

URINARY TRACT INFECTION AND BLOOD P₁ ANTIGEN: PRELIMINARY REPORT

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A clinical study was made on the relationship between the blood type P₁ antigen and urinary tract infection (UTI).

The blood type P₁ antigen could be detected in 3 out of 11 healthy Japanese volunteers (27.2%), and in 54% of the UTI patients as a whole. Classified by the type of infection, it could be detected in 3 out of 4 patients with upper UTI (75%) and in 11 out of 22 patients with lower UTI (50%). These incidences were higher than that of healthy volunteers, the difference being statistically significant.

The relationship between the annual frequency of UTI and the positive detection of P₁ antigen was examined. The patients who had been exposed to UTI twice or more a year proved to have a higher detection rate (61%), than the other group of patients, the difference being statistically significant.

Two of the patients with *E. coli* detected as a clinical isolate proved to have the P₁ antigen.

Key words: Urinary tract infection, Blood P₁ antigen

INTRODUCTION

Since the blood type P₁ antigen was detected by Landsteiner in 1927, this blood type has been known to have some connection with certain illnesses such as habitual abortion¹⁾ and parasitic infection¹⁾. In recent years its connection with urinary tract infections (UTI) has also been suggested. We thus made a study on the relation of the blood type P₁ antigen with cases of UTI that we often encounter in our daily practice.

PATIENTS AND METHODS

The study involved 26 patients (4 males and 22 females) who visited the Urological Department of Osaka City University Hospital and its related hospitals. Five healthy

male and 6 healthy female volunteers were also included in the study as a control group. (Table 1)

Table 1. Patients profile

		male	female
control group	(n=11)	5	6
UTI group	(n=26)	4	22
upper UTI	(n=4)	0	4
lower UTI	(n=22)	4	18

UTI: Urinary Tract Infection.

Anti-P₁ serum (Ortho) was used for detection of the blood type P₁ antigen, and P₁ antigen was judged as positive or negative on the basis of positive or negative hemagglutination of red blood cells (Fig. 1).

Erythrocytes washed three times
in phosphate buffered saline

↓
resuspended to a 3% solution
↓
mixed with anti P₁ antiserum
↓
incubated at 17°C for 30min.
↓
hemagglutination was studied by
light microscopy.

Fig. 1. Figure for method of determining blood P₁ antigen

RESULTS

1. The positive rate of P₁ antigen in healthy volunteers (Table 2)

P₁ antigen could be observed in 3 of the 11 volunteers (27.2%).

Table 2. The positive rate of blood P₁ antigen in healthy volunteers and the group of UTI

	Blood P substance		
	positive (+)	negative (-)	
Control group (n=11)	3	8	] *]
UTI group (n=26)	14	12	
upper UTI	3	1	
lower UTI	11	11	

UTI: Urinary Tract Infection
(* : p<0.01
ns : no significance)

2. The positive rate of P₁ antigen in the group of UTI

Table 2 shows the positive rate of P₁ antigen in the 26 patients belonging to the group of UTI. As a whole, it was positive in 54%. If classified by the type of infection, it was positive in 3 out of 4 patients with upper UTI (75%) and in 11 out of 22 patients with lower UTI (50%), and the incidences were significantly higher than that in healthy volunteers (P<0.01).

3. The annual frequency of UTI and the positive rate of P₁ antigen (Table 3).
The relationship between the annual fre-

Table 3. The annual frequency of UTI and the positive rate of blood P₁ antigen

UTI group times/year		Blood P substance		
		positive (+)	negative (-)	
initial	(n=8)	2	6	ns
2	(n=12)	8	4	*
2 ~	(n=6)	3	3	ns
Control group (n=11)		3	8	

(* : vs Control, P<0.001
ns : no significance)

quency of UTI and the positive rate was next examined. The positive rate of P₁ antigen was significantly higher in patients who had suffered from UTI twice or more a year than the other patients (P<0.05).

4. The clinical isolates of bacteria and the positive rate of P₁ antigen (Table 4).

The clinical isolates that could be identified were five kinds. The most common pathogen was *E. coli* which was isolated in 7 patients, followed by *Proteus*, *Klebsiella*, *Serratia* and *Pseudomonas* which were detected in 1 patient each. Among these patients, P₁ antigen was found positive in only 2 of the patients with *E. coli*.

Table 4. The clinical isolates of bacteria and the positive rate of blood P₁ antigen

Percentage of Blood P substance of isolated bacteria

	YASUMOTO ('83)	Roland ('81)
<i>E. coli</i>	2/7 (28.5)	(25)
<i>Proteus</i>	0/1 (0.0)	(42.8)
<i>Klebsiella</i>	0/1 (0.0)	(44.1)
<i>Enterobacter</i>	—	(46.6)
<i>Serratia</i>	0/1 (0.0)	
<i>Pseudomonas</i>	0/1 (0.0)	

DISCUSSION

As mentioned above, the blood type P₁ antigen is supposed to be connected with various illnesses. Its relation with urinary

tract infections, among others, was first described by Lomberg²⁾ in 1981, and later similar results were reported by Roland³⁾. The results of our study seem to support Lomberg's view that people having the blood type P₁ antigen are more vulnerable to urinary tract infections.

On the other hand, there is no definite theory yet about where bacteria begins to adhere to epithelial cells of the urinary tract as the first step in inducing a urinary tract infection. Roland, who noticed the similarity between the glycolipid composition and the blood type P₁ antigen on

the bacterial surface, hypothesized that adhesion of bacteria might begin in that structure.

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和文抄録

尿路感染症と血液型 P₁ 抗原

—予 報—

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血液型 P₁ 抗原と尿路感染症 (UTI) との関係を調べた。対象は正常人11例, UTI 26例で, 後者の内訳は上部尿路感染症 4 例, 下部尿路感染症 22例であった。P₁ 抗原の検出方法は Lomberg (1981) の方法に従った。〈結果〉①正常人における P₁ 抗原検出率は3/11例 (27.2%) であるのに対し, UTI 群では14/26例 (54.0%) と高い値を示し推計学的にも有意

であった。②過去1年間に UTI を来した回数についての検討では, 2 回以上 UTI を来した症例に高い P 抗原検出率を認めた。③臨床分離菌についてみると, *E. coli* を認めた 7 例中 2 例に P 抗原を検出したが, *Proteus*, *Klebsiella*, *Serratia*, *Pseudomonas* を認めた症例はいずれも検出しなかった。