

doi: 10.13241/j.cnki.pmb.2018.20.022

食管癌根治术后肺部感染的病原菌与耐药性分析*

周 晓 王文艳 赵旭东 沙纪名 赵 卉[△]

(安徽医科大学第二附属医院心胸外科 安徽 合肥 230601)

摘要 目的:探讨食管癌根治术后肺部感染的病原菌及耐药性,为临床合理应用抗菌药物提供依据。**方法:**选择2009年1月-2017年12月在我院行食管癌根治术的764例患者作为研究对象,记录患者临床基本资料,采集肺部感染患者深部痰液标本进行细菌培养,并对病原菌进行药物敏感性试验,分析其病原菌分布和耐药性。**结果:**764例食管癌根治术后患者肺部感染146例,感染率为19.11%;肺部感染患者痰液标本培养获得病原菌185株,其中革兰阴性菌116株,占62.70%,以铜绿假单胞菌和肺炎链球菌最多,分别占18.38%和14.05%;革兰阳性菌40株,占21.62%,以金黄色葡萄球菌最多,占8.65%;真菌29株,占15.68%,以白假丝酵母菌最多,占9.19%。铜绿假单胞菌、肺炎链球菌、鲍氏不动杆菌、大肠埃希菌对美洛西林的耐药率最高,分别占70.59%、73.08%、86.96%、62.50%,对亚胺培南耐药率最低,分别占5.88%、3.85%、26.09%、12.50%。金黄色葡萄球菌、表皮葡萄球菌对头孢唑林的耐药率最高,分别占81.25%、63.64%,溶血葡萄球菌对头孢唑林、阿奇霉素、环丙沙星的耐药率最高,均占71.43%,肠球菌对头孢唑林、环丙沙星耐药率最高,均占100.00%;黄色葡萄球菌、表皮葡萄球菌、溶血葡萄球菌、肠球菌对万古霉素耐药率最低,均为0.00%。**结论:**食管癌根治术后肺部感染以革兰阴性菌为主,病原菌主要对美洛西林、头孢唑林、阿奇霉素、环丙沙星产生耐药性,对亚胺培南、万古霉素耐药性较低,临床应合理选用抗菌药物进行治疗。

关键词:食管癌根治术;肺部感染;病原菌分布;耐药性

中图分类号:R735.1 **文献标识码:**A **文章编号:**1673-6273(2018)20-3901-04

Analysis on Pathogenic Bacteria and Drug Resistance of Pulmonary Infection after Radical Surgery for Esophageal Carcinoma*

ZHOU Xiao, WANG Wen-yan, ZHAO Xu-dong, SHA Ji-ming, ZHAO Hui[△]

(Department of Cardiothoracic Surgery, The Second Affiliated Hospital of Anhui Medical University, Hefei, Anhui, 230601, China)

ABSTRACT Objective: To explore the pathogenic bacteria and drug resistance of pulmonary infection after radical surgery for esophageal carcinoma, and to provide the basis for clinical rational use of antibacterial drugs. **Methods:** A total of 764 patients, who underwent radical surgery for esophageal carcinoma in Second Affiliated Hospital of Anhui Medical University from January 2009-December 2017, were chosen as research subjects. The basic clinical data of the patients were recorded. The deep sputum specimens from patients with pulmonary infection were collected for bacterial culture. Drug sensitivity test was performed for pathogenic bacteria, and the distribution and drug resistance of the pathogenic bacteria were analyzed. **Results:** There were 146 cases of pulmonary infection in 764 cases of radical surgery for esophageal carcinoma, and the infection rate was 19.11%. Among 185 strains of pathogenic bacteria from sputum specimens of patients with pulmonary infection, there were 116 strains of Gram-negative bacteria (62.70%), in which, *Pseudomonas aeruginosa* and *Streptococcus pneumoniae* were the most, accounting for 18.38% and 14.05% respectively; there were 40 strains of Gram-positive bacteria (21.62%), in which, *Staphylococcus aureus* were the most, accounting for 8.65%, 29 strains of fungi accounting for 15.68%, and *Candida albicans* were also the most, accounting for 9.19%. The resistance rates of *Pseudomonas aeruginosa*, *Streptococcus pneumoniae*, *Acinetobacter baumannii*, *Escherichia coli* to mezlocillin were the highest, accounted for 70.59%, 73.08%, 86.96%, 62.50% respectively, but the resistance rates of them to imipenem were the lowest, accounted for 5.88%, 3.85%, 26.09%, 12.50% respectively. The resistance rates of *Staphylococcus aureus*, *Staphylococcus epidermidis* to cefazolin were the highest, accounting for 81.25%, 63.64% respectively. The resistance rates of *Staphylococcus haemolyticus* to cefazolin, azithromycin, ciprofloxacin were the highest, all accounted for 71.43%. The resistance rates of *Enterococci* to cefazolin, ciprofloxacin were the highest, all accounted for 100.00%. The resistance rates of *Staphylococcus*, *Staphylococcus epidermidis*, *Staphylococcus haemolyticus* and *Enterococcus* to vancomycin were the lowest, all accounted for 0.00%. **Conclusion:** The pulmonary infection is Gram-negative bacteria mainly after radical surgery for esophageal carcinoma. The pathogenic bacteria is resistant to mezlocillin, cefazolin, azithromycin, ciprofloxacin mainly, the resistance rates of pathogenic bacteria to imipenem and vancomycin are lower. Antibiotics should be used rationally for clinical treatment.

* 基金项目:国家自然科学基金项目(81670060)

作者简介:周晓(1975-),男,硕士,副主任医师,从事胸腔疾病的微创手术治疗方面的研究,E-mail: wrghgf@163.com

△ 通讯作者:赵卉(1967-),男,硕士,主任医师,从事肺部肿瘤、慢性阻塞性肺病、支气管哮喘方面的研究,E-mail: irwfhg@163.com

(收稿日期:2018-05-14 接受日期:2018-06-11)

Key words: Radical surgery for esophageal carcinoma; Pulmonary infection; Pathogenic bacteria distribution; Drug resistance

Chinese Library Classification(CLC): R735.1 **Document code:** A

Article ID: 1673-6273(2018)20-3901-04

前言

食管癌是常见的消化道肿瘤,其典型的症状为进行性下咽困难,严重时水和唾液也难以下咽^[1-3]。目前,根治性切除仍是治疗食管癌的主要方法,在食管癌根治术后,均伴有吻合口瘘和肺部感染等并发症,严重者可导致死亡,对患者的预后、治疗费用及住院时间造成了直接影响^[4-5]。若发现感染患者,应该及时应用抗菌药物进行治疗,同时给予药敏试验,防止感染进一步扩散^[6]。近年来,随着外科治疗技术逐渐发展成熟,且监护仪器设备、麻醉方式和护理技术发展越来越成熟,肺癌根治术后出现吻合口瘘的发生率及患者病死率显著下降,但并发肺部感染的发生率仍处在较高水平,已经引起相关学者的重视^[7-9]。因此,对食管癌根治术后肺部感染进行早期诊断并采取积极有效的治疗,可明显改善患者预后^[10,11]。本研究将我院 764 例食管癌根治术患者作为研究对象,观察其肺部感染情况,采集样本进行病原菌分布和耐药性分析,现将本研究报道如下。

1 资料与方法

1.1 临床资料

选择 2014 年 6 月 -2017 年 8 月在我院行食管癌根治术的 764 例患者,纳入标准^[12]:(1)所有患者存在不同程度发热、咳嗽、咳痰等临床表现,肺部听诊可闻湿啰音;(2)患者血标本检测可见白细胞指标增加;(3)患者肺部影像学资料显示肺部炎症;(4)患者或家属知情同意并签署知情同意书。排除标准:(1)合并严重心、肝、肾功能障碍者;(2)临床资料不完整者;(3)无法积极配合者。其中男性患者 421 例,女性 343 例;年龄 42-68 岁,平均年龄(56.47±6.83)岁;鳞癌 612 例,腺癌 152 例;病理分期:I 期 189 例,II 期 575 例;病变位置:食管中段 575 例,下段 189 例。

1.2 方法

收集患者早晨痰液标本,用生理盐水对患者口腔进行清洗 3 次,用力深咳,将痰液置于无菌环境储存,以备实验。细菌鉴定方法采用梅里埃公司生产的 VITEK-60 及 GPC/GNB 鉴定卡进行细菌鉴定。采用国家卫生组织推荐的 K-B 纸片扩散法检测细菌耐药性,其中琼脂、药敏纸片均购自英国 Oxoid 公司。

1.3 观察指标

观察病原菌分布与构成比,记录主要革兰阴性菌和革兰阳性菌对抗菌药物的耐药率。

1.4 统计学方法

研究数据采用 SPSS18.0 进行分析处理,计数资料采用百分比形式表示,并采用描述性分析。

2 结果

2.1 病原菌分布

764 例食管癌根治术患者术后存在肺部感染的有 146 例,感染率为 19.11%;肺部感染患者痰液标本培养获得病原菌 185

株,其中革兰阴性菌 116 株,占 62.70%,革兰阳性菌 40 株,占 21.62%,真菌 29 株,占 15.68%,见表 1。

表 1 病原菌分布与构成比

Table 1 Distribution and constituent ratio of pathogenic bacteria

Pathogenic bacteria	n	Constituent ratio(%)
Gram-negative bacteria	116	62.70
<i>Pseudomonas aeruginosa</i>	34	18.38
<i>Streptococcus pneumoniae</i>	26	14.05
<i>Acinetobacter baumannii</i>	23	12.43
<i>Escherichia coli</i>	16	8.65
<i>Enterobacter cloacae</i>	11	5.95
Other	6	3.24
Gram-positive bacteria	40	21.62
<i>Staphylococcus aureus</i>	16	8.65
<i>Staphylococcus epidermidis</i>	11	5.95
<i>Staphylococcus haemolyticus</i>	7	3.78
<i>Enterococcus</i>	4	2.16
Other	2	1.08
Fungi	29	15.68
<i>Candida albicans</i>	17	9.19
<i>Candida tropicalis</i>	10	5.41
Other	2	1.08
Total	185	100.00

2.2 主要革兰阴性菌对抗菌药物的耐药率分析

铜绿假单胞菌、肺炎链球菌、鲍氏不动杆菌、大肠埃希菌对美洛西林的耐药率最高,分别占 70.59%、73.08%、86.96%、62.50%,对亚胺培南耐药率最低,分别占 5.88%、3.85%、26.09%、12.50%,见表 2。

2.3 主要革兰阳性菌对抗菌药物的耐药率分析

金黄色葡萄球菌、表皮葡萄球菌对头孢唑林的耐药率最高,分别占 81.25%、63.64%,溶血葡萄球菌对头孢唑林、阿奇霉素、环丙沙星的耐药率最高,均占 71.43%,肠球菌对头孢唑林、环丙沙星耐药率最高,均占 100.00%;黄色葡萄球菌、表皮葡萄球菌、溶血葡萄球菌、肠球菌对万古霉素耐药率最低,均为 0.00%,见表 3。

3 讨论

食管癌与生活环境、饮食生活习惯、年龄、性别、种族、地域、职业、遗传易感性等有一定关系,是多种因素所致的疾病^[13-15]。近几年,食管癌的发病率及病死率呈现逐渐上升趋势,其

表 2 主要革兰阴性菌对抗菌药物的耐药率分析

Table 2 Analysis of the resistance rate of major Gram-negative bacteria to antibiotics

Medicine	<i>Pseudomonas aeruginosa</i> (n=34)		<i>Streptococcus pneumoniae</i> (n=26)		<i>Acinetobacter baumannii</i> (n=23)		<i>Escherichia coli</i> (n=16)	
	n	Resistance rate(%)	n	Resistance rate(%)	n	Resistance rate(%)	n	Resistance rate(%)
Ceftriaxone	17	50.00	16	61.54	16	69.57	9	56.25
Ceftazidime	15	44.12	11	42.31	15	65.22	8	50.00
Cefepime	9	26.47	10	38.46	11	47.83	3	18.75
Ciprofloxacin	18	52.94	13	50.00	12	52.17	9	56.25
Imipenem	2	5.88	1	3.85	6	26.09	2	12.50
Levofloxacin	19	55.88	12	46.15	13	56.52	9	56.25
Mezlocillin	24	70.59	19	73.08	20	86.96	10	62.50
Sulbactam	8	23.53	7	26.92	8	34.78	6	37.50
Tazobactam	10	29.41	8	30.77	11	47.83	3	18.75

表 3 主要革兰阳性菌对抗菌药物的耐药率分析

Table 3 Analysis of the resistance rate of major Gram-positive bacteria to antibiotics

Medicine	<i>Staphylococcus aureus</i> (n=16)		<i>Staphylococcus epidermidis</i> (n=11)		<i>Staphylococcus haemolyticus</i> (n=7)		<i>Enterococcus</i> (n=4)	
	n	Resistance rate(%)	n	Resistance rate(%)	n	Resistance rate(%)	n	Resistance rate(%)
Penicillin	12	75.00	6	54.55	4	57.14	3	75.00
Cefazolin	13	81.25	7	63.64	5	71.43	4	100.00
Azithromycin	10	62.50	5	45.45	5	71.43	3	75.00
Vancomycin	0	0.00	0	0.00	0	0.00	0	0.00
Ciprofloxacin	12	75.00	6	54.55	5	71.43	4	100.00
Clindamycin	7	43.75	4	36.36	4	57.14	3	75.00

中食管癌术后经常出现肺部感染,甚至是围术期主要的致死原因,在进行食管癌根治术时,行开胸手术影响呼吸道净化功能,干扰吞咽,患者下肺部移动度下降,潮气量下降,排痰、咳嗽能力下降,使得患者呼吸道内淤积大量痰液,由于上述多种原因,增加患者肺部感染的风险^[16-18]。有研究报道显示,食管癌根治术并发肺部感染是一种较为常见的并发症,发生率在 20.00%-75.00%,病死率为 40.00%左右^[19]。在并发肺部感染需要进行早期诊断及有效的治疗,可改善患者的治疗效果,提高预后水平^[20,21]。因此,对于肺部感染患者掌握其致病菌分布及药敏特点是非常必要的。根据患者肺部感染临床表现、血常规检查结果、影像学资料及病原菌培养结果进行确诊,并采用积极有效的治疗,对于改善患者预后有着重要的作用^[22-24]。

本研究结果显示,764 例食管癌根治术患者并发肺部感染病例 146 例,发病率为 19.11%,采集肺部感染患者痰液标本进行病原学培养,获得病原菌 185 株,这一结果表明感染发生率较高且患者存在多重感染。在 185 株病原菌中,革兰阴性菌 116 株,占 62.70%,主要菌属为铜绿假单胞菌、肺炎链球菌,分别为 34 株、26 株,占比 18.38%、14.05%,其次是鲍氏不动杆菌及大肠埃希菌属,分别为 23 株、16 株,占比 12.43%、8.65%,对革兰阴性菌进行耐药性分析,病原菌对头孢曲松、环丙沙星、美洛西林等药物均表现出较高的耐药性,亚胺培南耐药率均处在较低水平,治疗时为提高有效性,可采用亚胺培南进行治疗

^[25-27]。革兰阳性菌 40 株,占 21.62%,其中金黄色葡萄球菌检出 16 株,占 8.65%,药物药敏学检测结果显示,革兰阳性菌如表皮葡萄球菌、金黄色葡萄球菌、肠球菌、溶血葡萄球菌对头孢唑林、青霉素、阿奇霉素以及环丙沙星均表现为较高的耐药性,肠球菌则同样对克林霉素耐药性较高,而对万古霉素耐药率均为 0.00%,因此在针对革兰阳性菌治疗时可选择万古霉素进行药物治疗^[28]。本研究真菌检出 29 株,检出率仅为 15.68%。在进一步对病原学特征进行分析可知,致病菌包括铜绿假单胞菌及金黄色葡萄球菌等比例较高,这一结果表明患者行食管癌根治术后,自身免疫力下降,导致患者并发肺部感染,并且可能与临床上抗菌药物滥用,机体内正常菌群失调存在密切关系^[29,30]。

综上所述,食管癌根治术后并发肺部感染,导致患者正常治疗受到影响,预后效果下降,因此在诊疗过程中,需要根据患者的临床表现、实验室检测结果以及影像学资料等内容,确诊患者是否存在肺部感染,并进一步分析其病原学特征、药敏性,从而有助于选择适当的抗菌药物进行临床治疗。

参考文献(References)

- [1] Patil AS, Gulavani NV, Dharmadhikari NP, et al. Perioperative complications of esophagectomy: Postneoadjuvant treatment versus primary surgery - Our experience and review of literature [J]. Indian J Cancer, 2017, 54(2): 439-441
- [2] Yasuda A, Yasuda T, Kimura Y, et al. A Case of Emergency Resection

- of Esophageal Cancer Which is on the Brink of Perforation after Neoadjuvant Chemotherapy[J]. Gan To Kagaku Ryoho, 2017, 44(12): 1943-1945
- [3] Tai WP, Nie GJ, Chen MJ, et al. Hot food and beverage consumption and the risk of esophageal squamous cell carcinoma: A case-control study in a northwest area in China[J]. Medicine (Baltimore), 2017, 96(50): e9325
- [4] Kumar R, Ghosh SK, Verma AK, et al. p16 Expression as a Surrogate Marker for HPV Infection in Esophageal Squamous Cell Carcinoma can Predict Response to Neo-Adjuvant Chemotherapy[J]. Asian Pac J Cancer Prev, 2015, 16(16): 7161-7165
- [5] Mostafalou N, Yahyapour Y, Sedaghat S, et al. Human papilloma virus infection in non-cancerous versus normal esophageal tissue samples by endoscopy[J]. Caspian J Intern Med, 2015, 6(1): 9-14
- [6] 王鹏,张东,郭学光,等.老年非小细胞肺癌患者肺部感染病原学分布与耐药性分析[J].现代生物医学进展, 2017, 17(32): 6260-6266
Wang Peng, Zhang Dong, Guo Xue-guang, et al. Analysis of Distribution and Drug Resistance Profile of Pathogens isolated from Sputum Samples of Elderly Non-small Cell Lung Cancer Patients Accompanied with Pneumonia [J]. Progress in Modern Biomedicine, 2017, 17(32): 6260-6266
- [7] Wang WL, Wang YC, Lee CT, et al. The impact of human papillomavirus infection on the survival and treatment response of patients with esophageal cancers[J]. J Dig Dis, 2015, 16(5): 256-263
- [8] Han X, Zhao YS, Fang Y, et al. Placement of transnasal drainage catheter and covered esophageal stent for the treatment of perforated esophageal carcinoma with mediastinal abscess [J]. J Surg Oncol, 2016, 114(6): 725-730
- [9] Loeser H, Schallenberg S, von Winterfeld M, et al. High protein and mRNA expression levels of TUBB3 (class III β -tubulin) are associated with aggressive tumor features in esophageal adenocarcinomas[J]. Oncotarget, 2017, 8(70): 115179-115189
- [10] 王亚群,王玲.食管癌患者术后肺部感染的围术期影响因素分析[J].临床麻醉学杂志, 2017, 33(6): 550-553
Wang Ya-qun, Wang Ling. Influence of perioperative factors on postoperative pulmonary infection in patients with esophageal cancer [J]. Journal of Clinical Anesthesiology, 2017, 33(6): 550-553
- [11] Hou N, Ma J, Li W, et al. T-cell immunoglobulin and mucin domain-containing protein-3 and galectin-9 protein expression: Potential prognostic significance in esophageal squamous cell carcinoma for Chinese patients[J]. Oncol Lett, 2017, 14(6): 8007-8013
- [12] 杨增周. 开胸食管癌根治术后患者肺部感染的危险因素及病原学分析[J].新乡医学院学报, 2017, 34(5): 405-408
Yang Zeng-zhou. Risk factors and etiological analysis of pulmonary infection in esophageal carcinoma patients after open esophagectomy [J]. Journal of Xinxiang Medical University, 2017, 34(5): 405-408
- [13] Lin K, Shah J, Ofori E, et al. Dilated Thoracic Esophagus Presenting with Painful Progressive Persistent Dysphagia and Leukocytosis of Unknown Origin[J]. Cureus, 2017, 9(11): e1851
- [14] Ludmir EB, Stephens SJ, Palta M, et al. Human papillomavirus tumor infection in esophageal squamous cell carcinoma [J]. J Gastrointest Oncol, 2015, 6(3): 287-295
- [15] Zhao QT, Zhang XP, Zhang H, et al. Prognostic role of platelet to lymphocyte ratio in esophageal cancer: A meta-analysis [J]. Oncotarget, 2017, 8(67): 112085-112093
- [16] Wang J, Zhang B, Meng J, et al. Analysis of risk factors for post-operative complications and prognostic predictors of disease recurrence following definitive treatment of patients with esophageal cancer from two medical centers in Northwest China [J]. Exp Ther Med, 2017, 14(3): 2584-2594
- [17] Liu G, Yang Z, Li T, et al. Optimization of b-values in diffusion-weighted imaging for esophageal cancer: Measuring the longitudinal length of gross tumor volume and evaluating chemoradiotherapeutic efficacy[J]. J Cancer Res Ther, 2017, 13(5): 748-755
- [18] 张晓勤,雷雨,丛伟.食管癌术后肺部感染患者临床特点及危险因素分析[J].肿瘤预防与治疗, 2015, 28(4): 187-189, 208
Zhang Xiao-qin, Lei Yu, Cong Wei. Study on the Clinical Characteristics of Esophageal Cancer Patients with Pulmonary Infection after Surgery and the Related Risk Factors [J]. Journal of Cancer Control and Treatment, 2015, 28(4): 187-189, 208
- [19] 谢锡浩,林万里,陈颖,等.腔镜食管癌根治术对食管癌患者并发症的影响[J].新医学, 2015, (9): 625-628
Xie Xi-hao, Lin Wan-li, Chen Ying, et al. Effect of endoscopic esophagectomy on postoperative complications in patients with esophageal cancer[J]. New Medicine, 2015, (9): 625-628
- [20] Ye P, Cao JL, Li QY, et al. Mediastinal transposition of the omentum reduces infection severity and pharmacy cost for patients undergoing esophagectomy[J]. J Thorac Dis, 2016, 8(7): 1653-1660
- [21] Yamashita K, Makino T, Miyata H, et al. Postoperative Infectious Complications are Associated with Adverse Oncologic Outcomes in Esophageal Cancer Patients Undergoing Preoperative Chemotherapy [J]. Ann Surg Oncol, 2016, 23(6): 2106-2114
- [22] Liu J, Deng T, Li C, et al. Reconstruction of Hypopharyngeal and Esophageal Defects Using a Gastric Tube after Total Esophagectomy and Pharyngolaryngectomy [J]. ORL J Otorhinolaryngol Relat Spec, 2016, 78(4): 208-215
- [23] Baba Y, Yoshida N, Shigaki H, et al. Prognostic Impact of Postoperative Complications in 502 Patients With Surgically Resected Esophageal Squamous Cell Carcinoma: A Retrospective Single-institution Study[J]. Ann Surg, 2016, 264(2): 305-311
- [24] Rezoagli E, Zanella A, Cressoni M, et al. Pathogenic Link Between Postextubation Pneumonia and Ventilator-Associated Pneumonia: An Experimental Study[J]. Anesth Analg, 2017, 124(4): 1339-1346
- [25] 李静,刘磊,王俊平,等.肺部感染铜绿假单胞菌的临床特点[J].现代生物医学进展, 2015, 15(11): 2119-2122, 2127
Li Jing, Liu Lei, Wang Jun-ping, et al. Clinical Characteristics of Pulmonary Infection with Pseudomonas Aeruginosa [J]. Progress in Modern Biomedicine, 2015, 15(11): 2119-2122, 2127
- [26] Bassetti M, Mayor S. Update on new research in Gram-negative infections European Congress of Clinical Microbiology and Infectious Diseases 2017 (22-25 April, Vienna, Austria) [J]. Future Sci OA, 2017, 4(2): FSO270
- [27] Lai JH, Yang JT, Chern J, et al. Comparative Phosphoproteomics Reveals the Role of AmpC β -lactamase Phosphorylation in the Clinical Imipenem-resistant Strain Acinetobacter baumannii SK17[J]. Mol Cell Proteomics, 2016, 15(1): 12-25

- 2011, 19(10): 906-907
- [7] 林正均, 罗昭强, 金仙勇. 血液透析的不同模式治疗急性肾功能衰竭患者的有效性及对肾功能、电解质的影响[J]. 安徽医药, 2016, 20(2): 316-319
- Lin Zheng-jun, Luo Zhao-jiang, Jin Xian-yong. The effectiveness of different hemodialysis modes in treatment of patients with acute renal failure and their effects on renal function and electrolyte Anhui [J]. Medical and Pharmaceutical Journal, 2016, 20(2): 316-319
- [8] 钟瑜萍, 李海燕, 宫仁豪, 等. 大黄黄芪不同配伍比例对慢性肾衰竭大鼠 24hUPQ、Scr、BUN 及肾脏形态学的影响 [J]. 中药药理与临床, 2016, 32(4): 63-66
- Zhong Yu-ping, Li Hai-yan, Gong Ren-hao, et al. Effects of different compatibilities of Rhubarb and Astragalus on 24 hour urinary protein, serum creatinine, urea nitrogen and renal tissue of rats with chronic renal failure [J]. Pharmacology and Clinics of Chinese Materia Medica, 2016, 32(4): 63-66
- [9] Wang YJ, He LQ, Sun W, et al. Optimized project of traditional Chinese medicine in treating chronic kidney disease stage 3: a multicenter double-blinded randomized controlled trial [J]. J Ethnopharm, 2012, 139(3): 757-764
- [10] Kojima A, Kakizaki S, Hosonuma KI, et al. Interferon treatment for patients with chronic hepatitis C complicated with chronic renal failure receiving hemodialysis [J]. J Gastroenterol Hepatol, 2013, 28(4): 690-699
- [11] 陈肖蓉. 加味防己黄芪汤治疗原发性肾病综合征的临床疗效观察及其对血清 IL-10、TNF- α 的影响[J]. 中国中医药科技, 2016, 0(4): 393-395
- Chen Xiao-rong. Clinical Observation on Curative Effect of Primary Nephrotic Syndrome Treated with Jiawei Fangji Huangqi Tang and Its Effects on Serum IL-10 and TNF- α [J]. Chinese Journal of Traditional Medical Science and Technology, 2016, 0(4): 393-395
- [12] 李毅, 张雪霞, 曹婉维. 黄芪注射液对梗阻性黄疸大鼠缺血再灌注损伤肾组织 HIF-1 α 表达的影响[J]. 中国中医药科技, 2017, 24(1): 24-26
- Li Yi, Zhang Xue-xia, Cao Wan-wei. Effect of Huangqi (Astragalus) Injection on Expression of HIF-1 α in Ischemia - Reperfusion Injury Kidney of Rats with Obstructive Jaundice Rats Chinese [J]. Journal of Traditional Medical Science and Technology, 2017, 24(1): 24-26
- [13] 涂祎璐, 李海燕, 宫仁豪, 等. 大黄与黄芪对慢性肾衰大鼠的肾保护作用及肠道屏障功能的影响[J]. 中国药房, 2017, 28(31): 4354-4358
- Tu Yi-lu, Li Hai-yan, Gong Ren-hao, et al. Effects of Rhei Radix and Astragali Radix on Renal Protection and Intestinal Barrier Function in Rats with Chronic Renal Failure [J]. China Pharmacy, 2017, 28(31): 4354-4358
- [14] 安方玉, 颜春鲁, 刘永琦, 等. 黄芪多糖对镉染毒大鼠肾损伤的保护作用[J]. 中国临床药理学杂志, 2018, 34(1): 49-52
- An Fang-yu, Yan Chun-lu, Liu Yong-qi, et al. Protective effects of Astragalus polysaccharides in renal injury under cadmium in rats [J]. The Chinese Journal of Clinical Pharmacology, 2018, 34(1): 49-52
- [15] 王彦杰, 李巧红, 冯学亮, 等. 常规西医治疗基础上穴位注射黄芪注射液在慢性肾衰竭患者中应用的效果研究[J]. 山西医药杂志, 2017, 46(16): 1918-1921
- Wang Yan-jie, Li Qiao-hong, Feng Xue-liang, et al. Effect of acupoint injection of Huangqi Injection on chronic renal failure patients treated with conventional western medicine [J]. Shanxi Medical Journal, 2017, 46(16): 1918-1921
- [16] 胡娜平, 李会会, 刘美佑, 等. 黄芪多糖和羟基红花黄色素 A 单用及合用对慢性肾病大鼠肾细胞凋亡的影响[J]. 中南药学, 2016, 30(2): 113-117
- Hu Na-ping, Li Hui-hui, Liu Mei-you, et al. Effect of astragalus polysaccharides and hydroxysafflor yellow A used alone or in combination on the apoptosis in rats with chronic kidney disease [J]. Central South Pharmacy, 2016, 30(2): 113-117
- [17] 项红秀. 黄芪地黄汤联合环磷酰胺治疗难治性肾病综合征的疗效及安全性评价[J]. 蚌埠医学院学报, 2017, 42(10): 1365-1367
- Xiang Hong-xiu. The evaluation of clinical efficacy and safety of Huangqi Dihuang decoction combined with cyclophosphamide in the treatment of refractory nephrotic syndrome [J]. Journal of Bengbu Medical College, 2017, 42(10): 1365-1367
- [18] 高匡嫣, 于俊生. 运用防己黄芪汤加减治疗肾性水肿经验[J]. 山东中医杂志, 2017, 36(9): 786-787
- Gao Kuang-yan. Clinical Experience of Yu Jun-sheng in Treating Renal Edema with Modified Fang ji Huang qi Decoction [J]. Shandong Journal of Traditional Chinese Medicine, 2017, 36(9): 786-787
- [19] 侯广建, 李伟, 赵蒙, 等. 黄芪-丹参药对通过改善肾脏血流对自发性高血压大鼠肾脏保护机制的实验研究[J]. 中华中医药学刊, 2018, 36(3): 645-647
- Hou Guang-jian, Li Wei, Zhao Meng, et al. Experimental Study on Protective Mechanism of Combination of Astragalus and Salvia Miltiorrhiza on Hypertensive Renal Damage by Improving Renal Blood Flow [J]. Chinese Archives of Traditional Chinese Medicine, 2018, 36(3): 645-647
- [20] 李承德, 王煜, 曲敬蓉, 等. 黄芪多糖对糖尿病大鼠肾脏 TGF- β 1/Smads 信号通路的影响[J]. 中国药理学通报, 2018, 34(4): 512-516
- Li Cheng-de, Wang Yu, Qu Jing-rong, et al. Effects of astragalus polysaccharide on renal TGF- β 1/Smads signaling pathway in rats with diabetes mellitus [J]. Chinese Pharmacological Bulletin, 2018, 34(4): 512-516

(上接第 3904 页)

- [28] Korayem GB, Eljaaly K, Matthias KR, et al. Oral Vancomycin Monotherapy Versus Combination Therapy in Solid Organ Transplant Recipients with Uncomplicated Clostridium difficile Infection: A Retrospective Cohort Study [J]. Transplant Proc, 2018, 50(1): 137-141
- [29] Kim MW, Greenfield BK, Snyder RE, et al. The association between community-associated Staphylococcus aureus colonization and disease: a meta-analysis [J]. BMC Infect Dis, 2018, 18(1): 86
- [30] Gern BH, Greninger AL, Weissman SJ, et al. Continued in vitro cefazolin susceptibility in methicillin-susceptible Staphylococcus aureus [J]. Ann Clin Microbiol Antimicrob, 2018, 17(1): 5