doi: 10.13241/j.cnki.pmb.2019.23.029

2 种方法在血清 β2- 微球蛋白检测中的效果对比 *

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摘要 目的：探讨散射免疫法和荧光免疫层析法在血清 β2- 微球蛋白中的检测效果对比观察及精确度。**方法：**选取 2016 年 10 月 -2017 年 8 月我院收治的肝肾功能损伤患者 88 例，对患者分别应用散射免疫法以及荧光免疫层析法进行检测。对比两组方法血清 β2- 微球蛋白的检测结果、灵敏度、特异性以及精确度。**结果：**检测结果方面，荧光免疫分析法患者的检测率明显高于散射免疫法，漏检率明显低于散射免疫法（$P<0.05$）；荧光免疫层析法的灵敏度、特异性以及诊断符合率明显高于散射免疫法（$P<0.05$）；各项指标水平方面，患者血清 β2- 微球蛋白、肌酐、尿酸以及尿素等指标的水平明显高于正常水平（$P<0.05$）；精确度方面，荧光免疫层析法批间、批内的精确度明显高于散射免疫法（$P<0.05$）。**结论：**对患者应用荧光免疫层析法检测血清 β2- 微球蛋白，有较高的检测符合率、灵敏度以及准确度，能够满足临床检测过程中的要求，进而有利于患者的诊断和治疗，临床上应当进一步推广应用。

关键词：散射免疫法；荧光免疫层析法；血清 β2- 微球蛋白；检测效果；精确度

中图分类号：R446.6 **文献标识码：**A **文章编号：**1673-6273(2019)23-4524-04

Comparison of two methods for detection of serum β2-microglobulin*

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ABSTRACT Objective: To explore the detection effect and accuracy of scattering immunoassay and fluorescence immunochromatography for detection of serum β2-microglobulin. **Methods:** 88 patients with liver and kidney function injury admitted to our hospital from October 2016 to August 2017 were selected in this study. And the level of serum β2-microglobulin was detected by scattering immunoassay and fluorescence immunochromatography, respectively. The detection results, sensitivity, specificity and accuracy of serum β2-microglobulin were compared between the two methods. **Results:** The detection rate by fluorescence immunochromatography was significantly higher than that of scattering immunoassay, while the missed detection rate was significantly lower than that of the scattering immune method ($P<0.05$). The sensitivity, specificity and diagnostic coincidence rate of fluorescence immunotomography were significantly higher than those of scattering immunotomography ($P<0.05$). The levels of serum β2-microglobulin, creatinine, uric acid and urea of these patients were significantly higher than normal ($P<0.05$). In terms of accuracy, the accuracy of fluorescence immunochromatography between and within batches was significantly higher than that of scattering immunoassay ($P<0.05$). **Conclusion:** The application of fluorescence immunochromatography for detection of serum β2-microglobulin in patients has a higher detection coincidence rate, sensitivity and accuracy, which can meet the requirements of clinical detection process, and is beneficial to the diagnosis and treatment of patients. Therefore, fluorescence immunochromatography should be further popularized in clinical application.

Key words: Scattering immunoassay; Fluorescence immunochromatography; Serumβ 2-microglobulin; Detection; Accuracy

Chinese Library Classification(CLC): R446.6 Document code: A

Article ID: 1673-6273(2019)23-4524-04

前言

血清 β2- 微球蛋白在正常机体内体液中的含量是较少的，产生该蛋白的细胞是各种有核细胞（包括淋巴细胞），该蛋白属于细胞膜上完整的组织相容抗原的一部分，当细胞活动处于旺盛状态时，该蛋白的水平会高于正常水平。造成患者肝病的因素不同，细胞坏死、变形以及炎症细胞浸润程度都是不同的，分泌血清 β2- 微球蛋白的量也有所不同[1]。目前对于血清 β2- 微球蛋白检测的方法主要是散射免疫法、酶联免疫吸附法以及化学发光法等，但是这些方法的检测时间较长、检测过程复杂，并且需要的仪器价格昂贵，进而制约这些检测方法的发展。随着医学检测技术的不断发展，荧光免疫层析法逐渐应用于血清 β2- 微球蛋白的检测中，检测符合率以及精确度较高[2]。所以选取 2016 年 10 月 -2017 年 8 月我院收治的肝肾功能损伤患者 88 例为研究对象，研究散射免疫法和荧光免疫层析法在血清 β2- 微球蛋白中的检测效果对比观察及精确度，现报道如下。

1 资料与方法

* 基金项目：吴阶平医学基金会临床科研专项资助基金（320.6750.17355）

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(收稿日期：2019-05-01 接受日期：2019-05-29)

1.1 一般资料

选取 2016 年 10 月 -2017 年 8 月我院收治的肝肾功能损伤患者 88 例，纳入标准：患者均知情同意本研究；基本生命特征处于正常状态[3]。排除标准：严重的心功能不全以及呼吸功能不全的患者；有严重意识障碍；严重的心脑血管疾病；严重原发性疾病；除肝肾功能异常有其他系统疾病史；免疫功能异常；精神异常不能配合诊断[4]。患者 88 例，男 49 例，女 39 例；年龄 20-76 岁，平均年龄（47.5± 3.9）岁；病程 1-5 年，平均病程（3.2± 1.3）年。

1.2 方法

1.2.1 散射免疫法进行检测 取患者清晨静脉血 5 mL，进行 3000 r/min 的离心处理 10 min，选取血清进行检测[5]。使用西门子医学诊断产品有限公司的 β2- 微球蛋白检测试剂盒，检测时仪器、试剂均经过校准，均为在控状态[6]。按照试剂盒上的操作方法严格应用西门子全自动生化仪上的散射免疫法测定 β2- 微球蛋白的含量。

1.2.2 荧光免疫层析法进行检测 首先抽取患者清晨空腹静脉血 5 mL，以 3000 r/min 的离心速度处理 10 min，选取血清进行检测[7]。应用全自动荧光免疫层析法进行测定，以固定检测线和质控线的条状纤维层析材料为固定相，测试液为流动相，血清 β2- 微球蛋白在流动相的作用下与荧光标记抗体进行结合，进而可以测定 β2- 微球蛋白的含量[8]。

1.3 观察指标

对比两种检测方式的疾病检出率以及灵敏度和特异性，正确率 = 检出例数 / 患者总例数× 100%；对比患者各项指标与正常水平的差异，主要包括血清 β2- 微球蛋白、肌酐、尿酸以及尿素等；对血清 β2- 微球蛋白进行多批次的检测，观察患者进行多批次检测值的差异[9]。

1.4 统计学方法

数据应用 SPSS18.0 进行分析，其中计数进行 x^2（%）检验，计量进行 t 检测（$\bar{x}\pm s$）检验，$P<0.05$ 提示有显著差异。

2 结果

2.1 两种方式疾病检出率的对比结果

检测结果方面，荧光免疫层析法的检测率明显高于散射免疫法，漏检率明显低于散射免疫法（$P<0.05$），具体见表 1。

表 1 两种方式疾病检出率的对比结果（例，%）

Table 1 Comparison of disease detection rates between the two methods[n(%)]

Groups	n	Check out the	Detection rate	The testers	Miss rate
Fluorescence immunochromatography	44	39	88.6%	5	11.3%
Scatter immunity method	44	24	54.5%	20	45.4%
x^2	/	6.892	6.901	5.011	4.881
P	/	<0.05	<0.05	<0.05	<0.05

2.2 两种方式灵敏性、特异性以及诊断符合率的对比

荧光免疫层析法的灵敏度、特异性以及诊断符合率明显高于散射免疫法（$P<0.05$），具体见表 2。

表 2 两种方式灵敏性、特异性以及诊断符合率的对比（例，%）

Table 2 Comparison of sensitivity, specificity and diagnostic coincidence rate between the two methods[n(%)]

Groups	n	Sensitivity	Specificity	Diagnostic coincidence rate
Fluorescence immunochromatography	44	88.9%	81.2%	79.4%
Scatter immunity method	44	47.2%	76.2%	71.2%
x^2	/	2.910	6.781	7.812
P	/	<0.05	<0.05	<0.05

2.3 患者各项指标与正常水平的对比

各项指标水平方面，患者血清 β2- 微球蛋白、肌酐、尿酸以及尿素等指标的水平明显高于正常水平（$P<0.05$），具体见表3。

2.4 两种方式批间、批内精确度均值的对比

精确度方面，荧光免疫层析法批间、批内的精确度明显高于散射免疫法（$P<0.05$），具体见表 4。

3 讨论

β2- 微球蛋白（β2-MG）是一种单链多肽低分子质量蛋白质，相对分子质量约为 11800，它由多种氨基酸残基组成，该种蛋白质在正常机体内的含量较少[10,11]。在人体尿液中更是微乎其微，只有当肾小管重吸收功能降低以及肾小球过滤功能增加时，在患者尿液中的含量会呈现明显增加的趋势，所以测定该种蛋白质的含量有助于在早期发现患者肾功能损伤的症状 [12]。通过本研究结果显示在检测结果方面，荧光免疫层析法的检测率明显高于散射免疫法，漏检率明显低于散射免疫法（$P<0.05$）。β2-MG 属于细胞表面人类淋巴细胞抗原的 β 链的一部分，主要存在的部位是白细胞、淋巴细胞表面、间叶细胞膜、血小板以及上皮细胞膜上，还会存在于脑脊液、血液以及尿液等体液中[13]。

表 3 患者各项指标与正常水平的对比($\bar{x}\pm s$)

Table 3 Comparison of patients' indicators with normal levels($\bar{x}\pm s$)

Groups	n	β2-microglobulin (mg/L)	Creatinine(umol/L)	Uric acid(mmol/L)	The urea(mmol /L)
In patients with	44	2.5± 0.7	55.9± 2.7	308.5± 10.4	4.7± 1.1
The normal level	44	1.8± 0.4	48.6± 0.8	228.1± 10.6	3.7± 0.8
T	/	11.194	13.391	16.125	12.235
P	/	＜0.05	＜0.05	＜0.05	＜0.05

表 4 两种方式批间、批内精确度均值的对比(ng/L,$\bar{x}\pm s$)

Table 4 Comparison of mean values of accuracy between and within batches of the two methods(ng/L,$\bar{x}\pm s$)

Groups	n	Between the group of			In the batch		
		High value	The median	Low	High value	The median	Low
Scatter immunity method	44	5.2± 0.6	3.7± 0.7	1.9± 0.7	5.0± 1.0	3.4± 1.1	2.1± 0.7
Fluorescence immunochromatography	44	3.9± 0.5	2.1± 0.6	1.1± 0.4	3.7± 0.9	1.9± 0.8	1.0± 3.5
T	/	12.138	12.657	11.834	13.056	14.168	12.034
P	/	＜0.05	＜0.05	＜0.05	＜0.05	＜0.05	＜0.05

但是当患者肾近曲小管受损时，机体对 β2-MG 重吸收能力下降，β2-MG 含量增加。尿素和肌酐水平也能判断患者的肾功能，但是该指标的灵敏度较差，不能在早期检测出患者肾功能损伤[14]。通过本研究结果显示在各项指标水平方面，患者 β2-微球蛋白、肌酐、尿酸以及尿素等指标的水平明显高于正常水平(P＜0.05)。

血清 β2- 微球蛋白在机体内的含量基本是恒定的，经过肾脏进行排泄，受到性别、年龄、运动状态等因素的影响所用是较小的，血尿素和肌酐水平难以发现肾功能损伤，易受到饮食以及运动状态的影响，所以血清 β2- 微球蛋白能够明显地反应患者机体肾功能损伤的情况，进而可以为肾功能损伤早期的诊断提供依据[15,16]。应用荧光免疫层析法进行检测，该方式离子的荧光半衰周期较长，在 10-1000us 之间，比普通荧光的时间长 5 个数量级，因为时间的延长，能够消除样品或试剂的非特异性荧光，所以该方式的特异性和灵敏度较高[17,18]。通过本研究结果显示在灵敏度和特异性方面，荧光免疫层析法的灵敏度、特异性以及诊断符合率明显高于散射免疫法(P＜0.05)。

β2-MG 是诊断患者肾近曲小管损伤的一个重要指标，应用散射免疫法进行检测，利用抗原与抗体反应产生浊度，并且其与 β2-MG 的浓度成正比，该方法的平均回收率较高，并且不会对实验人员造成放射性污染，稳定性、精密度和准确性性能良好[19,20]。而应用荧光免疫层析法进行检测有较高的检测符合率，荧光免疫层析法是一种利用荧光免疫层析技术以及双抗体夹心法的检测方式[21]。在进行层析的过程中，进行检测的样本 β2- 微球蛋白会与荧光标记的 β2- 微球蛋白单克隆抗体相结合形成一种复合物，进而移至检测区域，硝酸纤维膜上包被的 β2-微球蛋白单克隆抗体会捕获 β2-MG，在 T 区形成一种沉积的复合物。最后在激发光源的作用下，荧光物质会发射出特定的波长，进而被荧光免疫分析仪所捕获，转化为定量的数值，可以计算出 β2-MG 的浓度，这可以降低携带污染率，提高检测的精确度[22-24]。通过本研究结果显示在精确度方面，荧光免疫层析法批间、批内的精确度明显高于散射免疫法(P＜0.05)。

β2-MG 在体内合成的增多或排泄的减少都会造成患者机体平衡状态的破坏，进而成为疾病的预警[25]。对于一些恶性肿瘤患者来说，β2-MG 水平会明显高出正常水平，这其中的原因主要是：一恶性肿瘤患者体内的癌症细胞能够合成和分泌 β2-MG，进而造成患者血清中的含量明显上升，随着患者病情的逐渐加重，β2-MG 水平逐渐上升[26]。二是患者机体免疫功能的稳定性会受到恶性肿瘤细胞的影响，会启动患者机体的负反馈作用，人体的免疫功能在癌细胞的刺激下会增加 β2-MG 的分泌和释放量。三肿瘤细胞会对患者肾组织造成较大的影响，因为肾脏受到较大的影响，进而造成近曲小管吸收和降解 β2-MG 能力降低，使其含量增加[27]。应用荧光层析法进行检测，能够对样本直接进行加样，不用和散射免疫法一样增加样本的用量，并且取得的效果更好，该方式的线性稀释实验表明血清基质对于检测方法无明显影响，并且溶血样本对本方法的影响较小。因为该方法批内、批间的精确度较高，且方法稳定，足以说明该方式是可靠的，临床上应当进一步研究并应用[28,29]。有相关的研究表明经过长时间的应用荧光免疫层析法发现该方式检测的浓度曲线与标准曲线基本重合，进而可以为以后的分析提供固定的参考，还可以应用仪器的二点法进行分析校正，所以一方面减轻了临床上的工作强度，另一方面提高了方法的检测率[30]。由于本次研究对象的数量有限，检测患者 β2-MG 浓度时存在一定的误差，仍需要进一步研究。

综上所述，对患者应用荧光免疫层析法检测血清 β2- 微球蛋白，有较高的检测符合率、灵敏度以及准确度，能够满足临床检测过程中的要求，进而有利于患者的诊断和治疗，临床上应当进一步推广应用。

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