated services. However, the current system has the problems of too large positioning distance, large positioning error and inaccurate results.

Methods In order to solve this problem, the design method of ship medical rescue communication system based on MIMO precise positioning is put forward. Firstly, the MIMO precise positioning principle is introduced, then the key technologies of the system design, including overall capacity design, antenna tracking servo system and miniaturization terminal are focused on respectively. In the design of the overall system capacity, the main key

problems of the communication ability, communication function, link calculation and equipment configuration are analyzed, calculated and optimized.

Results the experimental results show that the system can effectively realize the medical rescue ship communication requirements, with strong robustness, and small positioning error.

Conclusions the system meets the actual needs and has good applicability.

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MIXED NOISE FILTERING METHOD IN 3D MEDICAL IMAGES

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Objectives Three dimensional (3D) medical images are widely used in disease diagnosis. With the popularity of 3D ultrasound technology, the image quality requirements are also higher and higher. Large scale mixing noise seriously affects the imaging quality of 3D medical ultrasound images. It is difficult to accurately interpret the ultrasound images, which restricts the development of the application of 3D ultrasound images.

Methods In this paper, a filtering algorithm based on large scale multiplicative noise interference in ultrasound images is proposed. Through the constrained decomposition and recombination of the imaging pixels of the 3D ultrasound images, the improved wavelet algorithm is used to reconstruct the different noise parts, and the multi-class filtering function is designed to classify the mixed noise interference and reconstruct the clearer 3D ultrasound images.

Results The experimental results show that the proposed noise filtering algorithm for 3D ultrasound images can effectively suppress the influence of large scale mixed noise on image quality, and preserve the details of 3D ultrasound images better.

Conclusions This method can effectively improve the sharpness of 3D medical images.

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DEVELOPMENT OF HIGH PRECISION DATA ACQUISITION COLLECTOR FOR

LARGE MEDICAL EQUIPMENT IN THE INTERNET OF THINGS

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Objectives In this paper, the structure of the Internet of things in the hospital is summarized, to design the data collector in the Internet of things, and realize the remote and high-precision acquisition of the data.

Methods First of all, the overall architecture of the Internet of things is designed, and combined with the specific functional requirements of different departments, data acquisition collector is designed by using embedded technology. In the hardware design, the anti-interference design is applied, and clutter filtering module is added; in the software design, the improved wavelet algorithm is used to purify the signal to ensure accuracy.

Results the data collector can complete the predetermined function, and can connect with other functional modules of the Internet of things, which can help the hospital to realize intelligent operation, and the accuracy has been significantly improved.

Conclusions the Internet of things and data collector can complete the scheduled function, and can realize the transmission of medical data.

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MARKER TRACKING OF 3D BRAIN INJURY IMAGE IN CLINICAL MEDICINE

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Objectives In the process of marker tracking for the CT images of the 3D brain injury in clinical medical, the performance of traditional raster scanning algorithm is limited.

Methods In order to improve the tracking accuracy of marker defect components in 3D brain injury images, in this paper, a marker tracking algorithm for 3D brain injury image based on image iterative clustering is proposed. On the basis of the first extraction of effective features, the marking process is improved, and the repeated records are removed iteratively. The defect mark number of CT scanning image of 3D brain injury image is corrected, and the tracking is completed.

Results the experimental results show that the proposed method can obtain the edges of 3D brain damage images with clear edges and complete contours, and simplify the tracking process.

Conclusions Specific engineering applications show that in the defect edge detection of CT scan images, the proposed algorithm is superior to Gauss-Laplace algorithm and Prewitt algorithm

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FAST SEGMENTATION METHOD OF BLOOD CLOT REGION IN BRAIN INJURY IMAGE

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Objectives The image of blood clots in brain injury image is highly blurred, and there is a problem that the edge of the image is difficult to be recognized.

Methods In order to solve this problem, a fast a new method for segmentation of blood clot region in brain injury image is proposed. According to the designed weak boundary image valve model for segmentation of fuzzy outline region, the instability of non-uniform fuzzy edge image segmentation is constrained; the global and local region information of the image are integrated to be segmented, as an Objectives function, and the uneven gray level image is segmented.

Results the experimental results show that the algorithm can extract the lesion area quickly and accurately, and the segmentation speed of the blood clot in the brain injury image is faster, and the robustness is better.

Conclusions in practical application, this method can improve the segmentation efficiency of 17%, and effectively solve the over segmentation and under segmentation problem.

111 THE APPLICATION OF 3D VIRTUAL GRAPHIC DESIGN IN MOBILE MEDICAL PLATFORM UI

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Objectives The traditional UI interface of mobile medical platform is still on the basis of 2D image, it is difficult to show the medical service process, which leads to complicated and difficult operation. Applying the 3d virtual graphic design into the UI interface design of mobile medical platform to improve user experience.

Methods Have Analyzed the mobile platform architecture of Android and IOS respectively, designed platform interface check report, online diagnosis and treatment, health guide and personalized supervision and other functional modules, conversioned Three-dimensional data of the performed on the medical information parameters of each module, combine the gesture recognition technology with mobile platform interface, the UI interface of 3d virtual mobile medical platform had been completed.

Results The experimental results show that the visual effect of the mobile medical platform in 3d virtual plane is more vivid, the interface layout is more compact and the function is more comprehensive.

Conclusion: Make the information of the platform more accessible, increase the users' sense of reality, and provide more convenient way for user operation.

112 THE DESIGN AND IMPLEMENTATION OF MEDICAL ICON WARNING BASED ON VISUAL COMMUNICATION IMAGE

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Objectives The icon is an important embodiment of the visualization of graphic medical image interaction interface. The research of icon design is one of the most active research directions in the field of the current medical graphics interaction interface. In order to better meet users' needs and satisfaction, medical ICONS should be designed to improve the clarity and accessibility of medical ICONS. **Methods** Firstly, analyzing of the design principles of graph in the interface of medical interaction, and predicting the outline of the warning icon. Using NET technology to build an auxiliary icon design process original system on Windows7 platform, this system includes quick design module, knowledge base storage module and design symbol evaluation module. Using visual communication techniques to extract icon feature points, clustering feature point, calculating the clustering center, thus acquiring icon design elements, realize the visual communication image under medical warning icon design.

Results Experiment in the traditional designs of medical icon alert results as control group, respectively from the contour accuracy of two methods of icon design, product definition and user's understanding of the degree of three aspects to experiment, and record the results.

Conclusions The design method of the icon has greatly improved the understanding and clarity of medical ICONS, and can better meet the needs of users' medical warning ICONS.

113 REAL TIME DETECTION METHOD OF MEDICAL ABNORMAL DATA IN CLOUD COMPUTING ENVIRONMENT

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Objectives In clinical medicine, irregular data collection is easy to lead to abnormal data collection, Due to the number of system data is large and nonlinear distribution, it is easy to produce slow convergence speed and low detection accuracy in medical abnormal data detection. Therefore, a real-time detection method of medical abnormal data based on Fuzzy hidden Markov model in cloud computing environment is proposed.

Methods In this paper, we design and implement a medical anomaly data detection system in cloud computing environment, Analysis hardware structure of system user interface, CPU control unit and data acquisition unit. The hidden Markov detection method is combined with fuzzy theory, the rule and process of abnormal data detection based on cloud computing are given, and the program code of medical abnormal data detection is also given, then the membership function of the correct data set is calculated. Finally, the membership degree is merged, based on this, we can judge the current data and realize the accurate detection of medical abnormal data.

Results The experimental results show that the designed system can detect medical abnormal data quickly and effectively, and the convergence rate is high, which can effectively improve the detection efficiency and

effectiveness.

Conclusions Cloud computing is applicable to a wide range of applications. In this paper, real time detection of medical abnormal data in cloud computing environment is proposed, it can achieve the purpose of rapid and effective detection of medical abnormal data, and meet the needs of actual detection.

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MEDICAL INFORMATION EXTRACTION TECHNOLOGY BASED ON ASSOCIATION RULES

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Objectives The traditional medical information extraction method needs to scan the information database several times, which leads to low efficiency and low accuracy of directional extraction of medical information. Therefore, a medical information extraction technology based on association rules is proposed.

Methods The concepts of fuzzy sets and semantic association rules are introduced to extract the fuzzy medical information, and request to make transformation and interpretation reasonably to solve the problem of accurate medical information extraction; on this basis, by adjusting the size of scanning item set, the information database is to avoid scanning repeatedly, so as to improve the efficiency of information extraction.

Results Simulation results show that the method can extract medical information efficiently, and improve the accuracy of medical information extraction.

Conclusions Compared with different methods, this method is obviously superior to other medical information extraction methods, it has high applicability, which provides the basis for the research and development in this field.

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DATA MINING DIAGNOSIS TECHNOLOGY BASED ON CT RADIATION IMAGE

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Objectives The analysis of medical CT radiation image is an important means of medical diagnosis, it is an urgent problem to excavate hidden, latent and regular knowledge from CT radiation images. In view of the current CT radiation image pathological diagnosis prone to data mining redundant information leading to misjudgment, A sequential data mining method based on CT image sequence correlation contour feature extraction and batch processing for CT radiation image data is proposed.

Methods A total of 80 cases of peripheral lung cancer confirmed by clinical pathology were collected, the clinical and CT attributes were standardized, and the CT radiation images were input into the database. Firstly, the CT radiation image was denoised and the feature was

optimized, template matching of CT radiation image sequencing data using genetic classification algorithm. Then, contour lasso search was performed based on edge prior knowledge, sequential sequential data mining and analysis of CT radiation images was carried out by using batch processing method to improve the processing efficiency.

Results Experimental results show that the method can accurately extract the contour features of CT radiation image. The location, burr, shape, glass density and other attributes of the extracted image are more accurate, and the accurate CT radiation image data mining can be realized, and the computing efficiency is higher.

Conclusions The proposed method achieves high mining accuracy, and proves that data mining has a wide application prospect in auxiliary medical diagnosis.

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OPTIMIZATION OF DATA COLLECTION ACCURACY OF ULTRASONIC EQUIPMENT

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Objectives With the continuous improvement of people's living standards and the aging of the population, the incidence and mortality of gradually increase. This requires intelligent collection of patient data to help patients understand their own health. For patients with poor data collection accuracy, further optimization research is needed.

Methods This paper classifies the patient data according to the pathogenesis, etiology, age level of patients and the type of patient. The wavelet analysis method is used to analyze the data of the patients, and the ultrasonic equipment is introduced to improve the accuracy of the classification data. The data of collected patients were determined and classified storage was carried out to optimize the data collection accuracy of patients.

Results The improved method is more accurate than the traditional method of collecting data. Moreover, the method of this paper has high stability and strong antiinterference in the process of information data acquisition.

Conclusions The experimental results show that the improved method is more accurate. But, ultrasound equipment is not applicable to all patients, so it is necessary to further study the applicability of the patient data collection method and expand the collection range and improve the accuracy of patient data collection.

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FAST RETRIEVAL TECHNOLOGY OF MEDICAL DATA IN MOBILE LIBRARY

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Objectives Due to the huge amount of data and various kinds of data in mobile library, the retrieval effect of the data is poor. Because of the particularity of the domain and heterogeneous and unstructured properties of medical data, the retrieval difficulty of medical data is increased. Therefore, a fast retrieval method of medical data for mobile library is proposed.

Methods In the massive data, vector processing the data attribute, attribute as the basic vector of m dimension space, data record as attribute vector sum. By using the concept similarity information between attributes, the similarity between attributes is obtained. The data correlation is obtained according to the similarity of attributes, and the massive data is classified according to the correlation degree of data. In the classification of the overall medical data, using the open source software Solr, the meta data of different types of medical data are uploaded to the Solr and the index is established, and the data mining method based on association rules is used to achieve high-speed retrieval.

Results Compared with the performance of data retrieval based on improved neural network, it is proved that the performance of the proposed method is far faster than other methods, and the detection speed is faster and the detection accuracy is higher.

Conclusion: Medical data efficient retrieval is a practical problem yet to be solved in application of the hospital, and the proposed method can achieve rapid retrieval of medical data of mobile library, it has higher detection accuracy and rate, high availability and high practicability in actual working environment.

Acknowledgements This paper is one of the research results of key project of Heilongjiang University drawing committee - Research on mobile library bibliographic recommendation based on Data Mining Technology (No. 2015-B-048).

118 THE DESIGN OF MEDICAL PROFESSIONAL TEACHING INFORMATION STORAGE SYSTEM BASED ON JAVA WEB

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Objectives The teaching information storage system of traditional medicine is easy to lose information, and the storage security of teaching information is very problematic. The teaching information of medical profession need certain security measure. However, the teaching information of medical specialty has a large amount of information and difficulty in encryption, the storage of medical professional teaching information has been a difficult problem in this field.

Methods The design method of medical professional teaching information storage system based on JAVA WEB was proposed. Establishment of a medical professional teaching information scheduling model, and the classification of rules set attributes for teaching information storage. The load balancing control method is used to design the information storage space redundancy data and information storage optimization algorithm. The software development and optimization of storage system is realized through program loading.

Results Comparing the system with the traditional system, we conducted an experiment. During the experiment, the information encryption accuracy, anti-interference performance and energy consumption of the system are compared. Through the comparison of these several aspects, the practical application of the medical professional teaching information storage system designed by this paper is analyzed.

Conclusions The information storage system designed in this paper can realize the encryption storage of medical professional teaching information, effectively save storage space, and can realize a wide range of applications.

119 MEDICAL IMAGE COMPRESSION APPROACH BASED ON DOUBLE COMPRESSION PROTOCOL

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Objectives Aiming at the problem of large amount of medical image and the harsh requirements of memory and bandwidth, the paper proposes a new medical image compression approach based on double compression protocol.

Methods First, the image is reduced by using square network. Then, for each pixel of the image, the optimal amplification method is selected and the methods are embed to the corresponding image pixels by digital watermarking technique.

Results The watermark image is further compressed by JPEG-LS lossless compression to get the final compression image, and to storage and transmit.

Conclusions Through the experiment for MR and CT two types of medical image, the result show that, compared with the JPEG method, the proposed method provides significant improvements and have ensured a better preservation of the image quality notably for high compression ratios.

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120 APPLICATION OF CLOUD COMPUTING TECHNOLOGY IN MEDICAL INFORMATIZATION CONSTRUCTION

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Objectives The cloud computing technology integrates computing, network computing and distributed computing effectively, and it is an advanced network computing model at present. Integrating it into the construction of medical informatization can effectively enhance the sharing of medical information and promote the computing power of

medicine, which is welcomed by the society.

Methods This paper is based on the cloud computing technology, adopts computer simulation method and case study method, and builds the servers, switches and corresponding workstations through network technology to build the hospital into a real network platform, so as to achieve the integrated management.

Results The cloud computing technology can perfectly cater to the development needs of modern medical construction, and has the advantages of high flexibility and high management efficiency.

Conclusions The application of cloud computing technology in medical information can share medical information and increase medical information storage, which plays an extremely important role in the construction of medical information. With the development of network technology, the cloud computing technology will be recognized by more and more medical industries, and become the cornerstone of the informatization development of the industry.

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Column 6: Environment & Health Education

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RELATION BETWEEN ENVIRONMENTAL POLLUTION CONTROL, HEALTH CARE EXPENDITURE AND EFFICIENCY OF ECONOMIC GROWTH: EMPIRICAL ANALYSIS BASED ON REGIONAL PANEL DATA IN CHINA

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Objectives To provide a basis for scientifically allocating environmental pollution control and health care expenditures, and provide references for increasing economic growth efficiency in each region through analysis of relation between environmental pollution control, health care expenditures and efficiency of economic growth in each region in China.

Methods CCR model and BCC model were built as per east area, central area and west area through use of panel data for 28 provinces and cities from 2005 to 2014, and MaxDEA software was used to analyze technical efficiency, scale efficiency, pure technical efficiency and scale returns of each index.

Results In accordance to results computed with MaxDEA software, it shows that environmental pollution control and health care expenditures both need scale enlargement and technological improvement. Upon comparison among these three areas, it was found that it needs more investment for environmental pollution control in central and east areas, while it needs more investment for health care in west area.

Conclusions As per research results, it is found that balancing economic growth efficiency through increasing environmental pollution control expenditures is not that

persistent, in a long-term, it may result in bottomless investment in environmental pollution control, further impeding economic growth, so it requires comprehensively evaluating environmental cost and adopting more scientific and effective economic development pattern. Health care investment is in direct proportion to economic growth efficiency, in addition to inputting health care hardware, health knowledge and education and other "software" input should also be strengthened, and medical care level should be continuously improved, thus establishing human capital for economic growth.

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WORKERS' HEALTH OF MINE VENTILATION COMPREHENSIVE SAFETY EVALUATION

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Objectives Human-machine - environmental system engineering is a new and comprehensive fringe subject. It is a method of using systematic scientific theory and system engineering, starting from the whole system, correctly handle three main factors relationship between people, machine, environment, make the system has a "safe, efficient, economy" comprehensive efficiency. Mine ventilation system is a man - machine - environment system to ensure mine safety production, which is an important system of guarantee the staff health, has important theoretical and realistic significance.

Methods Analyzed the mine aerobic condition from the two factors aspects of Objectives and subjective, Objectives factors including pressure, oxygen content, environmental temperature and humidity of the natural environment and field measurement underground oxygen concentration distribution; subjective factors including mine workers the subjective feeling caused by lack of oxygen, from the perspective of man - machine - environment system, calculation and evaluation of the three different mine roadway, to obtain its environmental quality quantitatively, and provide the basis for increasing oxygen ventilation measures.

Results By quantitatively calculate using TOPSIS method based on entropy weight, comprehensive evaluate mine ventilation system different work roadway, found the importance degree of influencing factors by calculating, facilitate the ventilation safety management targeted measures.

Conclusions Underground staff are affected by the mine air, dust, poisonous and harmful gas, temperature and humidity, many environmental factors, mine ventilation comprehensive safety evaluation is important management measure of ensure that the mine workers away from the bad work environment, avoid occupational disease.

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THE OCCUPATIONAL PRESSURE OF PRIVATE CHINA-BASED KINDERGARTEN TEACHERS

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Objectives To investigate the occupational teachers' pressure in Zunyi city in Guizhou Province, China. The research collects data by means of interview and questionnaire survey. It totally selects 301 kindergarten teachers of 10 private kindergartens with different levels and different scales to make questionnaire survey. In addition, it has deep interview for 8 kindergarten teachers. According to the research, the occupational pressure of kindergarten teachers formed by six dimensionalities: personal expectation, social support, kindergarten environment and management, parental element, developmental prospect and workload.

Methods The whole occupational pressure of private kindergarten teachers in Zunyi is comparatively large, the ranking order is: the largest pressure dimensionality is parental element (mean value is 3.72), the second dimensionality is social support (mean value is 3.71), the third is personal expectation (mean value is 3.56), the fourth is kindergarten environment and management (mean value is 3.46), these several items' dimensionalities are all higher than total pressure's mean value 3.37. The fifth is developmental prospect (mean value is 3.11), the sixth is workload (mean value is 2.66).

Results The result showed that the pressure of private kindergarten teachers have more difficulties than public kindergarten teachers, and the society pays less attention to the infant education, has high expectation and high demand for kindergarten teachers, but the kindergarten teachers have low social status; as for kindergarten, the reason includes management level, institutional aspect and occupational nature aspect; as for infants and their parents, it includes the developmental characters of infant in mind and body, the character of only child; parents have prejudice and high expectation for kindergarten teachers and excessively worried about their children's safety; the self-quality of kindergarten teachers is the important resource to lead to occupational pressure and so on.

Conclusions According to research result, the text will come up with the suggestions and countermeasures to relieve occupational pressure on private kindergarten teachers in Zunyi city based on three points of view: society, kindergarten and teachers themselves. The society should give their more encouragement, consideration, tolerant, understanding and respect to make them work and live better. Meantime, it hopes private kindergarten teachers make reflection and self-adjustment for their occupational pressure to help them search positive and effective strategy. It should optimizes management for private kindergarten leaders, provide evidence and guidance to improve quality for teacher and infant education, offer reference to promote the sustainable development of private kindergarten.

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number: AMA150011] 'bilingual education policy and mode for ethnic minority regions in accordance with law'.

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HEAT DAMAGE PREVENTION TECHNOLOGY IN DEEP MINING

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Objectives Working in a high-temperature environment, workers' physical health and ability to work will be greatly impaired. Working in a hot and humid environment for long periods, it can lead to heatstroke, dizziness, vomiting and eczema. After entering deep mining in mines, underground work environment heat increase is inevitable, optimization of ventilation system, select rational ventilation equipment and ventilation circuit, and take individual protective measures is the effective means to solve the problem of thermal pollution.

Methods Through on-site investigation and measurement of underground weather conditions, engineering equipment and hydrogeological conditions, obtain the underground thermal environment related data, calculate the downhole different heat source heat producing and heat contribution, analysis the influence degree of each heat source to mine thermal environment; Set up thermal environment evaluation index system of metal mine deep mining, build the thermal environment, construct high-temperature environment comprehensive evaluation model, comprehensive evaluate underground deep mining environmental thermal comfort, determine their level of evaluation, provide guidance for mine air conditioning work.

Results Determined the facilities installation location, quantity and installation method of ventilation equipment of underground ventilation system working surface, so that the air volume of each working face can meet the requirements of relevant ventilation technical specifications. The method and measure of mine cooling method are compared and analyzed in detail to determine the prevention and control plan for deep mining.

Conclusions Through take effective underground cooling measures, effectively improve the mine operation environment, reduce the working surface temperature and humidity, the harmful dust concentration reduce to acceptable range, reasonable ventilation system can effectively prevent the occupational diseases occurrence.

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HARM AND CONTROL OF PRODUCTIVE DUST ON HUMAN BODY

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Objectives Producer dust refers to the solid particles that are produced in the air for a long time during the production process. Industrial dust because of the different types and the physical and chemical properties, the damage to the body is also different, according to its location and pathological nature, hazard can be summarized as five parts: occupational pneumoconiosis disease and other respiratory system diseases, local effect, the whole body poisoning, allergy and other. To clarify the damage mechanism of dust to human body, it is of great significance to protect the human body effectively.

Methods Set up dust monitoring system, measured dust concentration on a dust points regular, appraised working conditions improve condition and the effect of technical measures, and organize the staff regular physical examination to the worker, understand occupational pneumoconiosis cases and other respiratory diseases, in order to provide a scientific basis for further completes the dust prevention work. The production adopts the method of airtight suction dust removal and the transportation of closed wind pipes to eliminate dust, Water for most of the dust has good inhibition diffusion performance, after it was wet dust is not easy to flying in the air, mining roadway, using wet drilling, washing purification into wet crushing or sprinkling water spray, such as the wind can effectively control dust, protect workers' health.

Results Comprehensive evaluation method is used to analyze dust hazard, and carries on the statistical processing of dust detection data, carry on effective dust control measures on the basis of it, taken after the technical transformation, dust concentration significantly reduced, significantly reducing the harm to human body.

Conclusions Raise the workers' protection awareness of the harm of productive dust, take protective measures of dust occupational hazard, to evaluate the result, to provide a scientific basis for putting forward reasonable dust hazard prevention strategy.

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OVERWEIGHT AND OBESITY AMONG LEFT-BEHIND CHILDREN IN RURAL CHINA: CORRELATIONS WITH SOCIOECONOMIC FACTORS AND LIVING BEHAVIORS/HABITS

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Objectives The rapid economic growth in China has elevated income levels and accelerated urban-rural population flows, but also has resulted in the problem of left-behind children and their overweight and obesity. However, there is no study on the correlations between overweight/ obesity and socioeconomic factors among left-behind children in rural China. In this work, with

physique measurement and questionnaire, we investigated the correlations of overweight/obesity with socioeconomic factors and living behaviors/habits among left-behind children in rural China.

Methods A multistage stratified cluster sampling was used in the investigations. Three cities were selected, including Ganzhou from Jiangxi Province, Shaoguan from Guangdong Province, and Longyan from Fujian Province. Then 7- to 12-year-old left-behind children were randomly selected for physique measurement and questionnaire. Statistical analysis was carried out on SPSS 22.0 at the significance level of $\alpha = 0.05$.

Results Multi-factor logistic regression shows the significant influence factors on the overweight and obesity of left-behind children are occupation and education level of guardians, family monthly income, days of exercise per week, hours of TV/computer per day, times of eating meat per week, times of having fast food per month, and times of drinking sodas per week. The rate of overweight with the guardians being officials or merchants is 7.32 or 6.23 times higher, and the rate of obesity is 6.61 or 6.93 times higher compared with other occupations. The rate of overweight in the case of eating meat 2-5 or >5 times per week is 3.97 or 7.85 fold higher, and the rate of obesity is 5.34 or 6.09 fold higher compared with the case of eating meat < 2 times per week. The rate of overweight or obesity is higher in the case of guardians having lower education level, higher family monthly income, less exercise per week, more hours of TV/computer per day, eating ≥ 4 times of fast food per month, or drinking ≥ 3 times of sodas per week.

Conclusions The overweight and obesity of left-behind children in rural China are largely associated with socioeconomic factors, living behaviors/habits, and eating habits. The significant influence factors on the overweight and obesity of left-behind children are occupation and education level of guardians, family monthly income, days of exercise per week, hours of TV/computer per day, times of eating meat per week, times of having fast food per month, and times of drinking sodas per week.

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THE INFLUENCE OF TENNIS ON BODY COMPOSITION OF MIDDLE - AGED OBESE WOMEN

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Objectives Through the study of middle-aged obese women participating in physical exercise after tennis comparative study of the target, hoping to get tennis and middle-aged obese women body composition of the relationship between the impact of the majority of middle-aged obese women to improve the health problems.

Methods The middle-aged obese women to implement tennis intervention, the total time of 5 months, exercise four times a week, each exercise 50 ~ 60min, the heart rate is the highest heart rate of 65% to 75 (125 to 150 beats / min); Adjust the intervention program once a week and conduct medical supervision at the same time. In the first two weeks, practice is to adapt to the recovery period. The experiment

time is 17:20 ~ 18:20 every afternoon, the test subjects do not participate in any other heavy manual labor and physical activity, and the diet control less into the high fat and high energy substances.

Results Through the literature review, we study the literature about body composition and body constitution, exercise prescription and so on, and provide the theoretical basis for the scientific research of this thesis. Expert interview method, through interviews with sports training experts and professors, teachers, coaches and collect relevant investigation information, as well as sports rehabilitation, sports medicine experts and professors to consult the definition of obesity type.

Conclusions Regular participation in tennis can reduce fat obesity in middle-aged women, body fat content decreased significantly. Often participate in tennis exercise so that obese middle-aged women's waist-hip ratio decreased, abdominal sebum thickness and Oeder significantly decreased ($P < 0.05$), making women more beautiful shape.

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"TOP LEVEL DESIGN" THEORY IS TO IMPROVE THE PHYSICAL FITNESS LEVEL OF COLLEGE STUDENTS

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Objectives In the perspective of university students' physical health level, based on the theory of "top-level design", analyze the impact of university students' physical health level of internal cause and external cause, and aims at the single form of physical education curriculum in colleges and universities, points out the specific measures to explore the path of ascension.

Methods The basic situation of physical health of college students in 29 colleges and universities in Anhui province was investigated by means of literature data, questionnaire survey, expert interview and data statistics.

Results "Top-level design" theory and curriculum theory perspective, in view of the university students' physique different levels, different levels should explore a suitable physical health level of college students stratification teaching methods, construct reasonable teaching goal, targeted layering teaching, examination can form "eugenics YouJiao, inquiry teaching".

Conclusions Freshmen and sophomores have a higher fitness rate, junior college juniors, and seniors the lowest. Failing student's proportion: 12.72%, accounting for higher. Pass the above 87.28%, and excellence rate is only 0.23%, 17.71% of college students' exercise at ordinary times. Of fear of hardships especially afraid of running in the classroom, the physical health of college students in Anhui province is not optimistic. The Anhui province every year for physical health test scores cannot graduate students accounted for 2.70%, the elective course of stratified teaching model in colleges and universities in Anhui province with 12 colleges and universities, accounted for 42.38%. The sports option class hierarchy model of integrating teaching and extracurricular sports club will be

the first selection of the ordinary university sports curriculum reform.

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ANALYSIS OF PROMOTING EFFECT OF TAIJIQUAN EXERCISE ON HEALTH CARE EFFECT

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Objectives *Taijiquan* is the sport with national characteristics in the national fitness program. It has a broad mass base, a good regulating effect on human physiological function, and a remarkable effect on the prevention and control of certain diseases and antiaging resistance. This study aims to prove the correlation between *Taijiquan* exercise and health care effect.

Methods Through investigation and analysis, we observed the distribution and classification of Chinese Medicine Constitution during *Taijiquan* exercise. Distribution of body constitution was analysed, and the effect of *Taijiquan* exercise on the conditioning and health care of human organs system was discussed in the present study.

Results The results showed that *Taijiquan* exercise can significantly improve the type of Chinese Medicine Constitution, and increase the quality of health. Other biased constitution transform to better physique after *Taijiquan* movement, which is beneficial to improve the mental state, the body constitution, and which can also promote the good living condition and increase the healthy constitution of the human body.

Conclusions Adhering to long-term *Taijiquan* exercise can improve and adjust the functions of the human nervous system, blood circulation system, respiratory system, digestive system and so on, the flexibility, muscle coordination of the joints are developed.

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INFLUENCE OF WISDOM EDUCATION ON PSYCHOLOGICAL RESILIENCE OF COLLEGE STUDENTS IN FRUSTRATION SITUATION

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Objectives Wisdom education is a kind of moral pursuit, which is characterized by innovation and has the effect of psychological regulation. Psychological adjustment plays an important role in the process of college students' growth. In order to promote the healthy growth of college students, this paper analyzes the influence of wisdom education on the psychological changes of college students in frustration situation.

Methods Using cluster random sampling method, a total of 200 male and female college students are selected as the research object. The college students' Resilience Scale (HARA) is used as the measuring tool to select the high resilience group and the low resilience group with 20 people in each group, and through short-term psychological change experiment and long-term psychological change experiment to explore the influence of wisdom education on resilience of college students in frustration situation.

Results The results of psychological changes show that in the frustration situation, the wisdom education has positive regulation on the adjustment of short-term psychological changes of college students, the adjustment of college students' long term psychological changes exists in both positive and negative aspects of regulation. Specifically, compared with low mental resilience, high mental resilience has more positive effects and less negative effects under wisdom education.

Conclusions Wisdom education enhances college students' understanding of resilience: Mental resilience is produced by the interaction between the outside, the individual and the two, the internal resilience of individuals mainly includes cognition, emotion, spirit, body, behavior and so on.

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EFFECT OF HIGH INTENSITY EXERCISE ON HUMAN KNEE JOINT INJURY

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Objectives The knee joint is the most complex and largest joint of the body, which plays a very important role in lower limbs movement and load supporting. In order to analyze and study the effect of high intensity exercise training on human knee joint injury, 160 athletes were selected as subjects.

Methods Before the experiment, everyone had the same knee health. And they were randomly divided into experimental group and control group. The experimental group was subjected to high-intensity exercise for 4 w, the control group did not do any high-intensity training. The changes of main cartilage and ligament of femur, tibia, fibula, patella and knee were measured by CT scanning and magnetic resonance imaging (MRI).

Results Experimental results show that the stress, stain and the displacement of medical cartilage of the athletes in experimental group are larger than control group, the difference was statistically significant.

Conclusions The proposed method had a potential value to study the shock and vibration behavior of human knee joint during high intensity exercise, which opens up a new research method for knee joint sports injury, and provides some reference for the prevention and treatment of knee joint sports injury.

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FATTY OXIDATION RATE IN OBESE PATIENTS UNDER LOW INTENSITY

EXERCISE

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Objectives To study the fatty oxidation rate in obese patients under low intensity exercise.

Methods Select 120 obese patients who have no exercise habits as the objects of this research. All patients are enrolled in an incremental exercise load test of upper limb vehicle, the test need to be performed twice, with the method being: benchmarking and fatty oxidation strength test should be carried out, and the breathing gas need to be analyzed during both of the tests. The starting power in the benchmarking should be controlled at 5 W and it should be increased by 10 W every 3 minutes and the rotating speed should be kept at 60 rpm, in this form until the patient was exhausted. Then, measure oxygen uptake and the change of respiration quotient. In the fatty oxidation strength test, there are five levels of incremental load, the initial load is controlled at 5W, each level has a duration of 6 minutes, the fifth level of the load is the corresponding load when the respiration quotient is lin the benchmarking, the calculation method of the other three levels is the average difference between the two. And a detailed record of changes in the rate of fatty metabolism is taken.

Results With the gradual increase of exercise intensity, the fatty oxidation rate of patients increases at first and then it decreases gradually. The fatty oxidation rate's peak value (5.46 ± 0.75) $\mu\text{mol/kg/min}$ is obtained under $34.9\% \pm 2.3\%$ VO_2 peak exercise intensity, and then the fatty oxidation rate is decreased when the exercise intensity is increased.

Conclusions If obese patients want to obtain the maximum fatty oxidation rate, they need to take a scientific and effective low intensity exercise intervention program.

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ANALYSIS OF UNHEALTHY BEHAVIORS AND INFLUENCING FACTORS AMONG UNIVERSITY STUDENTS

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Objectives University students are a large special group, whose life behavior is closely related to society, excessive drinking, smoking, excessive Internet surfing, abnormal diet and so on have become social health problems, which pose a short-term and long-term harm to the health of University Students.

Methods A self-designed questionnaire was used to investigate university students in four universities by cluster random sampling method; multivariate logistic regression analysis is used to screen the main influencing factors of smoking and alcohol drinking.

Results The awareness rate of unhealthy behaviors among university students is 68.34 %; drinking report rate is 15.2 %, smoking report rate is 8.3 %, bad internet behavior report rate is 8.42 %, bad dietary behavior report rate is 52.85 %, there are significant differences among different majors. Multivariate Logistic regression analysis shows that the main influencing factors of smoking are single

parent families, drinking and living in the urban areas; the main factors affecting alcohol consumption are gender, profession, family, county seat, tuition fees, smoking and fighting behavior.

Conclusions University students have inadequate understanding of unhealthy behaviors. In order to effectively reduce the incidence of University Students' health risk behaviors and improve the health level of university students, it is necessary to actively conduct health education for university students and actively control and guide all kinds of harmful behaviors.

134 FACTOR VARIABLE OF JOINT INJURY IN PHYSICAL EXERCISE UNDER LOW TEMPERATURE ENVIRONMENT

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Objectives The factors of joint injury in physical exercise under low temperature environment are discussed in this paper.

Methods A total of 206 patients with joint injuries are studied. The age, occupation, gender, length of exercise and environmental temperature of these patients are obtained and compared with healthy people. The variables influencing joint injury are linearly regressed.

Results In Longyan city from 2015 to 2017, for 206 patients with joint injury of physical exercise in low temperature environment, the factors of age, gender, occupation, exercise environment temperature is the main factors of ankle injury. The three factors of gender, exercise time, and temperature are the main variables that cause knee injury in physical exercise under low temperature environment. The two factors of age and temperature are the main variables causing elbow injury in exercise under low temperature environment.

Conclusions The symptoms of joint injury, the causes of joint damage, and preventive measures are described.

135 DILEMMA AND COUNTERMEASURE OF HOME SCHOOL COMMUNICATION IN HIGH SCHOOL PSYCHOLOGICAL CRISIS INTERVENTION BASED ON WISDOM EDUCATION

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Objectives In the process of intelligent education, when college students are faced with psychological crisis, the relationship and dilemma between the school and the parents in the process of communication is researched, and then the solution to the problem is proposed in this paper.
Methods By using the method of combining empirical

analysis and data investigation, a survey of 1500 college students in a university is carried out. The role and dilemma of schools and parents in the face of psychological crisis is to be understood.

Results The model of questionnaire survey is used to obtain the results. SPSS 21 and AMOS 21 are used for statistical analysis and mediation effect test. Results: In the crisis intervention, the relationship of schools and parents and students out of the crisis in all dimensions are positively correlated (all $P < 0.05$). Generally, bad communication between the parents and the school and self-esteem of university students in all dimensions are negatively correlated (all $P < 0.05$). Distrust communication and the dimensions of moral self-worth, individual orientation and physiological self-worth of university students are negatively correlated (all $P < 0.05$).
Conclusions Good home school communication has a mediating effect on university students' ability to get out of trouble and establish positive quality in the face of psychological crisis.

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136 PHYSIOLOGICAL INDICES IN TEENAGER'S FOOTBALL TRAINING

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Objectives In teenager's football training, there are three main periods: preparation period, competition period and rest period. The corresponding training should be arranged according to the law of physical and mental development and psychological characteristics of teenagers in different age groups, and teenager's growth and development, anatomy and physiology and various characteristics of the system are taken full advantage, to grasp its sensitive period for training.

Methods The changes of physiological indexes of teenagers in football training are analyzed, and the possibility of application of heart rate inflection point in the evaluation of aerobic capacity of young athletes is discussed. In this paper, 20 young male football players are selected, and the physiological indexes are determined and analyzed then.

Results The results showed that: in teenager's football training, there is a significant correlation between the indexes of cardio-pulmonary function.

Conclusions It needs to make a reasonable load, and carry out the principles of induction and progressive, intuitive, systematic, making our teenager's football training level to a new one.

137 THE INFLUENCE OF THE ART OF HOSPITAL GUIDED ENVIRONMENT ON THE REHABILITATION OF PATIENTS IS ANALYZED

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Objectives The good hospital guide environment can promote the rehabilitation of patients, but the traditional environment ignored the analysis on the rationality of design art, the effect of promotion is not obvious. In this paper, the analysis of influence of environmental art modeling guide hospital rehabilitation of patients.

Methods According to the demand of hospital environment guide, design the overall structure of hospital environment art, get the guide information, and the guide information is simplified to improve the guide information continuity and recognition, realized the pretreatment of the guide information; Introducing co-occurrence matrix to guide information spatial structure feature extraction, and computing the distance of connection points between features, Considering the rationality of the hospital environment art design guide, constructing model of hospital environment, analysis its impact on rehabilitation of patients.

Results The experimental results show that the improved hospital environment, the design is reasonable, can effectively play the role of promoting the rehabilitation of the patients.

Conclusions The built model has high precision and high accuracy, fully satisfy the modeling analysis needs, it plays an important role in assisting the analysis for the analysis of the influence of hospital environmental art on the rehabilitation of patients.

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ANALYSIS AND RECOVERY OF VULNERABLE MOVEMENTS IN BASKETBALL

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Objectives As a common sport in daily life, the basketball sport has some dangers. Some vulnerable movements can cause different levels of damage to the body. So in the process of basketball, try to avoid any injuries to the joints. So it is very critical that the action the analysis to easy injury in basketball, as well as the joint injury after the recovery process.

Methods Combined with the main component analysis method, the analysis and recovery method of vulnerable motion in basketball sports are proposed. Firstly, the factors that affect the injury of basketball players are obtained, which can be used to set up the training of basketball players for the damage vector set. Using the wavelet packet method to select a set of optimal vector as nuclear factors affecting basketball player injury of wavelet transform, the fusion of overtraining in statistical analysis theory to extract basketball player with the relationship between the characteristics of damage factors influence the basketball players. An accurate analysis model of the injury of basketball players is established by estimating the main component of the injury caused by the injury of the basketball player. Estimating the main component of the injury caused by the injury of the basketball player and accurate analysis model of basketball player injury was

established

Results The motion of basketball movement was collected through continuous photographic technique. And all action images need to be characterized by feature analysis. The following is a smart screening of vulnerable actions to obtain its action characteristics and collection of feature sets to study the recovery methods after human injury.

Conclusions Through experimental results, this analysis method to analysis of the vulnerability of basketball sport in detail the characteristics of the analysis, and the measures for further study after injury, to lay a certain foundation for the safety of basketball.

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EFFECTS OF INTERMITTENT LOW INTENSITY EXERCISE ON THE MORPHOLOGICAL CHARACTERISTICS OF DEEP NECK MUSCLES IN FEMALE PATIENTS WITH CHRONIC NECK PAIN

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Objectives To observe the effect of intermittent low intensity exercise on the morphological characteristics of deep neck muscles in female patients with chronic neck pain, can provide evidence for more targeted exercise therapy in clinic.

Methods a total of 60 female patients with chronic neck pain were randomly selected as the subjects. 30 subjects experience intermittent low-intensity exercise as the experimental group, and other 30 subjects who do not experience intermittent low-intensity exercise as the control group. High frequency ultrasound imaging technique is used to collect the anteroposterior diameter and transverse diameter of the transverse section of the deep cervical flexor tendon as morphological indexes. The differences between the two groups are compared, and the correlation analysis between the two groups of morphological indexes is carried out.

Results The left anterior and posterior diameters and transverse diameters of the neck pain group are less than those of the control group ($P < 0.05$, $P < 0.01$). There is no significant correlation in the correlation analysis of the control group.

Conclusions there is a strong correlation between deep neck flexor and intermittent low intensity exercise. In the exercise therapy of female patients with chronic neck pain, intermittent and low intensity exercise should be further strengthened.

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FACTOR VARIABLE ANALYSIS OF JOINT INJURY IN PHYSICAL EXERCISE UNDER LOW TEMPERATURE ENVIRONMENT

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Objectives Due to the lack of reasonable exercise

knowledge, it is often caused by outdoor physical exercise in winter. To ensure the safety of physical exercise, present an analysis of the factors of injury factor of physical exercise joints in low temperature environment.

Methods Have investigated the influence of hypothermia on temperature and joint movement, under low temperature, selected university students as research objects, the joint damage had been tested in the physical training, tested the coordination ability of skeletal muscles under different temperatures, the least squares estimation algorithm had been used to extract the characteristic parameters of skeletal muscle injury, classified the joint damage according to different types, tested the enzyme activity in skeletal muscle fiber, according to muscle stiffness to constructed the joint flexibility model, the analysis of the factor variables of joint motion injury caused by low temperature environment had been completed.

Results Experimental results show that, the method has high extraction accuracy, high accuracy of joint damage classification, certain authenticity and validity.

Conclusions According to the analysis, it has a great influence on joint damage by physical exercise in low-temperature environment. Low temperature can make your muscles be stiffen, skeletal muscle excitation be decreased, some metabolic enzymes be less active, the enzymatic activity of the rapid muscle fiber and slow muscle fiber be abnormal, and then cause significant damage to the joints.

141 EFFECTS OF MICROCLIMATE OPTIMIZATION ON ENVIRONMENTAL EFFECTS AND RESPIRATORY DISEASES IN COASTAL CITIES OF JIAODONG

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Objectives In this study, the effects of urban microclimate on environmental effects and respiratory diseases before and after the optimization of urban micro climate are investigated, and the changes of immunological indexes related to respiratory diseases induced by climate change are explored, to provide theoretical and experimental basis for prevention, diagnosis and treatment.

Methods In this study, 100 patients with respiratory disease in Jiaodong City were selected, among them, 50 patients in the experimental group were arranged as comfortable and pleasant climate, and the remaining 50 patients were in the climate relatively poor environment as control group. Through the scientific analysis of two groups of environmental indicators data, the incidences of two groups of patients were calculated, to analyze the effects of micro climate optimization on environment and the incidence of respiratory diseases.

Results The humidity and air quality index of the experimental group were significantly better than those of the control group, the incidence rate of the experimental group was 5 %, and the incidence rate of the control group was 95 %.

Conclusions The respiratory system of human immune function related cytokines have a certain change due to climate change. Through the micro climate optimization, the environment effect was improved, which can effectively

prevent respiratory disease patients, and the experimental result has guiding significance for clinical disease prevention, diagnosis and treatment of respiratory infection.

142 IMPROVEMENT OF EMERGENCY RESCUE TREATMENT MODE FOR PATIENTS WITH HYPERTENSION

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Objectives The primary objective of the present study was to explore the emergency treatment methods and improvement measures of patients with hypertension.

Methods Two hundred patients with hypertension were selected in the emergency department of a hospital in January 2016 to February 2017 as the research object. The clinical data of these patients were retrospectively analyzed. Among them, 90 patients with hypertension admitted to the hospital from January to October 2016 were taken as an example. These patients were given routine treatment first aid. One hundred and ten cases were admitted to hospital from November 2016 to February 2017 as observation group. The improved treatment method was used. Statistical analysis was made on the total effective rate before and after the improvement of treatment, The heart rate, blood pressure, blood potassium, blood sugar, blood urea nitrogen, white blood cell count and alanine aminotransferase content were compared between the two groups before and after the improved salvage treatment.

Results The effective rate of rescue under routine method was 72.34 %, the effective rate of rescue after improved rescue method was 88.57 %, the diastolic blood pressure and systolic blood pressure after the first aid were significantly lowered than those before treatment.

Conclusions Emergency rescue of patients with hypertension should be based on rapid blood pressure reduction, at the same time, according to the degree of injury of the patient's organ, the treatment was targeted, emergency treatment improvement programme can significantly improve the treatment efficiency of hypertension patients.

143 FAT OXIDATION RATE OF OBESE PATIENTS UNDER LOW INTENSITY EXERCISE

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Objectives: Obesity can increase weight, cardiovascular risk and insulin resistance in obese patients, and will cause many complications. Lipid metabolism related complications seriously affect the quality of life of patients. Prevention and control of obesity in obese patients is of great clinical significance. During low intensity and longtime exercise, free fatty acids from adipose tissue are the main sources of muscle fuel, which are related to small

energy demand, sufficient oxygen supply, slow muscle fiber recruitment, lipid oxidation and energy supply enhancement. The main ways to control obesity include diet control, exercise training, electrical stimulation and antispasmodic drugs in the clinical treatment. In exercise prescription formulation, exercise intensity control is relatively vague, and clinical studies are few.

Methods: In this paper, the fat oxidation rate of obese patients with low intensity exercise was investigated.

Results: The experiment results showed that the change of the exercise intensity was the main cause for the change of lipid oxidation rate. The maximum fat oxidation rate of normal people appeared in a relatively large range. With the increase of exercise intensity, the fat oxidation rate of obese patients first increased and then decreased.

Conclusions: The results have great clinical significance to prevent and control of obesity.

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Column 7: Sanitary control

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RELATION AMONG KNOWLEDGE, ATTITUDE AND BEHAVIOR CONCERNING HEALTH EDUCATION IN PRIMARY AND HIGH SCHOOL: EMPIRICAL ANALYSIS BASED ON STRUCTURAL EQUATION MODEL

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Objectives To provide scientific basis for better develop health education courses and knowledge communication in primary and high schools through analysis of relation among knowledge, attitude and behavior concerning health education in primary and high school by use of structural equation model.

Methods Questionnaire survey was conducted aiming at knowledge teaching of health education courses in primary and high schools, students' cognitive attitude and students' health behaviors, and factorial analysis was conducted concerning relation among knowledge, attitude and behavior in health education in primary and high schools adopting SPSS18.0 software, and then structural equation model was built by use of AMOS software.

Results According to structural equation model, it fit the relation model on health education knowledge, attitude and behavior between teachers and students, and it reached best fit optimizing index of structural equation model, where CMIN/DF value, RMR value, GFI and CFI values are respectively 1.393, 0.037, 0.899 and 0.951, showing that the global fitting of the model is good, and with good fitness degree. The results showed that health education knowledge and attitude of teachers and health education attitude and behavior of students are of important influence to health education effects in primary and high schools.

Conclusions Through integrating hierarchical linear model into structural equation, it may clearly explain interactional relation among knowledge, attitude and behavior in health education in primary and high school, accordingly, it is

suggested to strengthen training to teachers concerning health education knowledge, promote teachers' health education attitude, thus improving attention of students to health education, improving students' health education practice effect, further realizing the virtuous circle of health education in primary and high schools.

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CHINESE MEDICINE INDUSTRY EXTERNAL EXCHANGE UNDER THE VIEW OF "THE BELT AND ROAD"

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Objectives From the perspective of "Belt and Road", this article provides a favorable opportunity for the development of foreign exchange in the Chinese medicine industry based on the "One Belt, One Road" strategic platform. Put forward the problems and improvement tactics of the spread of Chinese medicine industry.

Methods Field research, access to literature and integration of information.

Results The article analyzes the impact of the development of foreign exchange in the Chinese medicine industry on the political, economic and cultural aspects of the country along the "Belt and Road" and proposed part of the Chinese medicine industry, the spread of foreign issues and improvement strategies.

Conclusions Chinese medicine industry is still facing many difficulties and challenges in the development of its foreign exchange, we should increase the exchanges with the Chinese medicine industry in terms of exploring similarities in Chinese and Western cultures, promoting innovations in Chinese medicine, and focusing on the promotion of Chinese medicine products and services.

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THE ROUTE OPTIMIZATION RESEARCH OF PHARMACEUTICAL COLD CHAIN LOGISTICS DISTRIBUTION BASED ON IMPROVED RNA ARTIFICIAL FISH SWARM ALGORITHM

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Objectives With the improvement of people's living conditions, people's pursue of advanced medical treatment become more urgent, which promotes the development of medical cold chain logistics. Pharmaceutical cold chain

logistics is a complicated system engineering, which ensure the refrigerated medical products is always in a specific temperature from production to sales, to ensure the quality of pharmaceutical product. In this paper, a newly proposed improved RNA artificial fish swarm algorithm is applied to the pharmaceutical cold-chain logistics distribution to optimize the delivery route. Thus ensuring the costs of the logistics distribution is minimal.

Methods This paper mainly studies the transportation links of medical cold chain logistics. We consider the comprehensive cost in this process of transportation as the objectives function. The time windows and load limits were used as the restrictive conditions, then some other conditions is considered to construct medical cold chain logistics distribution model. The improved RNA artificial fish swarm algorithm is used to optimize the delivery route, and then minimize the total costs.

Results The MATLAB simulation of medical cold chain logistics distribution model is carried out by the improved artificial fish swarm algorithm, ultimately come to the optimal cost. Compared with the traditional artificial fish swarm algorithm, the improved RNA artificial fish swarm algorithm find the optimal route more quickly.

Conclusions The results show the improved artificial fish swarm algorithm can find the optimal solution faster compared with the traditional artificial fish swarm algorithm. The research result of this paper is of important guiding significance for logistics enterprises to develop pharmaceutical cold chain logistics distribution system.

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OPTIMIZATION OF PHARMACEUTICAL COLD CHAIN LOGISTICS DISTRIBUTION BASED ON SEEKER GENETIC ALGORITHM

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Objectives With the continuous improvement of the national economy and the level of people's medical insurance, the demand for pharmaceutical cold chain logistics is also increasing. Because of the perishable nature of the medical products transported by the pharmaceutical cold chain logistics, coupled with the customer's sales of products for a certain period of time and the high standards on time, it is necessary to optimize the distribution of the pharmaceutical cold chain logistics.

Methods In this paper, we proposed a seeker genetic algorithm to study a distribution model of pharmaceutical cold chain logistic with soft time window. Customer's time window is fuzzed to reflect the actual requirements of customers. The satisfaction of customer is the membership function of starting service time. At the same time, according to different aspects of total cost, which include

fixed cost, transportation cost, medical cargo damage cost and energy cost, we establish the double-objectives distribution model with the consideration of maximizing satisfaction and minimizing total cost. Combing the uncertainty reasoning behavior in the seeker optimization algorithm and the nearest neighbor strategy, then improve the mutation operator in the genetic algorithm.

Results Compared with the basic genetic algorithm, the seeker genetic algorithm can shorten the transport distance and reduce the total cost, and improve the accuracy of the solution.

Conclusions The improved genetic algorithm has a great improvement in solving precision and convergence speed. It can save the cost of enterprises, improve the operation efficiency of enterprises, and shorten the distance and reduce the waste of medicine.

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THE MARKETIZATION ALLOCATION OF ELEMENTS OF CHINESE STYLE SPORTS HEALTH SERVICE SYSTEM

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Objectives From the perspective of the Chinese style of national traditional sports, this paper studies the marketization allocation of all elements of the sports health service system with Chinese characteristics, which provides the basis for the decision of "healthy China" strategy.

Methods This paper studies the market allocation of various elements of Chinese style sports health service system by means of literature, field investigation and expert interview, logical analysis and comparative law.

Results The paper explores the development trajectories of national traditional sports, combines the characteristics of the new era, and studies its suitable development path. Field investigation of different geographical and natural human environment, the behavior of people engaging in sports activities, attribution research on the sports paradigm of soil and water; Experts interview regional historical differences, study the economic and institutional intervention of public sports activities. Analyze the different customs, institutions, land, funds, human resources, technology and other elements, and influence the public participation in sports activities.

Conclusions The construction of Chinese style sports health service system should abide by the principle of "harmony and difference", because the land is suitable for people. Improve the quality of the supply system, improve the system, such as land, labor, capital, innovation factor productivity, the elements of sports health service system should be optimized configuration, meet the needs of the people for a better life needs. To mobilize the competitive energy of the market, through reform and innovation, to activate the marketization allocation of all elements of the sports health service system. Give full play to the "Internet +" enhance the level of sports products and services supply and catalytic role of sports system reform, innovation drive

sports consumption upgrade, improve the style of Chinese sports health service system.

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FOOD SAFETY AND PUBLIC HEALTH OF E-COMMERCE DELIVERY PLATFORM

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Objectives By means of literature analysis and investigation, the paper tries to solve the problems of food safety and public health caused by the rapid development of the food delivery platform in the context of the rapid development of e-commerce. This article attempts through the system design to make "Internet + restaurant industry" regulations more standard strictly, promote network reservation service platform with relevant departments to focus on food safety and public health problems.

Methods Including literature analysis method, field investigation method and building metering model method.

Results The development of e-commerce, making the network reservation third-party service platform, such as unclear responsibility, business does not operate in accordance with the law of the public license information, from the kitchen to consumers in the process of regulation is regulatory limbo. It is imperative to ensure food safety and health by the maximum degree of system design, and introduce the cold chain logistics system to improve the "fresh" degree.

Conclusions With the rapid development of e-commerce in the world, food safety and health problems have been closely watched, and the intensified competition in the industry has led to the gradual transition of food e-commerce from capital to rational. It is necessary to supervise and control the whole chain and the whole process of food safety from the qualification of the merchants to the monitoring of quality service level and the delivery safety of "the last kilometer".

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DEVELOPMENT OF NATIONAL FITNESS UNDER THE MARATHON MANIA

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Objectives With the rapid development of social economy, people's living standards continue to improve, to adapt themselves to the people's sports consciousness also gradually improve, people began to more and more involved in the fitness activities, the marathon boom is under the background of the rise, starting to attract social attention. The sudden rise of marathon racing in China has promoted the development of Chinese national fitness.

Methods Literature data, data statistics, etc.

Results The research shows that in the past five years, China's marathon competitions have taken on an upward trend, and by 2016, we have passed the 300-mark barrier, and to some extent, promoted the development of our national fitness industry. Learn about the development of the marathon, the problems such as the uneven distribution of the city, the lack of competition organization, and the impact of the marathon competition on the national fitness.

Conclusions Understanding to the development of marathon, tissue distribution, such as host city for the event lack and problems such as the marathon event held in the impact on the national fitness. In addition, put forward the increasing diversification of event management and corresponding measures of the scientific management of logistics, marathon better service for the future fitness to provide certain reference.

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INFLUENCE OF POPULATION AGING TO THE MEDICAL TREATMENT EXPENDITURE OF URBAN RESIDENTS

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Objectives To analyze the association model of elderly residents' mean medical consumption tendency after population aging.

Methods Combining national disclosed statistical data and based on association rules, error correction and linear regression model, the dynamic influence of population aging to elderly residents' medical consumption behaviors was investigated from three aspects including mean medical consumption tendency, actual medical level and medical consumption structure.

Results showed that the deepening of population aging is the main cause of increase of urban residents' medical consumption behavior; population aging has a positive correlation with mean medical consumption; population age structure has significant influence on various medical consumption rates, wherein the influence extent and direction are varying.

Conclusions population aging has a positive correlation with the medical consumption on necessary health care equipment, products and services, while has a negative correlation with luxury medical consumption.

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THE NECESSITY OF LEGISLATION ON MEDICAL TREATMENT AND PUBLIC

HEALTH AND RELATED RIGHTS AND LIABILITIES

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Objectives To investigate the necessity of legislation on medical treatment, public health, related rights and liabilities wherein.

Methods The theoretical basis for legislation on medical treatment and public health was analyzed and discussed. The aim of medical and health law is to reasonably allocate people's right in enjoying invested medical resource, medical product production, and medical product consumption and waste. Based on principle of multiple circulation of medical products, scientific and technological predominance, consistency of interests, social public participation and comprehensive economic benefits, the value target of legislation on medical treatment and public health is determined, i.e. enhancing just and equitable medical development, realizing harmony and unification of economy, ecosystem and social benefit, and guaranteeing human existence and medical security.

Results Analysis of rights and liabilities can promote medical and health development, improve the utilization efficiency of medical resources.

Conclusions Through analyzing the necessity of legislation on medical treatment, public health, related rights and liabilities, the wasting of medical resources can be inhibited.

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APPLICATION AND ANALYSIS OF MEDICAL ANIMATION IN SURGERY PROMOTION

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Objectives In order to make complex theory surgery more interesting.

Methods the Animation is used to promote the complex surgery theory. Some complex operation theory is depicted through simple and lively animation. Animation is used to better show the inner activities of the characters. It is a bold theoretical attempt to express complex surgical theory with humorous animated characters, and it is also a concrete manifestation of multimedia service medicine.

Results The practical application results show that this method is easier to be accepted in the investigation of medical theory study, and some theoretical knowledge is easier to be remembered.

Conclusions Using animation to teach can effectively improve the teaching methods and increase the interest of surgery promotion. It is worth recommending.

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CONSTRUCTION OF FOOD SAFETY INFORMATION SYSTEM

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Objectives In recent years, people have gradually turned more attention to food safety. In view of this, this paper mainly discusses the construction of food safety information system in China and how to solve the problems existing in the construction.

Methods The computer simulation method, SPSS statistical analysis software, and the cross research method combining the theoretical research and empirical analysis, and the qualitative analysis and quantitative analysis are comprehensively used. Through the actual investigation and data statistics of food safety information system at home and abroad, by learning the foreign advanced food safety information technologies, and applying them to domestic food manufacturers, the perfect food safety information system in China can be established.

Results By establishing a food safety system, standardizing production techniques and learning from foreign excellent food safety construction technologies, the perfect food safety information system can be constructed, which can effectively improve the level of the domestic food safety construction.

Conclusions The purpose of this paper is to provide feasible help for the construction of food safety informatization in china.

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CONSTRUCTION OF INFORMATION FOOD SAFETY SUPERVISION SYSTEM BASED ON CLOUD COMPUTING

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Objectives Food safety and food safety supervision have become a concern of the whole country. This paper mainly studies how to build a perfect information food safety supervision system based on cloud computing technology, so as to enhance the ability of food safety supervision.

Methods This paper first analyzes the related situation, and then adopts the deductive reasoning method (qualitative analysis) and empirical research method, that is the theory->hypothesis-questionnaire survey->SEM model to put forward the strategy of establishing food safety informant network, establishing an exchange supervision platform that O2O covers the whole network, and increasing the food safety supervision function on mobile maps and group buying APP, in order to build a higher level of information food safety supervision system.

Results Through the establishment of a perfect food safety supervision system with the core of cloud computing technology, the food safety issues in China are fully supervised in order to ensure the national food safety.

Conclusions Through the design of the construction of food safety supervision information, this paper studies the methods of perfecting the supervision system, so as to promote the development of food safety supervision in China and promote the sound development of the food industry.

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APPLICATION OF FOOD SAFETY MANAGEMENT OF COLD CHAIN LOGISTICS BASED ON HACCP

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Objectives In recent years, the incidence of population in China has become higher and higher. According to statistics, most of the causes come from food, so the food safety has become the primary problem to be solved. In order to improve the food safety, this paper uses HACCP management system to analyze the application of food safety management of cold chain logistics.

Methods This study regards HACCP as the theoretical basis, strictly follows the implementation principle of the system, and analyzes the application of the food safety management of cold chain logistics. First of all, the main process of cold chain logistics management is proposed. Secondly, the application effect of HACCP is analyzed from three aspects which are the key points and hazard analysis, real-time monitoring of critical control points, critical limits and deviation correction scheme. Finally, by observing the experimental results, we should verify whether the system meets the requirements of the safety management.

Results The experimental results show that the HACCP management system meets the requirements of food safety management, and the application effect is good.

Conclusions HACCP management system helps to improve the efficiency of food safety management, so as to improve to food safety.

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Column 8: Clinic therapy

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MEDICAL TREATMENT OF ZHONGJING AND WINE

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Objectives To provide theoretical basis for clinical application of Zhong Jing with the law of wine.

Methods Through the summary of Zhang Zhongjing's prescription, we analyzed the law of Zhang Zhongjing's use of wine and the significance of Zhang Zhongjing's use of wine was explored.

Results There are 28 prescriptions in total (including the additional formulas) of using wines in Treatise on Febrile diseases and synopsis of the Golden Chamber written by Zhang Zhongjing. There are two main kinds of wine in Zhongjing, one is the saka and the other is the white spiri. Zhong Jingfan used a decoction, and dipping medicine, to send medication with the saka. The white spiri is often used as a main medicine for treatment of angina pectoris.

Conclusions Which fully indicates Zhang Zhongjing's emphasis on the medicinal value of wine; it also plays a great role in promoting the enrichment and development of medicine and liquor in the later ages. Through the combination of wine and medicine, it reveals the efficacy of wine, thus expanding its scope of use. In the prescription of Zhongjing, has 7 prescription used the wine to decocting drugs; has 4 prescription used the wine and water to decocting drugs; has 5 prescription used the wine to help taking pill medicine; has 6 prescription used the wine to help taking powder medicine; has 6 prescription used the wine to soaking medicine. They can help the medicine reach the lesion and improve the efficacy of the drug. For some people, these should not use the wine, such as hot and weakness disease.

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CLINICAL OBSERVATION BUSHENLISHI DECOCTION OF 40 CASES OF LUMBAR DISC HERNIATION OF COLD DAMPNESSTYPE

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Objectives To observe the clinical curative effect of *Bushenlishi* decoction of cold dampness type lumbar disc herniation.

Methods In line with the 40 cases of lumbar disc herniation in patients with diagnostic criteria of cold dampness type selected from the first affiliated hospital of Henan University of Chinese Medicine, randomly divided into treatment group and control group, 20 cases in each group. There was no significant difference in baseline data such as gender, age, course of disease between the two groups. The treatment group was treated with *Bushenlishi* decoction (decocted in water), the control group using the loxoprofen sodium (60mg tid) and Aescuren (300mg bid). The course of treatment totally four weeks. The analgesic effect and JOA score of the two groups were observed.

Results The analgesic effect of the two groups was not significantly different between the two groups before and after treatment ($p>0.05$), and the improvement of JOA score in the treatment group was more significant than that in the control group ($p<0.05$).

Conclusions *Bushen* decoction can significantly improve

the clinical treatment of cold dampness type of lumbar disc herniation patients.

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Clinical observation of Duhuoji sheng decoction combined with proximal fibular osteotomy on the Treatment of Knee Osteoarthritis

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Objectives To observe the clinical efficacy of Duhuoji sheng decoction Combined with fibular osteotomy in the treatment of knee osteoarthritis. In order to find a reasonable solution for the treatment of knee osteoarthritis.

Methods From The First Affiliated Hospital of Henan University of Chinese Medicine, 30 patients who met the diagnostic criteria were selected and randomly divided into the treatment group and the control group (n=15). The treatment group was treated by Duhuoji sheng decoction combined with proximal fibular osteotomy, the control group were treated with Duhuoji sheng decoction. The VAS visual acuity score and HSS knee disease score were scored were performed at the beginning of the project, in 1st month and 3rd month.

Results Before and after treatment in the treatment group, the VAS score and HSS score were statistically significant (P<0.05); The control group patients before and after treatment, VAS score and HSS score were statistically significant (P<0.05); Between the two groups, after treatment for 1st months and 3rd month after treatment, the VAS score and HSS knee score of the treatment group were better than those of the control group (P<0.05). The difference was statistically significant.

Conclusion 1. Two methods have obvious curative effect on knee osteoarthritis; 2. Duhuoji sheng decoction combined with proximal fibular osteotomy for the treatment of knee osteoarthritis better effect, can significantly improve the patient's knee function.

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PATHOLOGICAL TYPE DIAGNOSIS METHOD RESEARCH OF IMPROVED BAYESIAN NETWORK BASED ON ROUGH SETS

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Objectives The diagnosis of tumor pathology has always been a hot topic both at home and abroad. In order to evade inconvenience and alleviate pain of the patients caused by the inaccurate diagnosis, this thesis presents a tumor pathology diagnosis method of improved Bayesian

Network based on rough sets.

Methods 854 cases of thyroid tumors were collected by using 18 typical tumor symptom questionnaires, and the diagnostic rules were derived by using the improved Bayesian network based on variable precision rough set.

Results Compared with the traditional rough set derivation method, the new method has a higher diagnostic accuracy than that of the rough set theory method.

Conclusions The tumor diagnosis model of improved Bayesian network based on rough set has better clinical value for improving the diagnosis of tumors and provides a new idea for the diagnosis and classification of tumors.

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FACTORS ANALYSIS ON PATIENTS' BEHAVIOR DECISION IN REFERRAL PROCESS BASED ON THE INVESTIGATION OF 30 HOSPITAL IN 12 PROVINCES IN CHINA

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Objectives This study was designed to explore and analyze the main influencing factors and path of patients' two-way referral behavior.

Methods Using the literature and Chinese health statistical year book data to analyze the influence factors of patients, how to choose hospital. Using the investigation of more than 2000 patients in 30 hospitals of 12 provinces to analyze the influence factors of patients referral behavior. At the sometime, set up the behavior model of patients choose hospital and behavior model of patients' infraduction.

Results The results showed that: 1, distance (56.7%), quality (15.8%), trust (10.7%), designated hospitals (6.3%) and price (5.6%) are the main factors influencing the hospital choosing of patients. 2, the "Two-way Referral" is just supravergence but not infraduction. 3, Medical conditions (31.8%), difficult miscellaneous diseases (19.1%), emergency and severe diseases (19.1%), emergency rescue (17.9%) and demand of the patients' families (12.1%) are the main factors influencing the patients' supravergence. Unsatisfied of the medical level (28.0%), service attitude (9.1%) and drug category of the grass-roots hospitals (17.9%), the unsupport of the doctors and hospital (21.0%) and the cumbersome of the referral procedures (24.0%) are the main reasons that the patients are not willing to infraduction.

Conclusions There are some differences between the influence factors of the patients' choice treatment unit and influence factors of the patients' two-way referral behavior. Illness, medical conditions and technology and family will be the main factors.

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CLINICAL DIAGNOSIS APPLICATIONS NEED RIGOROUS METAMORPHIC TESTING

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Objectives In the area of clinical diagnosis, machine learning programs are used widely in applications and diagnosis systems. And machine learning has been validated to be more effective than traditional clinical methods in the clinical diagnosis domain. As we know, one of the obstacles of machine learning programs testing is without test oracles, which are used to validate the outputs of applications. Clinical diagnosis applications are developed to discover previous-unknown characters of the patients based on the relationships among the sets of sampling data. If there is any way to get the prospective results of the applications, there would be no need to write such applications in the first place. And at the same time, compared with traditional applications, the clinical diagnosis area is a typical emerging domain which needs rigorous testing to ensure the quality and reliability. Because even a mis-diagnosis, which is generated with the diagnosis application, would lead to serious, even fatal and irreparable disasters. But the inputs of the applications are using combination of system-level biomolecular data, such as microarrays and sequencing data, and conventional pathology tests, such as blood count, histological images, and clinical symptoms. Metamorphic testing (MT) is an effective method to alleviate the oracle problem with metamorphic relations (MRs). In MT, when the test inputs satisfy certain relation, the outputs should also satisfy the corresponding relations. This kind of relations is called MR. Thus, in this research, we made the first experimental exploration to test the clinical diagnosis application with MT.

Methods Co-Forest is an effective semi-supervised learning algorithm to microcalcification detection for breast cancer diagnosis. In our experiments, 10 groups of graduate students are requested to develop programs based on the Co-Forest algorithm independently. In this way, 10 different Co-Forest programs are generated. We also asked them to test their own program with typical static testing methods and dynamic testing ways, only without metamorphic testing method. Then, we test the 10 programs with MT individually. Because they are based on the same algorithm, we can design some communal MRs based on the domain knowledge of clinical diagnosis and the properties of the Co-Forest algorithm, which can be used to test all the programs. We also designed some other different MRs based on the realization of different programs. As it has been demonstrated that the number of the MRs is related with the quality of the testing, we design MRs as many as possible to test the programs under test.

Results In the experiment, 3 communal MRs are generated and 2 individual MRs are designed for each program under test. The original test cases are generated with random testing strategy in order to ensure fairness. The results show that at least 2 latent bugs can be detected with the MRs. The number of the bugs is related with the program quality. At the same time, no relationship has been illustrated by the number of the bugs and the type of the MRs, which is inconsistent with the some reported research results. This result illustrates that the relation between MRs and the type of bugs need more experiments.

Conclusions Based on the experiments, we could conclude that MT is effective in clinical diagnosis testing, especially

in the diagnosis programs based on machine learning method. Therefore, MT provides a rigorous testing method to test this kind of safety critical and emerging applications. **Acknowledgements** Supported by Natural Science Foundation of China (No: 61702544), Natural Science Foundation of Jiangsu Province, China (No: BK20160769, BK20141072, BK20150721, BK20161469), China Postdoctoral Science Foundation (No: 2015M582786, 2016T91017, 2016M603031), Engineering Research Center of Jiangsu Province (No: BM2014391), Primary Research & Development Plan of Jiangsu Province (No: BE2015728, BE2016904), and Key Project of Research and Development Plan of China (No: 2016YFC0800606).

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THE PROTEOME VARIATION OF RAT SKELETAL MUSCLE INDUCED BY REPEATED ECCENTRIC EXERCISE

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Objectives To research proteome variety on skeletal muscle damage repair process induced by one and repeated eccentric exercise and proteomics mechanism of skeletal muscle repairing made by repeated eccentric exercise.

Methods 72 Wistar rats were randomly divided into normal control group, one eccentric exercise group and repeat exercise group a week later. Control group was not done exercise, the rest groups were exercised with 18 m/min of speed and -16 degrees of slope. Rats moved for 30 min, rest for 5 min and then moved for 30 min. Repetitive motion was done after a week. Proteome extraction and dielectrophoresis were taken after 0, 24, 48, 72 and 168 h of one and repeated eccentric exercise. Specific proteins were identified by MALDI-TOF MS and sorted according to its function.

Results Proteins expression about energy metabolism and cell damage were reduced especially from 0 to 72 h after repeated motion. The proteins number of decreased and increased expression were not different obviously from 0 to 24 h and the decreased proteins number was more than number of increased proteins obviously at 72 h after repeated motion. During the process of damage repair, energy metabolism related proteins included; isocitrate dehydrogenase, phosphate glucose mutase, nicotinamide adenine dinucleotide dehydrogenase, hemoglobin binding protein, pyruvate dehydrogenase, triose phosphate isomerase; cell damage repair related proteins were consisted of ubiquitin carboxyl terminal hydrolytic enzyme, immune globulin lambda light chain, intracellular chlorine ion channel protein, protein phosphatase 2c protein, glutathione peroxidase, double function peroxidase and express active; skeletal muscle cell structure protein have heat shock protein, endoplasmic reticulum stations protein and keratin, myosin and mitochondrial membrane protein.

Conclusions Repeated eccentric exercise may promote key enzyme expression of energy metabolism and energy supply for damage cell, accelerate skeletal muscle contraction protein degradation and cell swallow, and scavenge free radicals and slow inflammatory reaction

during 24-48 h to speed up the skeletal muscle damage repair.

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CHANGES OF MITOCHONDRIAL AUTOPHAGY - RELATED GENES AND AUTOPHAGOSOME AFTER SKELETAL MUSCLE BLUNT TRAUMA

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Objectives To study the changes of mitochondrial autophagy-related genes and autophagosome, to reveal the changes of mitochondrial adaptive repair process after skeletal muscle blunt trauma and to elucidate the mechanism of blunt trauma repair process.

Methods Sixty - four male Wistar rats were randomly divided into control group and blunt trauma group (divided into 12 h, 2 d, 5 d, 7 d, 10 d, 15 d and 30 d group) according to the time of extraction. The expression of HIF-1 α , AMPK α 2, BNIP3 and NIX protein in skeletal muscle hypoxia and autophagy-related factors were measured by Western-Blot. Quantitative reverse transcription PCR was performed to analyze the expression levels of HIF-1 α , AMPK α 2, BNIP3 and NIX. The ultrastructure and autophagic formation at different time points were observed by transmission electron microscopy.

Results The expression of HIF-1 α and AMPK α 2 protein reached the peak at 12 h and 2 d, and the expression of HIF-1 α was significantly higher than that of the control group ($p < 0.05$). The expression of AMPK α 2 was significantly higher at 5 d after injury ($p < 0.05$), and reached the normal level at 10 d. BNIP3 began to decline after 5 d, but still higher than normal at 10 d after treatment. NIX expression peak appeared at 12 h and 2 d after injury, with high-express to 7 d. The expression of HIF-1 α and AMPK α 2 mRNA was significantly higher than that of the control group ($p < 0.01$), but decreased until 5 d ($p < 0.05$), then decreased to normal level. The mRNA expression of BNIP3 and NIX was basically the same as their protein performance. A number of autophagosomes were observed at 12 h after injury, and the number of autophagosomes increased gradually at 2-7 d. After 10 d, the number of autophagosomes decreased compared with that of 12 h-7 d after blunt. And after 15 d, the number of autophagosomes decreased gradually.

Conclusions The changes of early stage metabolic regulator AMPK α 2 and hypoxia-sensitive factor HIF-1 α after skeletal muscle blunt trauma indicated that an energy crisis occurred in the skeletal muscle after injury, and the hypoxic environment was formed. The mitochondrial autophagy, the expression of BNIP3 and NIX showed that mitochondrial autophagy was activated and

hypoxia-induced mitochondrial autophagy at early skeletal muscle contusion period. Hypoxia-induced mitochondrial autophagy could remove the damaged mitochondria, maintain mitochondrial quality and provide raw materials for new mitochondria generation, facilitate the rapid recovery of damaged skeletal muscle, which may be a compensatory mechanism of the body response to injury.

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A FLUID MECHANICS BASED SIMULATION SYSTEM FOR ARTERIAL BLOOD FLOW VELOCITY

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Objectives The arterial blood flow velocity is employed for early diagnosis and treatment of cardio cerebrovascular diseases. The techniques such as the computational fluid dynamics, piston control, fluid flowing in catheters with different diameters, catheter diameter adjustment, data acquisition and visualization, are combined to simulate the flow of blood in arteries.

Methods In the computing part, the functional relationships between the fluid velocity and fluid density, fluid mass, velocity of piston, cylinder diameter, as well as the diameter of the catheter, are determined based on the computational fluid dynamics. In the mechanical part, being driven by electric motor, the piston in cylinder reciprocates with the lead screw to push the flow of fluid while the unidirectional flow is controlled by the on/off of the electromagnetic valve. In the control part, the blood vessels in different parts of human body are simulated by catheters with different diameters; the vascular stenosis is simulated by elasticity of electromagnetic clip, and the fluid velocity is changed over time by motor control. In the software part, the states of fluid are collected by sensors and visualized by software.

Results The blood flow velocities of the volunteers were measured, and then the computational fluid dynamics was adopted to calculate the parameters of the simulation system. The computed values were compared with the measured values with the mean error of less than 5 %.

Conclusions According to the knowledge of fluid mechanics, the simulation system for the arterial blood flow can accurately simulate the blood velocity of the arteries in each part of human body over time, which acts as a successful attempt and provides an applicable experimental platform for the medical researches

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THE CLINICAL EFFICACY STUDY OF

MINIMALLY INVASIVE SUBPIAL TONSILECTOMY MIST AND RECONSTRUCTION OF THE CISTERNA MAGNA IN THE TREATMENT OF CHIARI MALFORMATION (TYPE I) COMPLICATED WITH SYRINGOMYELIA

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Objectives Through Minimally Invasive Subpial tonsilectomy MIST and reconstruction of the cisterna magna, the pia deformity of cerebellar tonsillar herniation is removed, the rest is reshaped and repaired, the cisterna magna is rebuilt, which can improve the deformity of posterior fossa, restore cerebrospinal fluid circulation, treat the disease of Chiari malformation (type I) complicated with syringomyelia so that it can achieve good surgical results and reduce complications.

Methods Between January 2014 and June 2015, 130 patients meet the inclusion criteria. Under the intraoperative ultrasound monitoring, the minimally invasive subpial cerebellar tonsil herniation resection and reconstruction of the cisterna magna is used to treat the disease of Chiari malformation (type I) complicated with syringomyelia.

The scoring scale (CCOS) is used to assess four aspects of pain symptoms, non pain symptoms, functional and surgical complications, which combines with the traditional evaluation method of “improving”, “unchanging” and “worsening” to evaluate the surgical efficacy of the experimental group and the literature group and the historical control group.

SPSS21.0 statistical software is used to analyze, and the measurement data is expressed by mean±standard deviation ($\bar{x}\pm s$). All the data is checked by homogeneity of variance before statistical treatment, which meets the requirements of t-test. Two independent samples t-test and paired test are used for comparison between groups. Enumeration data is expressed by frequency and percentage, and χ^2 test and Fisher exact probability test are used to compare between groups. $p < 0.05$ is used as a statistically significant criterion.

Results There are 130 cases of minimally invasive surgery, 167 cases of historical control group, and 378 cases of literature group.

1) Evaluated by Chicago Chiari Outcome Scale (CCOS) scores, the minimally invasive group is good in 127 cases, the score is greater than or equal to 11 points, poor in 3 cases, scoring 4-10 points, and the improvement rate is 97.7%. while the improvement rate in historical control group is 82.2%. Tested by Fisher exact probability method, $P = 0.032 < 0.05$ indicates that compared with the historical control group, the minimally invasive group has better curative effect, and the difference is statistically significant.

2) Evaluated by traditional methods, compared with the 378 cases in the literature group, 123 cases in the minimally invasive group are good, unchanged in 7 cases, and the improvement rate is 94.6%. While the

improvement rate in the literature group is 77.8%. Tested by Fisher exact probability method, $P = 0.000 < 0.001$ indicates that compared with the literature group, the minimally invasive group has better curative effect, and the difference is statistically significant.

3) Compared with the MRI of 6 month after operation, the syringomyelia in 130 cases is reduced to some extent. Some patients disappear and the symptoms are relieved.

Conclusions The Minimally Invasive Subpial Tonsilectomy MIST and the reconstruction of cisterna magna is a modified method of operation for the treatment of Chiari malformation (type I) complicated with syringomyelia. The curative effect is obvious and the complications are few. The results measured by B ultrasonic during the operation are compared with the volume of cisterna magna in normal population preliminary. The extent of the blockage in the cisterna magna is generally assessed to guide the clinician in the treatment of the tonsillar herniation and the repair of the cisterna magna. Compared with the traditional surgery, this method, besides the small incision, mild postoperative response and less complications, emphasizes the reconstruction and repair of the cerebellar tonsil and the reconstruction of the cisterna magna and the circulation of cerebrospinal fluid.

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EXPLORATION OF THE CAUSES AND TREATMENT OF BONE NONUNION OF BASKETBALL PLAYERS AFTER FOREARM FRACTURE OPERATION

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Objectives To observe and analyze the causes of the bone nonunion of basketball players after forearm fracture operation. After summarizing the relevant factors, to propose a scientific and effective treatment strategy to improve the healing rate of forearm fracture operation.

Methods 80 cases of bone nonunion after forearm fracture operation are selected as the research objects and all patients are professional basketball players. The operation fixation method, postoperative treatment and secondary operation are analyzed rigorously in the way of retrospective analysis to find out the factors that affect the healing of forearm fracture. The internal and external factors are fully considered and summarized.

Results There are many factors caused nonunion after forearm fracture operation, which include infection, improper internal fixation method, failure of early bone graft after comminuted fracture, postoperative trauma and poor postoperative functional training. The specific number of cases is 16, 28, 11, 13 and 12. After the second operational treatment, all the patients get the good effect of bone healing without any complications, such as breakage of internal fixation or infection.

Conclusions There are many factors that cause the nonunion after forearm fracture operation. The larger proportion of the factors is iatrogenic factors. The measures of effectively preventing the problem of nonunion after forearm fracture operation and well recovering the forearm function are the scientific fixation method, timely bone graft and postoperative rational treatment.

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CLINICAL APPLICATION VALUE OF CERVICAL CANCER RADICAL SURGERY PLUS VENTRAL PARA-AORTIC LYMPH NODE DISSECTION IN THE IB2 AND IIA2 CERVICAL CANCER TREATMENT

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Objectives To observe and analyze the clinical application value of cervical cancer radical surgery plus ventral para-aortic lymph node dissection in the IB2 and IIA2 cervical cancer treatment.

Methods 90 cases of IB2 and IIA2 cervical cancer are the research objects. They are randomly divided into the research group and reference group (45 cases each group). The treatment program of cervical cancer radical surgery is applied to the patients in reference group, and treatment program of cervical cancer radical surgery plus ventral para-aortic lymph node dissection is applied to the patients in research group. And then compare the treatment effect of two groups of patients.

Results By observing the surgery time of the patients, the result shows that the research group is (232.6 ± 33.8) minutes, the reference group is (245.5 ± 21.9) minutes, the contrast shows no significant difference, P > 0.05; by comparing the amount of bleeding during surgery and the incidence of complications, there is no significant difference between the two groups (P > 0.05); compared with the reference group, the number of recurrences after two or three years is less in research group, there is significant difference, P < 0.05, with statistical significance.

Conclusions The application of cervical cancer radical surgery plus ventral para-aortic lymph node dissection in the IB2 and IIA2 cervical cancer cases can get good results, which can significantly reduce the recurrence rate and improve patients' life quality. Therefore, this treatment program is worth to be promoted widely.

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SURGICAL TREATMENT METHOD AND EFFECTS OF MIDDLE-SUPER THORACIC SPINAL FRACTURE AND DISLOCATION COMBINED WITH INCOMPLETE SPINAL CORD INJURY OF MARTIAL ART ATHLETES

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Objectives to analyze the surgical treatment of thoracic spinal fracture and dislocation combined with spinal incomplete spinal cord injury of martial art athletes and observe the therapeutic effect.

Methods The 60 cases of thoracic spinal fracture and dislocation combined with spinal incomplete spinal cord

injury fracture dislocation are selected as the subjects, all patients are professional martial art athletes. The therapeutic schedule of patients is posterior pedicle screw fixation, reduction and fusion, and the X-ray and CT films situations of patients before and after surgery are recorded respectively, meanwhile the vertebral Cobb angle and vertebral height as well as the changes of nerve injury are compared.

Results after the treatment with surgery, all the patients are followed up for 1 year to 4 years, the incisions of patients obtain primary healing, and the average fracture healing time is (9.6 + 3.0) months. There are four cases of complications, namely, 2 cases with deep vein thrombosis and 2 cases with lung infection respectively. After the timely treatment, all patients are cured, no internal fixation failed. Comparing the Cobb angle of the injured vertebra and the loss of vertebral height before and after surgery, and the results show that the postoperative advantage superiority is better than preoperative, P < 0.05, and the statistical significance exists.

Conclusions posterior pedicle screw fixation, reduction and fusion method used in the treatment of thoracic spinal fracture and dislocation combined with spinal incomplete spinal cord injury of martial art athletes can obtain good effects.

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FINITE ELEMENT ANALYSIS OF TWO KINDS OF INTERNAL FIXATION METHODS OF RECONSTRUCTION PLATE AND TITANIUM ELASTIC NAIL IN THE TREATMENT OF MIDDLE CLAVICLE FRACTURE OF WUSHU ATHLETE

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Objectives The stress distribution and maximum stress of titanium elastic nail (TEN) after intramedullary fixation and reconstruction plate fixation are analyzed by finite element method in the middle clavicle fracture of Wushu athlete.

Methods Three-dimensional reconstruction of CT data of clavicle is carried out by using simulation software. An improved finite element analysis model is designed to simulate the deformation of clavicle under external force. The model of impact force is calculated.

Results The results of stress analysis can be well analyzed by the model. The results of different fixation methods are different.

Conclusions I TEN intramedullary fixation can treat simple clavicle fracture. The stress distribution of the clavicle is closer to the normal clavicle, but the stress of clavicle and TEN in the fracture end is larger. The effect of reconstruction plate fixation for clavicle fracture is more stable, but the stress shielding effect is more obvious. Therefore, TEN intramedullary fixation is recommended for simple displaced clavicle fracture.

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CLINICAL RESEARCH ON SURGICAL TREATMENT AND CONSERVATIVE TREATMENT OF 52 CASES OF CONDYLAR

NECK FRACTURE IN SOCCER PLAYERS

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Objectives The effective treatment methods of condylar neck fracture in football players are researched in this paper.

Methods 52 cases of soccer players with condylar neck fracture are randomly selected. According to the indication of operation and conservative treatment, the patients are divided into surgical treatment group and conservative treatment group (manual reduction + dental arch splint fixation + intermaxillary elastic traction). The therapeutic effects of the two methods are compared according to the occluding relation, facial type, maximum opening degree and other complications after treatment.

Results After 12 months of follow-up, the average maximum open degree is 34mm, 98% occluding relation is good, and there is no obvious facial change. After conservative treatment, the average maximum opening degree is 31mm, 78.3% occluding relation is good, and oral hygiene is relatively poor. Through T test, $P < 0.05$, the two groups of treatment effect in the maximum opening degree, facial type, average traction time and other aspects have significant differences.

Conclusions For the condylar neck fracture of football players, open reduction and internal fixation should be performed as far as possible under the condition of absence of strict surgical contraindication.

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OBSERVATION OF THE CLINICAL EFFICACY AND SAFETY OF THREE DIFFERENT INTERNAL FIXATION METHODS OF THE TREATMENT OF CLAVICLE FRACTURE OF AEROBICS ATHLETES

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Objectives The purpose is to observe of the clinical efficacy and safety of three different internal fixation methods of the treatment of clavicle fracture of aerobics athletes.

Methods 47 cases of clavicle fracture caused by aerobics are randomly divided into three groups. 15 patients are treated with Kirschner wire and steel wire encircling, 17 cases are treated with plate and screw internal fixation, and 15 cases are treated with Ni Ti shape memory alloy embracing fixator. The operation time, excellent rate, healing time, intraoperative bleeding and complications are evaluated.

Results The difference of operation time, intraoperative bleeding, healing time of three kinds of internal fixation methods in treatment groups of clavicle fracture have no statistical significance of ($P > 0.05$). Comparison of postoperative complication of nickel titanium memory alloy embracing fixator group and double Kirschner wires surrounding method group and plate fixation group has no statistical significance ($P < 0.05$). Compared with the other

groups, the excellent rate of nickel titanium memory alloy embracing for the treatment of clavicle fracture has statistically significant difference ($P < 0.05$).

Conclusions The clinical effect of Ni Ti shape memory alloy embracing fixator in the treatment of clavicle fracture is slightly better than that of Kirschner wire, steel wire encircling method, steel plate and screw fixation method. The recovery ability of athletes and general personnel has not been taken into account.

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DISCUSSION OF THE EFFECT OF ANTERIOR ODONTOID SCREW FIXATION IN THE TREATMENT OF PATIENTS WITH TYPE II ODONTOID FRACTURE IN VOLLEYBALL PLAYERS

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Objectives This paper is to discuss the effect of anterior odontoid screw fixation in the treatment of patients with odontoid fracture of type II in volleyball players.

Methods 30 cases of anterior cervical odontoid screw fixation for the treatment of patients with odontoid fracture of type II in volleyball players from October 2015 to October 2016 are selected to analyze recovery of spinal cord function (ASIA classification), bone fusion time, fusion rate and complications.

Results 28 patients are followed up for 12 months. The neurological function of 17 patients with spinal cord injury increases by 1~2 grade. All patients achieve bony fusion within 3~6 months, and the fracture healing rate was 100%. There were no esophageal or tracheal injuries, no laryngeal or recurrent laryngeal nerve injuries. X-rays show that the cervical spine sequence and physiological curvature recover satisfactorily, and the flexion, extension and rotation of the cervical spine return to normal without loosening, displacement and breakage of the screws.

Conclusions Anterior odontoid screw fixation is an effective treatment for odontoid fracture. It can reconstruct the stability of atlanto axial joint and prevent secondary injury of cervical spinal cord. It is a safe and reliable method of operation.

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CAUSES AND TREATMENT OF KNEE MENISCUS INJURY UNDER HIGH INTENSITY EXERCISE

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Objectives Taking volleyball as an example, the relationship between high intensity exercise and knee meniscus injury is researched in this paper, so that volleyball players can avoid knee meniscus injury in training and improve the athletic level.

Methods By using the method of questionnaire, consulting literature, and mathematical statistics, the knee meniscus injury of 60 volleyball players in a volleyball team is

statistically analyzed. The causes of knee meniscus are selectively analyzed.

Results The method of avoiding the injury of knee meniscus in the process of training is proposed. The main causes of knee meniscus injury in volleyball athletes are training intensity, irregular movements, physical fatigue, inappropriate training equipment, and inadequate preparation.

Conclusions Strengthen the flexibility of knee meniscus exercises, good preparation activities and training before training, master the technical essentials and enhance the role of medical supervision, can effectively reduce the risk of knee meniscus injury in the training for volleyball players.

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ACCURACY AND IMAGING ANALYSIS OF EARLY FEMORAL HEAD NECROSIS WERE DIAGNOSED BY MRI

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Objectives First, An animal model of avascular necrosis of the femoral head is established. The results of MRI and bone image are compared, and the accurate diagnosis and imaging analysis of CT, MRI and bone image on early femoral head are discussed. Second, from the perspective of static imaging, dynamic imaging and histopathology, the animal femoral head necrosis is evaluated and the imaging findings of early femoral head necrosis and its correlation with histopathology are studied. Third, determining the imaging findings of early femoral head necrosis and evaluate the accuracy of MRI in diagnosing femoral head necrosis.

Methods A total of 20 New Zealand white rabbits were randomly divided into 4 groups with 5 rabbits in each group, group A was induced by lipopolysaccharide and glucocorticoid, group B received high-dose intramuscular injection of dexamethasone, group C was only injected with lincomycin, group D was the blank control group. After 6 w, MRI, CT and bone image analysis were performed.

Results In group A, 57.6 % of New Zealand rabbits suffered from osteonecrosis of the femoral head after 6 w of induction with lipopolysaccharide and glucocorticoid, and no femoral head necrosis occurred in the control group; Massive steroid induced osteonecrosis of the femoral head in group B, MRI and bone image sensitivity are the same for early lesions. In group C, only 34.8 % of New Zealand rabbits were found to have abnormal signals of femoral head or proximal femur. There was no change in group D.

Conclusions Rabbit femoral head necrosis can be induced by lipopolysaccharide lipopolysaccharide combined with glucocorticoid or high-dose intramuscular injection of dexamethasone, and increase the probability of osteonecrosis of the femoral head. The risk of femoral head necrosis can be found only in the injection of jiemycin. MRI has a good sensitivity and specificity in the early diagnosis of femoral head, and there is a certain correlation between the progress of histopathology.

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A DOUBLE CLOSED LOOP CONTROL

METHOD FOR VARIABLE SPRAY SIZE AND DEPOSITION VOLUME

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Objectives Aiming at the difficult characteristics of variable spray droplet size and the amount of droplet deposition, this work designed a double closed-loop control strategy, a variable precision control system with the inner ring as the pressure control and the closed loop as the flow control. Here, the control parameters of the system were optimized by chaos off-line, and the optimized parameters controlled by PLC programming. This made it possible to realize the minimum application of spray droplets on the target. The experimental results show that the double closed-loop nonlinear PID control made the control system more effective than the PID control by 3 times under the same interference.

Methods In this paper, a spray flow control method based on PLC is proposed. It adopts fuzzy PID control method. As far as its software is concerned, the combination of the fuzzy control theory and PID control method may provide a solution to the problems that may be found in the traditional PID control method, e.g. the response speed, adjustment time, etc. And then the fuzzy PID control algorithm is used to set up the flow control system model of the variable spray flow in SIMULINK to get the optimal parameters through the model simulation. Again, according to the control requirement for the variable spray flow valve and the farmland spraying pesticide medicine, the hardware system is set up, and the fuzzy PID is programmed into the PLC program according to the simulation result. Finally, by using the Doppler Particle analyzer to measure the spray diameter and the chemical potentiometric titration to measure the deposition volume, the optimal flow control target value of the system is obtained to achieve the precise application.

Results Experiments show that the system could be quite effective in the control of spray flow in line with the requirements. Specifically, the droplet size actually reached 72.75%, the deposition rate per square centimeter up to 0.3031mg, the system regulation time 1.5s and overshoot of 2.67%.

Conclusions Double closed loop variable rate spray can effectively solve the problem of droplet deposition, and provide effective theoretical support for precision agriculture.

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Column 9: Miscellaneous

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DISRUPTION MANAGEMENT FOR SINGLE MACHINE SCHEDULING BASED ON

HYBRID PARTICLE SWARM OPTIMIZATION

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Objectives In actual production of enterprise, an original plan of production scheduling due to sudden disruption events such as machine failure, emergency orders, reworks may be no longer optimal, or even no feasible, which affects follow-up execution of the production scheduling process. This paper uses lexicographic multiple goals programming to build up the multi-Objectives disruption management model where original Objectives is based on the sum of completion time, while the deviation Objectives is based on the minimum disruption of customer satisfaction after disruption. A hybrid particle swarm optimization is proposed to meet characteristics of the above mode solution, which can effectively improve the stability of production scheduling system under the influence of disruption events and adjust the production scheduling plan in real time.

Methods First of all, according to the improvement of TOPSIS, we evaluate the supply priority of different customers which is used as a weight of customer satisfaction. Secondly, we use lexicographic multiple goals programming to build up the multi-objectives disruption management model where the deviation objectives is based on the original sum of completion time and the minimum disruption of customer satisfaction after disruption. Then a hybrid particle swarm optimization algorithm is designed to balance the global search and local search, which takes the advantage of annealing algorithm in global optimization and draws on the mutation of genetic algorithm to increase the diversity of the solution space.

Results Through the experimental examples and the comparing with traditional particle swarm algorithm and genetic algorithm, it is known that the proposed hybrid particle swarm optimization method can obtain the optimal solution in a shorter period.

Conclusions In the disruption management for single machine scheduling, the proposed model is effective and practical. The proposed algorithm needs less time and obtains optimal solution to help satisfy solving need of disruption management model of production scheduling problem.

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THE DEVELOPMENT OF BASKETBALL CHARACTERISTICS UNDER THE STRATEGY OF "UNIVERSAL HEALTH"

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Objectives As no. 46 of the state council issued in 2014, the "national fitness" promoted to national strategy, participation in sports is the trend of The Times, to participate in basketball has become dongguan residents' way of life. Known as the "basketball city" of dongguan, basketball culture is the leading position in China.

Methods In this paper, the influences of the methods of literature, questionnaire and statistics are used to influence basketball culture.

Results Objectives analysis is made on the influence of basketball culture on residents, urban construction and local characteristic culture. With the theme of dongguan basketball culture, it mainly studies the influence of basketball culture on dongguan residents, urban construction and characteristic culture. In this paper, the influence of basketball to local residents is expounded from Objectives and Objectives, and the influence of sports hardware facilities and community facilities on public health education is explained.

Conclusions Research results show that the basketball culture sports life of local residents have a positive impact, the urban construction has certain sports facilities "overweight", the influence of formation has a promoting effect on local culture.

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THE CONSTITUENT ELEMENTS OF THE GOVERNMENT PURCHASING PUBLIC SPORTS SERVICE

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Objectives Government purchasing public sports services is a new round of reform of our country sports management system and the government supplies public sports service mode to adapt to the social development of innovation. Along with the acceleration of economic development in our country in recent years, the government requires transformation of public sports service function is extremely urgent. Elements constitute the Objectives things exist and maintain their necessary for normal operation of the basic unit; the minimum is a necessary component of things whole. Study the components of government purchasing public sports services, for the development of government purchasing public sports services related policies to provide theoretical reference, for the government to buy public sports service implementation process to provide practical help.

Methods Using the methods of literature, field investigation and expert demonstration, this paper analyzes the constituent elements of government purchasing public sports service.

Results To review the relevant information at home and abroad, and combine the practice of purchasing public sports service in local governments, analyze the elements of the government's purchase of public sports services.

Conclusions The main elements include: the government purchase of public sports service government purchase public sports service of three main body-buyers, providers and users; the public demand of the government purchasing public sports service. The government purchasing public sports service the most commonly used way. The

implementation of the government purchasing public sports services. Government purchase of public sports service before, during and post supervision and effect assessment. The government purchasing public sports service policies and regulations, etc.

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THE DEVELOPMENT AND RESEARCH OF THE SUPPLY-SIDE REFORM OF SPORTS INDUSTRY UNDER THE BACKGROUND OF "INTERNET PLUS"

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Objectives The state council issued the "guidance on the promotion of Internet+ action" to promote the development of the Internet in the field of consumption. The proposal of supply-side structural reform is essentially a mode of economic reform to improve the total factor productivity. Research under the environment of "Internet +" sports resources supply and social demand docking, to be able to solve the existing problems of our country sports industry, optimize the industrial structure, realize the balance of supply and demand of the sports industry development has the vital significance in the future.

Methods Literature data, logic analysis, statistical analysis, etc.

Results Through the Internet, the sports resources are interconnected. Distributed and integrated, and the sports industry and market demand are better combined to better promote the development of national sports. The combination of "Internet plus" and the supply-side reform of the sports industry has brought new blood and development opportunities to the sports industry. How to use "Internet +" to realize the sports industry supply side reform.

Conclusions Internet applications to the sports industry is a kind of inevitable trend, make full use of Internet technology, the characteristics of the Internet, to "go capacity, inventories, deleveraging, cost reduction, fill short board" as the main task. Realizing the Internet for the industry of sports industry, sports industry development of a new relationship, to build a new sports industry structure, to realize the innovation and the upgrading of the sports industry and promote the rapid development of sports industry, make full use of sports resources, to achieve comprehensive, coordinated and sustainable development of sports industry.

Acknowledgements Project of Huanggang Normal University: In the context of "Internet plus", the sports industry supply-side reform (Grand No. 04201710403).

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GOVERNMENT PURCHASES OF PUBLIC SPORTS SERVICES IN THE FORM OF CHANGES AND IMPROVEMENTS

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Objectives The government buys the public sports service, is the new reform of the sports management system in our country and the government supplies the public sports service mode to adapt to the new era social development innovation. During the period of the planned economy and the initial government of the market economy, the public services and public services are seriously wasted, and the public sports services and public demand are provided with the phenomenon of "not needed". Mechanism of government purchase is a change of government function change the way of public sports service, the production and provide separation, introducing market mechanism, competitive, and improve the quality and efficiency of public sports service, meet the demand of People's Daily fitness as soon as possible. The study of the government's purchase of public sports services provides theoretical reference and practical help for the government to purchase public sports services.

Methods The paper studies the changes and improvement of government's supply of public sports services by means of literature, field investigation and expert demonstration.

Results Refer to relevant information both at home and abroad, combined with the practice of government purchasing public sports services around the country, the government purchasing public sports service in a way that argument analysis, put forward the way of government purchasing public sports service innovation and improvement.

Conclusions Through the establishment of contract mechanism, clear responsibility, ensure order, highlight the competition mechanism, "sports is the livelihood of the people" as the starting point and the foothold and so on to strengthen the government purchase of public sports service improvements. The realization of the strategic target to promote national fitness, the need for national fitness sports facilities and related services to provide basic protection.

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CHINA'S SPORTS CULTURE COMMUNICATION STRATEGY UNDER THE "BELT AND ROAD" VISION

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Objectives Belt and Road is put forward and the implementation of the strategy construction, objectively promote the Chinese culture to the second round of the global economic and cultural propaganda. Eurasian aims to promote coordinated development of regional economies culture common Eurasian, strengthen the national language and culture communication, jointly by different regional culture in different areas to complete the political mutual trust, cultural tolerance, economic integration, the interests of the community, the mission of community and destiny community. This paper takes "Belt construction and Road" strategy to promote sports culture spread existing challenges and development strategy for research purposes, provide reference for the further sustainable development of sports culture, and provide theoretical basis for other related research.

Methods Literature and logic analysis were used.

Results In the Belt and Road strategic background of Road, the sports culture in the Belt and Road under the strategic development of the main research results to investigate, and there are some of the challenges and make the corresponding strategies of development and research.

Conclusions Belt and Road strategy is a breakthrough for the development of sports culture and international communication, current "western" strong I weak pattern of the international spread of no substantive changes, China should through the Belt and strategy of Road construction of sports culture international competitiveness, in response to the challenges of the world education environment development.

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MASS SPORTS PARTICIPATION AND SPORTS CONSUMPTION IN URBAN CHINA IN THE CONTEXT OF HEALTHY CHINA STRATEGY 2030

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Objectives China released its 'Healthy China 2030' blueprint guide in October 2016. It focuses on Chinese people's health project and the building of harmonious society up to 2030. Healthy China Strategy has become a direction for China's Sports Thirteenth Five Year Plan (2016-2020). President Xi Jinping at the 19th CPC National Congress also highlighted this Strategy in 2017. Despite of medical service system, the promotion of people's health has strong link with sport. With the support of Chinese central government, it is clear that Chinese sports participation and sports consumption will receive more opportunities and policy priorities to develop. Through a case study of several selected cities in China, this paper aims to explore the interrelationship between mass sports participation and sports consumption in urban China.

Methods It employs qualitative semi-structured interviews on key stakeholders, questionnaires focusing on urban sports participants, participatory observations at 25 sports venues as well as content analysis of the implementation of relevant sports policies in 2016 and 2017 in Suzhou, Wuxi, Hefei and Wuhu.

Results With the policy-support of Health China Strategy, sports participation in the selected cities has been growing. The average sports consumption has been rising from 2016 to 2017. More sport-relating positions have been created for the construction of public sports facilities. More sports parks and sports museum has been planned. However, there are still some existing issues, including the backwardness of the sports public service; unbalanced sports participation at different regions; shortage of advertising and lagging governance.

Conclusions It is concluded sport participation and sports consumption in urban China gets twofold success with the policy-support in 2016 and 2017 while facing the increasing sports demanding of China is aging population and new emerging middle class in the coming leisure society. The co-governance of mass sport and sports industry in China will assist the achievement of Healthy China Strategy 2030.

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QIAI INDUSTRIALIZATION DEVELOPMENT STRATEGY SYSTEM

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Objectives The Chinese herbal medicine of Qiai, one of the "four treasures of the spring", is regarded as the "king of the leaves of China", and the national geographic symbol protects the products. The compendium of materia medica has a clear description of the origin. In the booming at the same time, also have a few problems, this project mainly system *tsao* culture, summarizes the current situation of the development of Chinese *mugwort*, summarizes the Chinese *mugwort* (*Qiai*) the existing problems in the development of industrialization, industrialization technical system to develop Chinese *mugwort* and strategic system, power ai - Qiai brand building.

Methods Literature research, field investigation, qualitative and quantitative methods were used.

Results Based on the literature, the paper expounds the culture of ai, collects and surveys the scale of the planting, the production enterprise of the company, and the type of the products. This paper expounds the basic status quo of the development of Hubei province. The problems existing in the development of the industrialization were summarized.

Conclusions Adhere to the market leading, leading the form of the base, optimize the combination of various industrial elements, and promote the development of the industrialization of the industry. It is recommended that the key implementation of the Hubei Li Shizhen, Hubei Li Shizhen pharmaceutical group lead, Hubei Qiaai Tang Technology Co., Ltd. Leading enterprises, leading the development of the industry science of the industry; It is suggested to build a big base, big brand, big health and big market, and build a "China ai du" with true strength. It is suggested to use the good policy platform, park platform, festival meeting platform, scientific research platform, marketing platform, etc., with the help of the development of the industrialization of the main platform of various platforms.

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DEVELOPMENT OF RURAL E-COMMERCE IN THE CONTEXT OF CONSUMPTION UPGRADE

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Objectives The paper aims to provide a basic framework for the theoretical research of rural e-commerce, promote

green organic food supply, model innovation and healthy consumption.

Methods It mainly adopts the method of literature research to collect relevant research results, and then uses the method of deductive research to arrange the structure of the article.

Results The paper finds that the current popularity of rural-commerce is not high. Most areas are still in the propaganda stage. There are still a series of problems to develop rural e-commerce. It can solve the problems for rural e-commerce by planting of green organic food vigorously.

Conclusions With the increase of people's awareness of food safety, green organic consumption has become the mainstream and has become the driving force for China's economic growth. Since the supply side of green organic food is mostly located in the countryside, the demand side is mostly located in the city, and rural e-commerce as the link between the supply end and the demand side, its development is imperative.

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EVALUATION OF MTI STUDENTS' TRANSLATION ABILITY BASED ON FACTOR ANALYSIS

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Objectives With the continuous development of translation in China and the development of social economy, the demand for high-level professional translators is also increasing. How to evaluate the translation ability of MTI students is very important for the development of the enterprise and our country.

Methods Factor analysis.

Results Considering two aspects of translation and interpretation, selecting literal translation, verbal translation, textual translation, translation time, constructing the evaluation model based on factor analysis to evaluate the translation ability of MTI students.

Conclusions Providing a theoretical basis for our country and enterprises to choose translation talents.

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APPLICATION OF 7075 ALUMINUM ALLOY IN MEDICAL EQUIPMENT AND ITS PERFORMANCE ANALYSIS

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Objectives With advantages of small density, high specific

strength, good corrosion resistance and formability, aluminum alloy materials enjoy broad application prospect and irreplaceable position. Therefore, aluminum alloy technology has been listed as national defense key technology and key foundational technology.

Methods Among all aluminum alloy materials, 7075 aluminum alloy plays an extremely important role in medical research industry for its outstanding high strength and anti-crash capacity. Currently, the aluminum alloys of middle-high strength are urgently needed in fabricating medical device structural parts and components, so that the weight of medical equipment can be greatly reduced while guaranteeing structural strength and meeting relevant requirement for parts design.

Results by subjecting the aluminum alloy was to solution treatment test, aging treatment test, and various welding and processing tests, then the machining properties, thermal treatment properties and welding characteristics of aluminum alloy can be understood and mastered, and then the properties of aluminum alloy were verified.

Conclusions Through verification and analysis of 7075 aluminum alloy property, it can be known that the property of such aluminum alloy meets the requirement of medical equipment. The importance and application of 7075 aluminum alloy in medical equipment structural parts fabrication was determined. Discussion: compared with other aluminum alloy, 7075 aluminum alloy has outstanding high strength, which can be used in fabricating medical equipment structural parts instead of black metals, so as to greatly reduce equipment weight. This material serve as a better choice for designing high-strength and lightweight medical parts.

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REAL TIME DETECTION SYSTEM OF RESIDUAL CHLORINE CONCENTRATION IN WASTE WATER AFTER MEDICAL WASTE DISPOSAL

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Objectives The state requires medical waste water to be discharged after treatment, and most hospitals in China adopt chlorine dioxide to treat medical sewage, check the effect of chlorine dioxide disinfection and whether to produce two pollution is determined by detecting the residual chlorine content in the treated wastewater. Due to the complex composition of sewage, there are always exist problems in the detection of residual chlorine concentration in Wastewater. A real-time detection system of residual chlorine concentration in medical waste water was designed.

Methods Detecting the residual chlorine in medical waste water by the principle of optical absorption in the visible wavelength range of reagent coloring. The microcontroller is the main controller to control system reset mechanism to achieve real-time continuous detection, information display and remote transmission, wastewater discharge standards and so on.

Results The experimental results prove that, the detection system can automatically run a series of operations such as sample extraction, processing, cleaning, residual chlorine

test and sewage discharge, and realize continuous automatic detection and control functions. The detection results are basically consistent with the results of routine detection of residual chlorine.

Conclusions In this paper, the real-time detection system of residual chlorine concentration in medical wastewater is designed by using photoelectric detection method, which is innovative and reliable.

Acknowledgements Scientific research project of Tianshui Normal University - The advanced oxidation technologies containing benzene ring senior aromatic organic wastewater treatment research (No. TSA1412).

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ENGLISH TRANSLATION ORIENTATION FOR MEDICAL EQUIPMENT CASTING TECHNIQUE

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Objectives With the development of medical equipment casting techniques, the accuracy of foreign related data translation has a great impact on the whole production process. For the English translation activities of medical equipment casting process, in the whole translation process, the integration of aesthetic orientation combined with the local cultural characteristics and professional terminology will greatly optimize the medical equipment casting techniques and improve the efficiency of medical equipment casting production.

Methods From the analysis of development of direction of medical casting techniques, for the case of translation of countries with English culture, combined with the specific requirements of medical English translation of the casting process, the application status of aesthetic English translation is analyzed in order to explore the English translation of medical equipment casting.

Results From the empirical results, it can be seen that English translation has a great influence on the English translation of medical equipment casting.

Conclusions Therefore, the relevant material translation process should be paid attention to ensure that learners can accurately grasp the relevant knowledge and cultural connotation.

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DESIGN OF OPTIMAL EVACUATION MODEL FOR CONGESTION PROCESS IN TOURISM AREA

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Objectives In the congestion process in tourism area, there is problem of lack of anticipation and blindness in the

evacuation of the wounded.

Methods To address this problem, an optimal evacuation model for congestion process in tourism area based on multi-constrained condition is proposed in this paper. The basic data are obtained by manual processing, and then the variance analysis and T test of independent sample are used to analyze the factors affecting the free movement speed of the personnel. The wounded evacuation function of multi-Objectives optimization is designed, and the improved ant colony algorithm is used to solve the problem, and the optimal evacuation channel is calculated.

Results Experimental results show that the factors of stairs, gender and group have significant influence on the free movement speed, and the factor of group is the most influential factor among the three factors.

Conclusions In the evacuation area, the constraints should be taken into account, and the weightings of constraints should be set according to the situation.

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MULTIMEDIA ENGLISH TEACHING OPTIMIZATION METHOD IN COMPLEX MEDICINE

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Objectives In universities of medicine, English teaching is not paid enough attention. Some complex medical foreign information cannot be well popularized, and some good teaching methods are not well applied.

Methods To address this problem, the reform of English teaching methods in medical school is researched in the aspect of the multimedia teaching method. With the simple sound dynamic multimedia virtual characters, some complex medical theory is explained. The complicated theory with medical animation display is to enhance impressions of students. The Internet is used to guide the learning interest of students.

Results Actual test results show that, with adopting the improved teaching method, the students have a significant improvement in the interest of some related documents. In addition, in the study of foreign medical materials, the interest of students has also increased significantly.

Conclusions The proposed method can improve the enthusiasm of students in the major of medicine to learn English.

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MARKETING PRICE IMPACT FACTOR MODELING BASED ON BIG DATA OF MEDICAL EQUIPMENT SALES

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Objectives In order to accurately grasp the impact factors of the price of medical equipment sales.

Methods On the basis of big data, the association model is

established. Based on association rule, the big data that affect the sales of medical equipment are classified into first level factor to fourth level factor. Combined with different factors, the influence degree of price is set with different weighting, and linear regression is used to verify the value.

Results Experimental results show that based on the verification of the linear regression model, the model can better verify the influence factors, and give the corresponding countermeasures.

Conclusions Under the guidance of big data, the factors affecting the sales price of medical equipment are highly interactive with the process of dynamic change, however, is determined by many factors.

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EVALUATION METHOD OF MEDICAL LITERACY ABILITY OF UNIVERSITY STUDENTS UNDER MEDICAL ACCREDITATION SYSTEM

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Objectives Under the existing medical certification system, students' medical literacy assessment is insufficient.

Methods Based on literature review on domestic evaluation of capacity, according to the medical certification system of its own characteristics, and the design principle of the evaluation index of industry requirements, a method for evaluation of medical students' information literacy ability under the current medical accreditation system is put forward. Using the rough set method, the index system is simplified; on the basis of comparing the commonly used evaluation methods, aiming at the shortcomings of the existing methods, the D-S evidence theory and the genetic algorithm are combined to optimize the existing evaluation model, and the shortcomings of the existing methods are analyzed.

Results The experimental results show that the model can effectively realize the evaluation of medical university students' related ability, and the evaluation results are more accurate.

Conclusions the model is robust and can be applied and promoted.

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CONTROL STRATEGY OF HEAVE COMPENSATION FOR FLOATING CRANE IN MARITIME MEDICAL SEARCH AND RESCUE

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Objectives In maritime medical search and rescue, the heave can cause collisions in search and rescue during the offshore construction with floating crane, which leads to interference of search and rescue.

Methods To address this problem, an active heave compensation system based on tuning parameter controller with improved ant colony algorithm is proposed in this paper, in order to improve the traditional parameter optimization. Simulations with Matlab platform are carried out for control of heave compensation for floating crane in maritime medical search and rescue. The effectiveness of control strategy of the system is verified with physical prototype by test.

Results Simulations and test results show that, the compensation system can decouple ship motions caused by floating crane in the heave direction during the search and rescue.

Conclusions The proposed controller has high robust and stability. The control parameters can be adjusted adaptively according to the change of sea conditions, and the control effect is satisfied.

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DESIGN AND IMPLEMENTATION OF AUTO MEDICAL ALARM SYSTEM

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Objectives The traditional medical car alarm system often makes mistakes, which greatly reduces the running accuracy of medical alert system. At the same time of life bring convenience for people, also added some unnecessary trouble. So some people have to give up to understand medical car alarm system, this will cause the car appear when some emergency medical accidents can't timely treatment processing.

Methods The communication module is designed by using GSM network for multi-frequency communication. The detection signal is connected by serial interface, so as to prevent the occurrence of false alarm, the output of control signal can be controlled without interruption. The design of the control center is completed by using the serial port of MAX202 TC35. For the software part of the auto medical alert system, the Command interface of the GSM engine module is regulated by defining the AT Command interface in GSM07.07. According to each AT instruction design message automatic reminder program, complete the software design of medical alarm system.

Results Traditional medical car alarm system as the control group, the traditional method of medical alert system and medical alert system designed in this paper to do experiments, respectively from the rate of false positives, running process of system energy consumption and system running stability experiment. And the experimental results are recorded and compared.

Conclusions Design the method of automatic medical alarm system, it has the very high alarm accuracy, low rate of false positives, and in the process of system operation energy consumption under alarm system power consumption is much lower than that of the traditional methods. The stability of the system has also improved.

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DESIGN AND IMPLEMENTATION OF IOT SYSTEM FOR LARGE MEDICAL CONSUMABLES

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Objectives The medical consumables are various and large in quantity, which cause great difficulties in management. On the basis of analyzing the characteristics of medical consumables and the actual demand of management in modern hospitals, applying the Internet of things technology to the management of large medical consumables to improve the management and service level of medical consumables.

Methods The construction target and construction points of medical consumables Internet of things were analyzed. Put intelligent identification, tracking, management and control as the main content in medical consumables Internet of things, establish the whole process of operation system from planning, purchasing, warehousing, outbound to the final use of patients. The embedded processor is used to collect, analyze and process the data in real time in the whole running process, and upload the data to the cloud server in real time, analyze the big data in the cloud storage service, provide accurate medical consumables management and final accounts data, and realize the design of large medical consumables network system.

Results The proposed system can improve the efficiency of medical consumables management, it can dynamically design the quantity of procurement, avoid unnecessary waste, but also provide technical support for medical institutions, and improve the level of hospital services. It is helpful to solve the problems caused by human operation in the management of medical consumables.

Conclusions For the purpose of innovative hospital medical consumables management mode, the Internet of things technology is applied to the management of medical consumables, and the medical consumables management mode based on Internet of things technology is constructed, which provides system support for the innovation of hospital medical consumables management.

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INFLUENCING FACTORS OF ELECTRICITY SUPPLIER ECONOMY ON DRUG PRICES

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Objectives Online shopping is one of the main forms of

e-commerce, it has great advantages compared with traditional shops, it has gained recognition from more and more people, This paper analyzes the specific impact of the electricity supplier economy on drug prices from different angles.

Methods The framework of drug price floating model under the electronic economic environment is constructed; Then statistical software SPSS11.5 is used to sort out all kinds of drug price data; Finally, according to the data, the hypothesis of the floating model of drug price is tested, and the floating model of drug price under the electronic economic environment is established.

Results Drug prices are mainly affected by suppliers, marketing intermediaries and customer psychology, which affect drug prices, the overall performance of electricity supplier and drug price is negatively correlated, and the price of drugs is decreasing with the economic growth of e-commerce.

Conclusions "Supplier - company - marketing intermediary-customer" this chain has formed the company's core marketing system, the price of drugs is mainly affected by the cost and cost of each link of the chain, That is to say, It is related to the purchasing cost, the production cost and management cost of the company itself, the marketing cost related to the marketing intermediary, and the customer related pre-sales and after-sales service costs

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AUTOMATIC STORAGE METHOD OF MEDICAL EQUIPMENT INFORMATION BASED ON INTERNET OF THINGS

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Objectives With the development of Internet of things technology, the application of Internet of things technology in daily life and industrial production is increasing, and the amount of data produced every day is also growing rapidly. The Internet of things has heterogeneous, massive, timeliness and other characteristics, The Internet of things has heterogeneous, massive, timeliness and other characteristics, it can realize the information storage of a large number of medical equipment of the hospital, and it is of great significance for the effective management of medical equipment.

Methods An automatic storage method of medical equipment information based on Internet of things was proposed. In this paper, a large number of information files with two-dimensional coordinate properties were processed and the automatic storage optimization strategy was proposed. First of all, this paper used the G mean algorithm which automatically determines the number of clusters to clustered the data of the Internet of things, and used the four tree structure to index the medical equipment information in the cluster. Then, the medical equipment information in the cluster was merged into a large file containing multiple storage blocks, and the file index of each block was stored in the head of the block. Finally, the block local index pre loading strategy was used to improve the efficiency of medical equipment information storage.

Results The experimental results show that, the algorithm

has obvious advantages for clustering analysis of massive medical equipment information data. In addition, the experiment of mass information merging storage based on distance compactness is also carried out, the experimental results show that the storage efficiency can be effectively improved after merging storage.

Conclusions Through the local index pre loading access experiment, it is concluded that the storage efficiency can be improved obviously when the user accesses the information in the same block frequently.

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VARIABLE-DOMAIN FUZZY PID CONTROL OF DROPLET DEPOSITION BASED ON PARAMETER OPTIMIZATION

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Objectives Variable spray control techniques directly affect on the dose application from the target to pests. Traditional control programs are difficult to adapt to the development of precision agriculture. In this paper, the chaotic parameters are firstly used to optimize the variable-domain fuzzy Proportion Integration Differentia (PID) controller, with the control parameters being optimized off-line. Secondly, the optimal control parameters are implemented by STM32 programming technology to get the optimal control method. Finally, the deposition of droplet on the plant surface will be analyzed by experiments. The experimental results show that the fuzzy PID control can make the micro flow spray system 4 ~ 5 times higher than the PID control under the same interference effect.

Methods Our efforts are to develop an accurate spray control system based on STM32 single chip microcomputer. By controlling the pressure and flow rate of the liquid in the nozzle tube, the system can automatically adjust the opening degree of the valve according to the corresponding pressure and flow value calculated by the amount of unit-based spray with the help of the PC's host computer, thus obtaining the precision of the liquid spray. Through the establishment of the mathematical model, the spray system was designed using variable universe fuzzy PID control algorithm for the control purpose, also with the introduction of the SIMULINK simulation platform. Experiments show that that was a stable system able to meet the technical requirements of precision spray. The analysis and statistics of spray particles were performed by using PIV (Doppler Particle Velocity Imager). Concerning different pressure and flow conditions, the particle characteristics were also measured to obtain the optimal values under the ideal conditions of the particle distribution effect, thus meeting the actual spray requirements.

Results The particle size of the droplet particles in the fog field was analyzed by the particle analysis function in the Doppler particle velocimeter. When the pressure was 0.144MPa and the flow rate was 0.506, the percentage of particles was the highest up to 90.54% with the best spray effect. The method for the determination of the amount of ethylene was determined by the potentiometric titration

method. Under the same conditions, the ethylene content of the variable-domain fuzzy PID control algorithm was 0.48g, compared to the traditional control method at 0.13g. Application of variable universe fuzzy PID control algorithm apparently obtained a droplet deposition that was superior to the traditional control method.

Conclusions Variable-domain Fuzzy PID Control of Droplet Deposition based on Parameter Optimization can well solve the control of droplet deposition and droplet flow. It provides an effective solution for precision agriculture control.

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NOISE FACTOR MEASUREMENT BASED ON BIOELECTRIC PREAMPLIFIER LOW-NOISE AMPLIFIER

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Objectives Bioelectricity preamplifier is an electronic instrument widely used in the biomedical field. In recent years, linear integrated elements have been used to produce bioelectric preamplifier in foreign countries, and which achieve good results. But in the measurement of noise coefficient, there are still problems of low efficiency. **Methods** According to the measurement principle of noise coefficient, a method to measure the noise coefficient of low noise amplifier is studied. Using AV3981 noise factor tester test mode and setting the measurement frequency range of 80~120 MHz, the interval is 3 MHz. The noise source with ultra noise ratio of 15.36 dB is corrected and connected with low-noise preamplifier to measure, the data is processed with Excel software, and the original data curve and polynomial fitting curve are drawn.

Results The fitting curve of the gain shows the characteristics of both sides low and middle height, the value between 100 and 122MHz is greater than 22 dB, the fitting curve of noise coefficient is relatively flat between 100 and 122MHz, and all of them are below 1.66dB.

Conclusions The influence factors of noise include impedance matching, background interference of RF signal generator and so on. The measurement method can accurately measure the noise coefficient of the low noise amplifier, and provide an effective measure for the further development of the low noise amplifier.

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PROMOTING EFFECT OF CHINESE MEDICINE CULTURE ON TRADITIONAL TOURISM

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Objectives According to the current traditional tourism survey findings, more and more tourists enjoy the complex and varied Chinese medicine during the tour. But restricted by industry and environmental constraints, it is difficult to analyze the size of traditional tourism development in traditional Chinese medicine culture. So put forward the research of traditional Chinese medicine culture on traditional tourism promotion.

Methods Have deeply discussed the relationship among the tourist motivation, tourism involvement and tourism behavior ,based on the culture of Chinese medicine, constructed the traditional tourism market development model, explored the elements of Chinese medicine culture to promote tourism motivation, and counted elements, then the analysis of promoting effect between them had been completed.

Results The promotion function of traditional tourism based on traditional Chinese medicine is analyzed, it can further enhance the traditional tourism competitive strength, take this opportunity to promote the development and progress of the traditional tourism industry.

Conclusions The research is of great significance to meet the needs of consumers and improve tourism competitiveness.

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