In this study, a method for the determination of the entrapment efficiency of celastrol NLC by microcolumn centrifugation was established. Sephadex G-50 microcolumn centrifugal separation of liposomes and free drugs is the principle of anti-molecular sieve action, large molecular weight of the material was first separated, and small molecular weight of the material was trapped in the Sephadex G-50 pores. The results showed that NLC and free drug separation effect was obvious, repeated experimental results show that the deviation is small, RSD <2.

References:

1. Kuchta K, Xiang Y, Huang S, et al. Celastrol, an active constituent of the TCM plant Tripterygium wilfordii Hook. f., inhibits prostate cancer bone metastasis[J]. Prostate cancer and prostatic diseases, 2017.

2. Poonia N, Kharb R, Lather V, et al. Nanostructured lipid carriers: versatile oral delivery vehicle[J]. Future Science OA, 2016, 2(3): FSO135.

## FUNCTIONAL MODIFICATION OF MESOPOROUS SILICA NANOPARTICLES AND ITS APPLICATION IN DRUG DELIVERY SYSTEM

**Bo-Le Ma1, Xue-Ying Yan***

School of Pharmacy, Heilongjiang University of Chinese Medicine, P.R.China

*Corresponding author: Xue-Ying Yan, Address: Heping Road 24, Harbin 150040, School of Pharmacy, Heilongjiang University of Chinese Medicine, P.R.China Email:523319985@qq.com

Abstract: The drug carrier based on mesoporous silica nanoparticles (MSNs) has been widely used in the fields of medicine and biology because of its advantages of stable structure, simple particle size and easy surface functionalization. According to different treatment purposes, the use of different functional modification method to achieve the purpose of slow release control, improve efficacy. In this paper, the functional modification of MSNs and its application in the drug delivery system were reviewed, the potential and application prospects of MSNs in drug delivery were provided.

Key words: mesoporous silica; functional modification; drug delivery system

1. Targeting modification

MSNs targeted modification can transport drugs to the target organ, so that the target organ enrichment, thereby reducing the side effects, improving drug treatment and bioavailability. Qu et al prepared mitochondrial target mesoporous silica nanoparticles (MSNP) with an average diameter of 68 nm and loaded a hydrophobic anticancer agent α-tocopherol succinate (α-TOS).The targeting of mitochondria is achieved by efficient mitochondrial targeting of the ligand trimethylphosphine (TPP) on the surface functionalization of MSNP. Experiments demonstrate the high anti-cancer efficiency of delivering α-TOS by targeting mitochondria to MSNP [1]. Hu et al prepared PDA coated with MSNs to construct a drug delivery system for glioma treatment. The results showed that MSN-DOX-PDA-NGR was used in intracranial tumor tissue in the accumulation of higher than the unmodified NPs [2].Chen et al prepared a protein-based MSNs targeted and controlled drug delivery system. In this system, the naturally occurring protein transferrin (Tf) is grafted on the surface of MSN by redox cleavable disulfide bonds as a blocking agent and targeting ligand. Demonstrating its ability to enhance intracellular accumulation and targeting of tumor cells in vitro [3].

2 .PH responsiveness modification

Because the normal tissue of the human body is different from the pH of the diseased tissue, the normal tissue pH is neutral and the pH of the tumor site is weakly acidic, so the drug carrier can be designed to be responsive to the release of pH within the tumor.

Liu et al prepared sericin coated mesoporous silica nanoparticles (SMSNs) for lysosomal delivery of DOX to overcome MDR and reduce systemic toxicity. The sericin was coated on the drug via a pH-sensitive imine bond.To prevents MSNs-encapsulated DOX from premieving in external environments. These DOX-loaded SMSNs not only effectively kill drug-resistant cells in vitro, but also significantly reduce the growth of DOX-resistant MCF-7 / ADR (breast cancer cell) tumors in preclinical animal models without frequent systemic toxicity [4]. Zhang et al prepared a controllable ligand-functionalized MSNs delivery system via a coordination key that responds to pH-responsive release of doxorubicin and prolongs the circulating time of the drug in the body. The resulting MSNs showed pH-responsive release properties, avoiding premature leakage of the drug in the circulation and achieving on-demand release within the tumor cells [5].

3. Conclusion

This paper describes the carrier functionalization in recent years and a variety of responsive release. At present, the functionalization of MSNs presents a “one base meritorious service” trend that is a MSNs substrate to achieve multiple functional modification, in the carrier application more and more attention. MSNs as a carrier in the field of biomedical application of great potential in the loading of Western medicine for the treatment of various diseases has been quite research, but the traditional Chinese medicine, especially Chinese medicine compound loading is rarely studied, it can be deep research to achieve effectiveness of MSNs Chinese medicine preparations.

References

1.Qu Q, Ma X, Zhao Y. Anticancer Effect of α-Tocopheryl Succinate Delivered by Mitochondria-Targeted Mesoporous Silica

Nanoparticles[J]. 2016.

2.Hu J, Xiang Z, Wen Z, et al. Asn-Gly-Arg-modified polydopamine-coated nanoparticles for dual-targeting therapy of brain glioma in rats [J]. Oncotarget, 2016, 7(45):73681-73696.

3.Chen X, Sun H, Hu J, et al. Transferrin gated mesoporous silica nanoparticles for redox-responsive and targeted drug delivery [J]. Colloids & Surfaces B Biointerfaces, 2017, 152:77.

4.Liu J, Li Q, Zhang J, et al. Safe and Effective Reversal of Cancer Multidrug Resistance Using Sericin-Coated Mesoporous Silica Nanoparticles for Lysosome-Targeting Delivery in Mice [J]. Small, 2017, 13.

5.Zhang Q, Zhao H, Li D, et al. A surface-grafted ligand functionalization strategy for coordinate binding of doxorubicin at surface of PEGylated mesoporous silica nanoparticles: Toward pH-responsive drug delivery [J]. Colloids & Surfaces B Biointerfaces, 2016, 149:138.

## CONSIDERATION AND EXPLORATION ON IMPROVING CLINICAL ABILITY OF TCM POSTGRADUATE STUDENTS

**Chaoran LI , Zhongren SUN, Dezhu Liu**

Adress: Heping Street 24, XiangfangDistrict,Harbin City, Heilongjiang Province, ChinaPostal code:150040 , Email:crwd44@163.com, Tel:18646193033

Abstract: Objective: Theoretical study on how to improve the clinical ability of TCM postgraduate students. Methods: The first one is to raise teacher quality, enrich curriculum system, perfect assessment mechanism and optimizate education resource. And the second one is to improve the clinical practice ability, scientific research ability and develop good medical professionalism. Results: Through standardizing the management system and enhancing the practical ability two ways to improve clinical ability. Conclusion: Only in this way, can we build the postgraduate education quality assurance system which is suitable for students' development and improve the clinical ability of TCM Postgraduate Students effectively.

Key words: clinical TCM, postgraduate, management system, clinical ability

TCM is an applied science which is used for therapeutic purposes and known to experience medicine. In this paper, TCM clinical postgraduate education is regarded as a system composed of many elements and analyse the existing problems in the elements.

1.The current analysis on the research quality of TCM clinical postgraduate students:

After the investigation and analysis on the quality of postgraduate students in the university of TCM, finding that the clinical students generally have solid basic skills and Chinesesolid theoretical foundation, solid basic skills and basic theory of TCM. But the ability to combine TCM theory and practice is a little poor and could not apply the professional knowledge to diagnose and treat disease.

1.1 Ignoring the ideological and moral education is the first factor that influences the research quality of TCM clinical postgraduate students.

1.2 Curriculum system setting is unreasonable,teaching material and methods are boring and postraduate students lack of practical experience is the second factor that influences the research quality of TCM clinical postgraduate students.

1.3 Colleges and teachers are lack of understanding and recognition to the postgraduate training mode,excessively emphasze on the importance of the paper, which make the postgraduate students pay more attention to the foundation experiment than the clinical practice.

1.4 Clinical Division is refined step by step,the clinical direction of postgraduate students are clear and definite, so that it is quiet difficult to take time for other professional practice.

1.5 The specialty of medical education and the imperfect of medical legislations and regulations which make postgraduate students get little opportunities to do clinical practice.

2.The measures to improve the research quality of TCM clinical postgraduate students

Postgraduate medical education aim at training the application and the clinical type of medical talents and improving the clinical skills as the core. Now in view of the present situation that more and more postgraduate students' clinical ability is poor, author applys some solutions .

2.1 Standardize the management system

2.1.1 To improve the teaching quality of postgraduate students and attach great importance to the teachers.High quality teacher team is a guarantee for the postgraduate students to improve the capablity of postgraduate teaching. First of all, the tutors have good medical ethics,surefooted working styles and solid professional proficiency.

2.1.2 To reform and enrich the curriculum system setting of postgraduate students.Curriculum system setting and content is quiet important for improving the postgraduate students clinical skills. The curriculum system setting should be based on the cultivation of practical skills, consolidate the foundation theory and broaden knowledge as supplement.