

## 从肺、肠、脑的关系浅析安宫牛黄丸治疗肺性脑病

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**【摘要】** 肺性脑病是慢性肺部疾病、肺源性心脏病等疾病晚期常见并发症,病死率高,是常见的内科急危重症之一。运用中西医结合方法诊治肺性脑病可降低病死率。临床上安宫牛黄丸治疗肺性脑病多有应用,且取得了良好的疗效。本文通过总结中医古籍和西医对肺、肠、脑关系的认识以及安宫牛黄丸治疗肺性脑病的机制,从肺、肠、脑三者的关系进一步阐释肺性脑病的发病机制和演变过程,以期对临床诊治肺性脑病起到指导作用,具有科学性与实际意义。

**【关键词】** 肺; 肠; 脑; 安宫牛黄丸; 肺性脑病

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**Analysis of treating pulmonary encephalopathy with Angong Niu Huang pill from relationships among lung, intestine and brain** Li Qiaoru, Li Zhijun, Wang Dongqiang

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**【Abstract】** Pulmonary encephalopathy (PE) is a common late complication of chronic lung disease, pulmonary heart disease, etc, with a high mortality rate and being one of the acute and critical diseases ordinarily seen in internal medicine. The integrated method of using traditional Chinese medicine (TCM) and Western medicine for treatment of PE can reduce its mortality. Clinically, Angong Niu Huang pill is widely used in the treatment of this disease, and has achieved good therapeutic results. This article has summarized the understanding of relationships among lung, intestine and brain in ancient books of TCM and Western medicine, the mechanism of Angong Niu Huang pill in the treatment of PE, and further explains the pathogenesis and evolutionary process of PE from the relationships among above organs, so as to play a guiding role possessing scientific and practical significance in the clinical diagnosis and treatment of PE.

**【Key words】** Lung; Intestine; Brain; Angong Niu Huang pill; Pulmonary encephalopathy

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肺性脑病是由于严重的胸部或肺部疾病伴呼吸衰竭(呼衰),导致缺氧和二氧化碳(CO<sub>2</sub>)潴留引起各种精神障碍和神经症状的一组综合征,属于躯体疾病所致的症状性精神病<sup>[1]</sup>。传统中医经典中并无“肺性脑病”的病名,中医内科疾病诊疗常规中将这类以咳痰喘、意识恍惚、嗜睡、躁动抽搐以及昏迷等表现为主的疾病归为“肺胀”<sup>[2-4]</sup>。笔者认为肺性脑病的病变部位首先在肺,继而累及肠和脑。肺、肠、脑三者在生理病理上密切相关、相互影响,故肺脏疾病进一步发展可致胃肠病变,严重者可累及脑,导致意识改变。肺性脑病的治疗应以清肺祛痰、泻下通腑、开窍醒神为主。安宫牛黄丸具有清热、祛痰、开窍的功效,临床上可用于治疗肺性脑病<sup>[5-6]</sup>。

### 1 肺、肠、脑三者的关系

**1.1 肺脑直接相关:**“肺者,气之本……”“诸气者,皆属于肺”。肺乃气之主,肺主志节,气盛则神全。《医宗金鉴》言:“脑为元神之府”,脑主宰神明,需依赖气的温煦、濡养、推动。“饮入于胃,游溢精气,上输于脾,脾气散精,上归于肺;通调水道,下输膀胱”“……肺朝百脉,输精于皮毛”。肺是水谷精微和气体等物质交换的场所,肺将吸收来的水谷精

微、清气结合为宗气,通过肺朝百脉营养全身及脑髓。肺脏病变脑髓失养,则神明异常。《温热论》言:“温邪上受,首先犯肺,逆传心包。”也解释了肺脏及脑的病情演变。邪气侵犯机体,肺为娇脏首先受之,进而病变入里,伤及心、脑,出现神昏、谵语等症状。肺与脑生理病理上密切相关。肺性脑病患者出现神昏谵妄、撮空理线等病变则是由肺演变至脑的体现<sup>[7-8]</sup>。现代医学认为肺脑关系密切。肺脏疾病引起的低氧、高碳酸血症导致呼吸性酸中毒,脑细胞内酸碱平衡被破坏,氢离子(H<sup>+</sup>)浓度增加, pH 值下降,脑组织酸中毒;其次脑组织在低氧、CO<sub>2</sub>分压增高的情况下,脑细胞兴奋性降低或血管扩张、通透性增加,出现脑水肿,进而导致一系列精神意识病变<sup>[9-11]</sup>。

### 1.2 肺脑间接相关

**1.2.1 肺肠互为表里:**中国古籍《黄帝内经》中就提出“肺与大肠相表里”的理论。肺与大肠互为表里,生理上相互协调、病理上互相影响。《素灵微蕴》曰:“肺与大肠表里同气,肺气化津,滋灌大肠……”《医经精义》曰:“大肠之所以能传导者,以其为肺之腑,肺气下达,故能传导。”《素问·阴阳象大

论》曰：“清气在下，则生飧泄……春伤于风，夏生飧泄。”从以上经典理论可以看出肺肠关系密切。肺脏病变，肺气宣发肃降功能失常，则影响大肠的传导功能；大肠腑气不通，则肺气上逆，故肠病也可及肺。肺肠互为表里，关系密切<sup>[12]</sup>。

现代医学研究表明，肺与大肠的关系可以追溯到人体起源。在人体胚胎早期，肺肠拥有同源性，另外研究表明，肺肠黏膜免疫具有相关性<sup>[13]</sup>，肺肠之间信号通路的多源性，如肺肠之间存在转化生长因子-β1(TGF-β1)/Smads/细胞外调节蛋白激酶(ERK)、Toll 样受体 4(TLR4)/肿瘤坏死因子-2α(TNF-2α)、脂多糖(LPS)等信号通路转导机制<sup>[14-16]</sup>。有研究显示，肺脏病变过程中，肠道固有淋巴细胞迁移至肺脏，参与免疫应答过程<sup>[17]</sup>。现代研究进一步验证了肺与肠关系密切，两者互为表里，生理病理上都互相支持、互相影响。

**1.2.2 肠脑关系：**生理方面，手阳明大肠经其走向由手至头，循行分布上肢外及颈部、面部。《灵枢·经脉篇》曰：“大肠手阳明之脉……上颈，贯颊……”可见大肠经直接与脑相关联。《素问·六节藏象论》曰：“五味入口，藏于肠胃……神乃自生。”通过原文不难看出胃肠为后天之本，胃肠功能正常，脑窍才能得以荣养，从而发挥正常的精神意识活动。人体所食需经胃腑腐熟、脾脏运化后通过小肠泌别清浊、大肠传导进而使“清者”上呈营养脑窍，使神明清晰。

病理学方面，张仲景发现阳明病多有意识症状，即大肠病变多表现为意识、精神异常。《伤寒论》曰：“阳明证，其人喜忘者，必有蓄血。所以然者，本有久瘀血，故令喜忘……”喜忘，即记忆障碍为神志病。阳明为胃肠所主，而意识为脑所主。故胃肠病变可影响脑，肠脑相关。邪气犯肺，肺病可致肠道不通、不能正常传导，清窍失养或糟粕、痰浊上逆蒙蔽清窍而致脑病，出现神昏、谵语、躁动、精神障碍等症状<sup>[18]</sup>。

现代研究的肠脑轴说通过大量实验诠释了肠和脑的生理病理联系。研究表明，多种神经肽物质不仅存在于脑中，在胃肠道也有分布，由此提出“脑肠肽”的概念<sup>[19-21]</sup>。目前已发现的 60 余种脑肠肽中较为明确的兴奋性神经递质有组胺、5-羟色胺、P 物质、降钙素原相关肽、促肾上腺皮质激素释放因子等，抑制性递质有胆囊收缩素、一氧化氮、血管活性肠肽等。脑肠肽不仅在外周广泛调节胃肠道功能，而且在中枢系统也参与对胃肠道生理活动的调节。脑肠肽的发现揭示了脑和肠之间有着密切的关系<sup>[22-25]</sup>。

## 2 “肺性脑病”的发病机制及治疗医则

肺性脑病当属“肺胀”之“肺厥”“肺衰”“痰蒙神窍证”“神昏”“昏迷”等范畴。中医病机认为肺性脑病为本虚标实之症，病机为素体虚损，或外感邪气，致气机阻滞，传导失司，清窍失养；或痰浊内生，痰热腑结，痰蒙神窍而致神识昏蒙、意识不清、烦躁谵妄、躁扰不宁等。

肺性脑病发于肺脏，进而传至肠和脑，最终表现在脑窍。本虚标实为肺性脑病的病机要点，本虚为肺、脾、肾、心等器官功能衰弱；标实是痰、热、瘀、火等病理产物。痰邪为主要致病邪气，化火生热或瘀血内阻。“肺为贮痰之器”，痰浊阻滞肺脏，肺失清肃，气机不畅，肠道传导失司，津液等不能上呈清窍、或痰浊上蒙清窍，致神昏、烦躁谵妄、躁扰不宁

等精神、意识症状。这是肺性脑病的病理演变机制。

由此可见，痰瘀火热、气虚血瘀是肺性脑病的主要病机。肺性脑病的发生以“痰、瘀、热”为主要病理因素，所以治法当以清热祛痰、泻下通腑、开窍熄风为主。

## 3 安宫牛黄丸治疗“肺性脑病”的原理分析

安宫牛黄丸记载于清代医家吴瑭所著《温病条辨》。其主要成分是牛黄、麝香、黄连、黄芩、栀子、郁金、冰片、珍珠、朱砂、雄黄等。牛黄气清香，味微苦而后甜，性凉，具有清热、解毒、定惊的作用；麝香辛、温，具有开窍、活血、散结、止痛的作用；黄芩、黄连、栀子清泻肺、肠邪热以去除痰湿之气。诸药合用安宫牛黄丸具有清热解毒、豁痰开窍、开窍醒神之功效，可用于治疗以高热、神昏、烦躁谵语、抽搐痰厥、腑气不通等为主要表现的肺性脑病。现代药理学研究表明，安宫牛黄丸具有解热、抗炎、镇静及降低耗氧量等的作用，可以降低毛细血管通透性，进而保障血脑屏障，改善脑代谢和脑部神经功能；另外还可以调节炎症介质活性，恢复脑组织正常功能，醒神开窍等<sup>[26-27]</sup>。

## 4 总结

肺、肠、脑三者之间关系密切。本文通过描述三者之间病变传导，揭示了肺性脑病的病理演变；从发病机制、治疗原则诠释安宫牛黄丸治疗“肺性脑病”的原理。以上为笔者学习所悟，其中包含了西医对肺、肠、脑的关系、安宫牛黄丸及肺性脑病的研究，具有科学性和实际意义。望对于安宫牛黄丸的新用及肺性脑病的治疗有一定帮助。

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## 参考文献

- [1] 林果为,王言耀,葛均波.实用内科学[M].北京:人民卫生出版社,2017:1204.  
Lin GW, Wang YY, Ge JB. Practice of Internal Medicine [M]. Beijing: People's Medical Publishing House, 2017: 1204.
- [2] 郑翠婷,李荣,张梓洁,等.中医学对五脏胀病的病因病机及治疗原则认识初探[J].中西医结合心脑血管病杂志,2020,18(14):2341-2343. DOI: 10.12102/j.issn.1672-1349.2020.14.039.  
Zheng CT, Li R, Zhang ZJ, et al. Discussion on pathogenesis and treatment principle of five visceral diseases [J]. Chin J Integr Med Cardio/Cerebrovasc Dis, 2020, 18 (14): 2341-2343. DOI: 10.12102/j.issn.1672-1349.2020.14.039.
- [3] 孙冉冉,雒云祥,时信.肺性脑病的中医研究近况分析[J/CD].中西医结合心脑血管病电子杂志,2017,5(25):36-37. DOI: 10.3969/j.issn.2095-6681.2017.25.022.  
Sun RR, Luo YX, Shi X. Analysis of the current situation of Traditional Chinese Medicine research on pulmonary encephalopathy cardiovascular [J/CD]. Cardiovasc Dis J Integr Tradit Chin Western Med (Electronic Edition), 2017, 5 (25): 36-37. DOI: 10.3969/j.issn.2095-6681.2017.25.022.
- [4] 王明航,李建生,余学庆,等.慢性阻塞性肺疾病肺性脑病中医证候要素分布规律研究[J].中华中医药杂志,2010,25(3):345-348.  
Wang MH, Li JS, Yu XQ, et al. Study on distribution regularity of syndrome elements of pulmonary encephalopathy of chronic obstructive pulmonary diseases [J]. China J Tradit Chin Med Pharm, 2010, 25 (3): 345-348.
- [5] 杨益宝,莫雪妮,陈斯宁.肺性脑病中西医结合诊疗进展[J].辽宁中医药大学学报,2019,21(1):206-211. DOI: 10.13194/j.issn.1673-842x.2019.01.057.  
Yang YB, Mo XN, Chen SN. Progress in the diagnosis and treatment of pulmonary encephalopathy [J]. J Liaoning Univ Tradit Chin Med, 2019, 21 (1): 206-211. DOI: 10.13194/j.issn.1673-842x.2019.01.057.
- [6] 李桥茹,李志军,王东强.安宫牛黄丸治疗肺性脑病的应用体会[J].中国中西医结合急救杂志,2018,25(3):311-313. DOI: 10.3969/j.issn.1008-9691.2018.03.023.

- Li QR, Li ZJ, Wang DQ. The experience of treating pulmonary encephalopathy with Angong Niuhuangwan [J]. *Chin J TCM WM Crit Care*, 2018, 25 (3): 311-313. DOI: 10.3969/j.issn.1008-9691.2018.03.023.
- [7] 孙宇鹏, 张伟. 从“肺脑相关”论治慢性阻塞性肺疾病合并认知障碍 [J]. *中医药信息*, 2016, 33 (2): 24-26.  
Sun YP, Zhang W. Discussion on “Correlation between Lung and Brain” in the treatment of chronic obstructive pulmonary disease with cognitive impairment [J]. *Inf Tradit Chin Med*, 2016, 33 (2): 24-26.
- [8] 凌文萍. 温病四大家辨治神志异常特色研究 [D]. 济南: 山东中医药大学, 2019.  
Ling WP. The characteristic study on distinguishing from the mind disorder by four masters of seasonal febrile disease school [D]. Jinan: Shandong University of Tradition Chinese Medicine, 2019.
- [9] 黄程, 胡恒章. 肺性脑病所致精神障碍一例报道 [J/CD]. *中华脑科疾病与康复杂志(电子版)*, 2019, 9 (5): 317-318. DOI: 10.3877/cma.j.issn.2095-123X.2019.05.015.  
Huang C, Hu HZ. A case report of mental disorder caused by pulmonary encephalopathy [J/CD]. *Chin J Brain Dis Rehabil (Electronic Edition)*, 2019, 9 (5): 317-318. DOI: 10.3877/cma.j.issn.2095-123X.2019.05.015.
- [10] 陆再英, 钟南山. 内科学 [M]. 7 版. 北京: 人民卫生出版社, 2008: 143-144.  
Lu ZY, Zhong NS. Internal Medicine [M]. 7th ed. Beijing: People's Medical Publishing House, 2008: 143-144.
- [11] 刘兢, 刘淦册, 马志辉, 等. 基于肺脑相关论电针联合 Schuell 语言训练治疗脑卒中后失语症的临床观察 [J]. *特别健康*, 2018, 7 (17): 224. DOI: 10.3969/j.issn.2095-6851.2018.17.348.  
Liu J, Liu YC, Ma ZH, et al. Clinical observation of electroacupuncture combined with Schuell language training in the treatment of aphasia after stroke [J]. *Special Health*, 2018, 7 (17): 224. DOI: 10.3969/j.issn.2095-6851.2018.17.348.
- [12] 石莉杰, 李雪薇, 李艳英, 等. 从“肺与大肠相表里”浅谈 COVID-19 肺肠同治 [J]. *中医学*, 2020, 9 (4): 293-297. DOI: 10.12677/TCM.2020.94044.  
Shi LJ, Li XW, Li YY, et al. Discussion on the treatment of COVID-19 lung intestine from “lung and large intestine” [J]. *Tradit Chin Med*, 2020, 9 (4): 293-297. DOI: 10.12677/TCM.2020.94044.
- [13] 韩俊阁, 刘晓燕, 张刘扛, 等. “肺与大肠相表里”机理的研究: 高氧刺激对肺肠黏膜免疫因子含量表达的影响 [J]. *世界中医药*, 2015, 10 (1): 80-82, 85. DOI: 10.3969/j.issn.1673-7202.2015.01.021.  
Han JC, Liu XY, Zhang LK, et al. Mechanism research on “lung and large intestine being interior-exteriorly related”: effect of hyperoxia on the expression of CK of lung and intestinal mucosa [J]. *World Chin Med*, 2015, 10 (1): 80-82, 85. DOI: 10.3969/j.issn.1673-7202.2015.01.021.
- [14] 王宝家, 杨宇, 郑秀丽, 等. 基于肺肠微生物及 TGF- $\beta$ 1/Smads/ERK 信号通路探讨溃疡性结肠炎大鼠肺损伤的机制 [J]. *中华中医药杂志*, 2014, 29 (11): 3555-3559.  
Wang BJ, Yang Y, Zheng XL, et al. Study on the mechanism of lung injury of rats with ulcerative colitis based on lung-intestines microecology and TGF- $\beta$ 1/Smads/ERK signaling pathway [J]. *China J Trad Chin Med Pharm*, 2014, 29 (11): 3555-3559.
- [15] 张锦锋, 窦清理, 陈涓, 等. 早期肠内营养标准化治疗流程管理应用于慢性阻塞性肺疾病急性加重有创机械通气患者的临床效果分析 [J]. *中华危重病急救医学*, 2020, 32 (1): 67-71. DOI: 10.3760/cma.j.cn121430-20190927-00012.  
Zhang JF, Dou QL, Chen J, et al. Analysis of clinical effects of early enteral nutrition standardized treatment process management on patients with acute exacerbation of chronic obstructive pulmonary disease on invasive mechanical ventilation [J]. *Chin Crit Care Med*, 2020, 32 (1): 67-71. DOI: 10.3760/cma.j.cn121430-20190927-00012.
- [16] 刘絮, 刘晓燕, 郭霞珍. 肺与大肠 LPS 信号通路相关性的实验研究 [J]. *世界中医药*, 2014, 9 (4): 422-423, 426. DOI: 10.3969/j.issn.1673-7202.2014.04.007.  
Liu X, Liu XY, Guo XZ. The experimental study on LPS signal path correlation of lung and large intestine [J]. *World Chin Med*, 2014, 9 (4): 422-423, 426. DOI: 10.3969/j.issn.1673-7202.2014.04.007.
- [17] Huang Y, Mao K, Chen X, et al. SIP-dependent interorgan trafficking of group 2 innate lymphoid cells supports host defense [J]. *Science*, 2018, 359 (6371): 114-119. DOI: 10.1126/science.aam5809.
- [18] 马艳苗, 孙琳, 梁琦, 等. 基于《伤寒论》阳明探讨脑肠相关与中医通下的关系 [J]. *中华中医药杂志*, 2017, 32 (6): 2405-2407.  
Ma YM, Sun L, Liang Q, et al. Discussion on the relationship between brain-gut and traditional Chinese medicine purgation from yangming of *Shanghan Lun* [J]. *Chin J Tradit Chin Med Pharm*, 2017, 32 (6): 2405-2407.
- [19] 李可敏, 李景南. 应激与肠道微生物-肠脑轴相互作用机制研究进展 [J]. *中华内科杂志*, 2020, 59 (3): 247-249. DOI: 10.3760/cma.j.issn.0578-1426.2020.03.018.  
Li KM, Li JN. The research progress of interaction between the intestinal microbiota-gut-brain axis and stress [J]. *Chin J Intern Med*, 2020, 59 (3): 247-249. DOI: 10.3760/cma.j.issn.0578-1426.2020.03.018.
- [20] 苗继文, 程波, 李娜, 等. 脑肠轴调节机制的研究进展 [J]. *中华神经医学杂志*, 2020, 19 (4): 422-426. DOI: 10.3760/cma.j.cn115354-20190506-00252.  
Miao JW, Cheng B, Li N, et al. Recent advance in regulation mechanism of gut brain axis [J]. *Chin J Neuromed*, 2020, 19 (4): 422-426. DOI: 10.3760/cma.j.cn115354-20190506-00252.
- [21] 李贵阳, 嵇建刚, 张立霞. 基于脑肠肺轴理论通腑泻浊法在急性脑梗死治疗中的应用 [J]. *陕西中医*, 2020, 41 (7): 882-884. DOI: 10.3969/j.issn.1000-7369.2020.07.012.  
Li GY, Ji JG, Zhang LX. Application of Tongfu Xiezhuo method in the treatment of acute cerebral infarction based on brain gut lung axis theory [J]. *Shaanxi J Tradit Chin Med*, 2020, 41 (7): 882-884. DOI: 10.3969/j.issn.1000-7369.2020.07.012.
- [22] 罗原, 闫炳苍, 张玲, 等. 基于脑-肠轴“从肠治脑”论治急性脑中风痰热实证意识障碍 [J]. *中国中医急症*, 2020, 29 (7): 1219-1223. DOI: 10.3969/j.issn.1004-745X.2020.07.025.  
Luo Y, Yan BC, Zhang L, et al. The new explanation of disturbance of consciousness of acute cerebral apoplexy with phlegm heat excess syndrome based on brain-gut axis [J]. *J Emerg Tradit Chin Med*, 2020, 29 (7): 1219-1223. DOI: 10.3969/j.issn.1004-745X.2020.07.025.
- [23] 刘奇, 陈荣昌, 贾留群, 等. 无创通气用于肺性脑病患者疗效的 Meta 分析 [J]. *中华危重病急救医学*, 2016, 28 (1): 57-62. DOI: 10.3760/cma.j.issn.2095-4352.2016.01.011.  
Liu Q, Chen RC, Jia LQ, et al. Effect of noninvasive ventilation on hypercapnic encephalopathy syndrome: a Meta-analysis [J]. *Chin Crit Care Med*, 2016, 28 (1): 57-62. DOI: 10.3760/cma.j.issn.2095-4352.2016.01.011.
- [24] 孙仁华, 江荣林, 黄曼, 等. 重症患者早期肠内营养临床实践专家共识 [J]. *中华危重病急救医学*, 2018, 30 (8): 715-721. DOI: 10.3760/cma.j.issn.2095-4352.2018.08.001.  
Sun RH, Jiang RL, Huang M, et al. Consensus of early enteral nutrition clinical practice in critically ill patients [J]. *Chin Crit Care Med*, 2018, 30 (8): 715-721. DOI: 10.3760/cma.j.issn.2095-4352.2018.08.001.
- [25] 欧阳斐, 许美霞, 杨涛, 等. 早期肠内营养对大面积脑梗死患者继发感染及预后的影响 [J]. *中华危重病急救医学*, 2016, 28 (10): 940-942. DOI: 10.3760/cma.j.issn.2095-4352.2016.10.016.  
Ouyang F, Xu MX, Yang T, et al. Influence of early enteral nutrition on secondary infection and prognosis in patients with massive cerebral infarction [J]. *Chin Crit Care Med*, 2016, 28 (10): 940-942. DOI: 10.3760/cma.j.issn.2095-4352.2016.10.016.
- [26] 世界中医药学会联合会急症专业委员会, 中国医师协会急诊医师分会, 中国中西医结合学会重症医学专业委员会, 等. 安宫牛黄丸急重症临床应用专家共识 [J]. *中国急救医学*, 2019, 39 (8): 726-730. DOI: 10.3969/j.issn.1002-1949.2019.08.003.  
World Federation of Chinese Medicine Societies Emergency Committee, Emergency Physicians Branch of Chinese Medical Doctor Association, Committee of Critical Care Medicine, Chinese Association of Integrative Medicine, et al. Expert consensus on the clinical application of Angong Niuhuang Pill in the treatment of acute severe disease [J]. *Chin J Crit Care*, 2019, 39 (8): 726-730. DOI: 10.3969/j.issn.1002-1949.2019.08.003.
- [27] 柴玉爽, 曾珊珊, 何源峰, 等. 安宫牛黄丸的 UPLC 特征指纹图谱与化学模式识别 [J]. *中国中药杂志*, 2020, 45 (3): 565-571. DOI: 10.19540/j.cnki.cjmm.20191217.305.  
Chai YS, Zeng HH, He YF, et al. UPLC characteristic fingerprint and chemical pattern recognition of Angong Niuhuang Pills [J]. *China J Chin Mater Med*, 2020, 45 (3): 565-571. DOI: 10.19540/j.cnki.cjmm.20191217.305.