·临床论著·

肾虚与红细胞免疫和补体溶解免疫复合物功能的关系

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内容提要 本文介绍运用红细胞C_3b受体花环试验和^{125}I标记 BSA 的方法，对 67 例肾虚患者及 43 例健康人进行了检测。结果：肾气虚组(34 例)、肾阴虚组 (11 例)、肾阳虚组 (22 例)及健康人红细胞花环率(%)分别为11.21±0.92、9.23±1.97、12.71±1.51及 21.37±1.12；补体CRA 活性(%)分别为 55.35±5.71、52.05±8.87、47.89±4.36 及 98.71±1.39，肾虚各组与健康人比较 P 值均<0.01，差异有显著性意义。说明肾虚患者存在免疫防御和免疫调节功能障碍。

1981 年Siegel等人根据诸多实验研究提出了"红细胞免疫系统"的概念[1]，认为人类红细胞除了具有呼吸功能外，还具有免疫功能，能通过其C_3b受体识别和储存抗原，清除免疫复合物。1975 年Miller首次报道了当抗原一抗体复合物遭到过量的补体作用时，该复合物可以发生溶解[2]。这种由补体引起的抗原抗体复合物溶解的现象，称为补体溶解免疫复合物活性(CRA)。我们采用红细胞C_3b受体花环试验和^{125}I标记牛血清白蛋白(BSA)体外制备抗原抗体复合物的方法，检测了 67 例肾虚患者和43例健康人的红细胞免疫功能和补体CRA，现报告如下。

临床资料

肾虚患者为我院附属医院和附属省中医院住院患者共67例，根据全国中西医结合虚证与老年病防治学术会议所定的"中医虚证辨证参考标准"[3]。其中慢性肾炎22例，先天性和高血压性心脏病 9 例，先兆流产 18 例，慢性肝炎 3 例，散在病种 15 例。平均年龄 41.55±13.89 岁，男 21 例，女 46 例。其中肾气虚34例，男 8 例，女 26 例；肾阴虚 11 例，男 3 例，女 8 例；肾阳虚22例，男 10 例，女 12 例。住院期间用中药治疗，未服用西药。对照组均选自我院健康男女学生和广州市中心血站健康献血员，男 24 例，女 19 例；平均年龄31.65±8.48 岁，经体检无内脏及各系统疾病。

方 法

一、红细胞C_3b受体花环试验：采用郭峰等报道的方法[4]。

二、补体CRA检测：参考 Schifferli[5]的方法，并根据本实验室条件加以改进。

1.材料：(1)^{125}I 标记 BSA：应用氯胺-T 法，^{125}I-BSA 比活性为 10μCi/μg。(2)兔抗 BSA 血清制备：取BSA 4mg/ml 加福氏完全佐剂，多点皮下注射，琼脂扩散法测凝集效价为 1:32 即可心脏无菌采血。常规法分离兔血清，56°C 30 分钟灭活补体，小瓶分装，−70°C保存。(3)^{125}I-BSA-抗BSA复合物的制备：取浓度为 40μg/ml的^{125}I-BSA 溶液与 1:2 稀释的兔抗 BSA 血清各250μl混匀，37°C水浴60 分钟，4°C过夜，3000rpm 离心 20 分钟，弃上清，沉淀用 pH7.2、0.15M 的 PBS 缓冲液洗一遍，再浮悬于一定体积的 PBS 中。

2.测定方法：未稀释待测血清 90μl加^{125}I-BSA-抗BSA复合物10μl混匀，37°C 水浴 15 分钟后，加冷PBS (pH7.2，0.15M) 2 ml，测cpm 数，3000rpm离心 20 分钟，弃上清，测沉淀 cpm 数。试验组用肾虚患者血清。对照组分自然溶解组(用 56°C30 分钟灭活补体的正常人混

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合血清)和正常溶解组(用20份正常人混合新鲜血清)。以上均用复管。

计算方法：

$$溶解率=\frac{总cpm-沉淀cpm}{总cpm}\times 100\%$$

相对溶解率

$$\frac{检测管溶解率-自然溶解率}{正常溶解率-自然溶解率}\times 100\%$$

结　果

肾虚各组与健康人组红细胞花环率及补体CRA检测结果：见附表。

附表　肾虚各组与健康人红细胞花环率和补体CRA活性比较　($\bar{X}\pm SE$)

组　别	例数	红细胞花环率(%)	补体CRA(%)
健康人	43	21.37±1.12	98.71±1.39
肾气虚	34	11.21±0.92*	55.35±5.71*
肾阴虚	11	9.23±1.97*	52.05±8.87*
肾阳虚	22	12.71±1.51*	47.89±4.36*

*与健康人组对比，$P<0.01$

肾虚各组的红细胞免疫功能均明显低于对照组，差异有显著性意义($P<0.01$)。肾虚各组的补体CRA亦都低于对照组，差异有显著性意义($P<0.01$)。我们还对各组进行了总方差检验，$P<0.001$，但是肾虚各组间两两比较，差别无显著性意义($P>0.05$)。

讨　论

一、现代免疫学认为免疫细胞起源于骨髓多能造血干细胞。中医认为"肾主骨生髓"，可能是从细胞发生学的高度揭示了肾本质与免疫学的密切关系，肾虚患者红细胞免疫功能和补体CRA功能下降，说明肾虚患者"肾主骨生髓"机能不足，可能导致免疫系统功能下降。

二、人类红细胞具有免疫防御功能。每个红细胞的C_3b受体数要比白细胞少得多，但是红细胞总数要比白细胞多400～500倍，所以红细胞与白细胞的总C_3b受体数之比为21：1，循环的免疫复合物在血中与红细胞相遇的机会要比白细胞大500～1 000倍，因此体内清除免疫复合物的主要因素是红细胞而不是白细胞。本组肾虚患者红细胞免疫功能下降，部分地说明了"精气夺则虚"这一中医的基本命题。

三、实验提示免疫和神经内分泌之间存在着完整的调节环路，目前发现离体淋巴细胞可产生ACTH样多肽，认为人体内存在淋巴—肾上腺轴。60年代以来，上海等地学者发现肾虚患者的丘脑—垂体—肾上腺轴、甲状腺轴和性腺轴有不同程度的障碍。结合我们的工作，肾虚患者红细胞免疫功能和补体CRA活性亦同时下降。由于红细胞的生成受到肾脏促红细胞生成素和雄性激素的调节，补体CRA属于免疫自稳的重要部分，所以我们认为肾虚患者丘脑—垂体—肾上腺轴及其它靶腺轴的功能障碍与免疫功能减退有着必然的联系，这方面的研究有待深入。

四、红细胞能参与免疫调节——激活巨噬细胞和粒细胞，使抗体合成增加，血清杀菌和补体活性等增强。补体CRA也是人体自稳功能的一种表现，它能溶解独特型—抗独特型复合物，使机体免疫状态维持在适当水平；一旦补体出现缺损，必将造成整个免疫网络系统紊乱，导致免疫性疾病。肾虚患者红细胞免疫功能和补体CRA功能低下，提示肾虚患者存在着免疫调节功能紊乱。

五、由于条件和时间的限制，本组尚未设立脾虚以及治疗前后的对照组。但本文结果揭示肾虚患者存在着红细胞免疫系统功能减退的现象，是否为虚证共有的现象，尚需进一步验证。

参 考 文 献

1. Siegel I, et al. The red-cell immune system. Lancet 1981; 2:556.
2. Miller GW, et al. A new complement function: solubilization of antibody antigen aggregates. Proc Natl Acad Sci USA 1975; 72:418.
3. 沈自尹整理. 中医虚证辨证参考标准. 中西医结合杂志 1983; 3(2):117.
4. 郭　峰，等. 红细胞免疫功能的初步研究. 中华医学杂志 1982; 62(12):715.
5. Schifferli JA, et al. Complement-mediated solubilization in patients with systemic lupus erythematosus nephritis or vasculitis. Clin Exp Immunol 1981; 46(5):557.

Abstracts of Original Articles

Exploration on Relationship among Kidney Deficiency, Erythrocyte Immune Action and Complex Release Activity of Complement

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Erythrocyte immune action (EIA) and complex release activity of complement (CRA) are two of the progresses in the field of immunology. In order to explore the relationship among the Kidney deficiency of TCM and EIA, CRA, the yeast-ring test of erythrocyte C3b receptor and BSA labelled with ^{125}I test were used to detect 67 Kidney deficiency patients and 43 healthy individuals. The results showed that among the patients the average ratios of yeast-ring of Kidney Qi(气) deficiency (34 cases), Kidney Yin(阴) deficiency (11 cases) and Kidney Yang(阳) deficiency (22 cases) were 11.21±0.92%, 9.23±1.97% and 12.71±1.51% respectively; the average ratios of CRA, 55.35±5.71%, 52.05±8.87% and 47.89±4.36% respectively. However, among the controls, the ratios of yeast-ring and CRA were 21.37±1.12% and 98.71±1.39% respectively ($P<0.01$).

It was concluded that there were some disturbances of immune defence, immune regulation and that of immune-endocrinous network in the patients of Kidney deficiency. It is necessary to study in these respects on the purpose of researches on Kidney nature.

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Clinical Significance of Cardionation Diagnosis for Deficiency of Heart-Lung Qi(气)

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With the ^{125}I-ANP kit and method provided by the central laboratory of the General Hospital of People's Liberation Army, 42 Heart-Lung Qi deficiency patients' plasma cardionation was determined, 82.24±68.85 pg/ml, which was markedly lower than that of healthy subjects ($P<0.01$). That of 18 Yin(阴) deficiency patients was 591.33±202.36 pg/ml which was significantly higher than that of healthy control ($P<0.01$). Among the former cases, 9 of them has taken Shengmai Yin(生脉饮) for 25 days and all of them normalized from 135.22±97.54 to 416.22±277.62 pg/ml. A significant difference could be found before and after the medication ($P<0.05$). The result suggested that the level of plasma cardionation was one of the criteria which could be used for the diagnosis of Heart-Lung Qi deficiency syndrome and the appraisal of its therapeutical effect.

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Characteristic of Cardiac Function and Effect of Shengmai(生脉) Injection on Qi(气) Deficiency and Qi-Yin(气阴) Deficiency in Patients with Coronary Heart Disease

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Deficiency of Qi (DQ) and deficiency of both Qi and Yin (DQY) are most common deficiency syndrome in TCM classification of coronary heart disease (CHD) patients. Comparison of cardiac function between DQ and DQY group showed that Q-ZI in DQY group was significantly longer than that in DQ group ($P<0.01$), PEP/LVET ratio in DQY was significantly higher than that in DQ group ($P<0.05$), and HI in DQY group was much lower than that in DQ group ($P<0.001$). The 3 parameters of heart failure patient in DQY group were markedly different from those in DQ group, but in non-heart failure patients only HI was different between DQY and DQ group. It suggested that in CHD patients the left ventricular function in DQY group is lower than that in DQ group, especially in patients with heart failure. After intravenous administration of Shengmai Injection, the majority of cardiac functional parameters improved in various degrees. However, in DQ group, the dz/dt max and compliance (C) had no evident changes ($P>0.05$), in contrast with DQ group there were some