

## SERUM C-REACTIVE PROTEIN LEVELS ARE ASSOCIATED WITH RESIDUAL URGENCY SYMPTOMS IN PATIENTS WITH BENIGN PROSTATIC HYPERPLASIA AFTER MEDICAL TREATMENT

### Hypothesis / aims of study

Urinary urgency is a common and bothersome symptom in patients with benign prostatic hyperplasia (BPH); this symptom may persist even after medical treatment. Chronic inflammation has been reported to be associated with the pathogenesis of BPH and lower urinary tract symptoms (LUTS). We investigate the association between serum C-reactive protein (CRP) level and residual urgency symptoms in BPH patients after medical treatment.

### Study design, materials and methods

A total of 205 men undergoing stable medical treatment for BPH, defined as a total prostate volume of  $\geq 40$  mL, were enrolled. Patients with acute infection or those taking non-steroid anti-inflammatory drugs or aspirin were excluded. Uroflowmetry, postvoid residual volume, transrectal ultrasound parameters, serum prostate specific antigen (PSA), and CRP level were measured. A three-day void diary was recorded to identify the presence of urinary urgency.

### Results

The mean serum CRP level was 0.24 mg/dL (range, 0.01–2.84), and residual urgency was identified in 90 patients (43.9%). Patients with residual urgency were older and had significantly higher serum CRP levels ( $0.39 \pm 0.54$  mg/dL) than those without urgency ( $0.13 \pm 0.20$ ,  $p < 0.001$ , Table 1). On multivariable logistic regression analysis, men with CRP levels of  $\geq 0.3$  mg/dL were more likely to have urgency (odds ratio, 8.22; 95% confidence interval, 3.34–20.3) after adjusting for age, serum PSA level, and antimuscarinic use (Table 2). Patients with serum CRP levels  $\geq 0.30$  mg/dL had more urgency (82.1%) than those with serum CRP levels  $< 0.30$  mg/dL (34.9%).

### Interpretation of results

The significant association between residual urgency and serum CRP level in our study implies that chronic inflammation may play a role in the occurrence of residual urgency symptoms in BPH patients. In addition, serum CRP level may be a diagnostic tool for predicting residual urgency in BPH patients under treatment with a high receiver operating characteristics (ROC) curve area (Figure 1).

### Concluding message

Serum CRP level is significantly associated with residual urgency in BPH patients after medical treatment. Chronic inflammation may play a role in the occurrence of residual urgency in BPH patients.

Table 1 Demographic data

	Total N = 205	Urgency (+) N = 90	Urgency (-) N = 115	P value
Age (years)	73.1 $\pm$ 9.5	75.0 $\pm$ 1.0	71.7 $\pm$ 9.0	0.013
Alcoholism	13 (6.3%)	7 (7.8%)	6 (5.2%)	0.455
Heavy smoker	12 (5.9%)	7 (7.8%)	5 (4.4%)	0.299
Co-morbidities (DM, HTN, CAD)	98 (47.8%)	45 (50.0%)	53 (46.1%)	0.578
Alpha-blocker user	169 (82.4%)	74 (82.2%)	95 (82.6%)	0.942
5ARI user	161 (78.5%)	66 (73.3%)	95 (82.6%)	0.108
Antimuscarinics user	16 (7.8%)	12 (13.3%)	4 (3.5%)	0.009
PSA (ng/mL)	3.9 $\pm$ 3.6	4.5 $\pm$ 4.2	3.5 $\pm$ 3.1	0.112
CRP (mg/dL)	0.24 $\pm$ 0.41	0.39 $\pm$ 0.54	0.13 $\pm$ 0.20	<0.001
TPV (mL)	64.0 $\pm$ 22.1	66.8 $\pm$ 23.3	61.7 $\pm$ 21.0	0.093
TZI	0.48 $\pm$ 0.12	0.48 $\pm$ 0.11	0.46 $\pm$ 0.12	0.233
Q <sub>max</sub> (mL/s)	12.3 $\pm$ 6.3	12.8 $\pm$ 6.5	12.5 $\pm$ 6.3	0.751
Voided volume (mL)	22.6.0 $\pm$ 121.7	216.4 $\pm$ 108.8	240.8 $\pm$ 142.6	0.202
PVR (mL)	70.0 $\pm$ 71.5	78.3 $\pm$ 76.2	64.5 $\pm$ 60.3	0.152

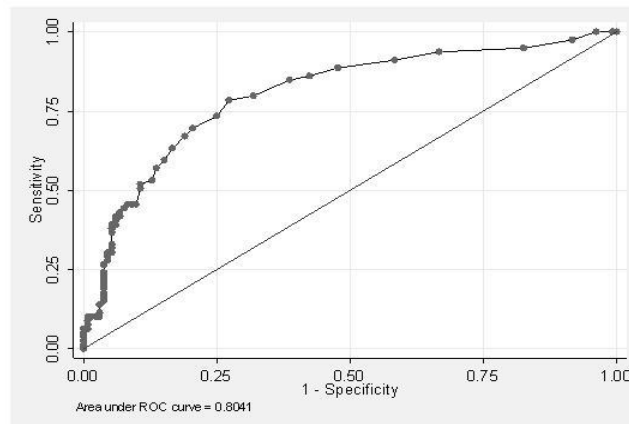
DM: diabetes mellitus; HTN: hypertension; CAD: coronary artery disease; 5ARI: 5 alpha-reductase inhibitor; PSA: prostate specific antigen; CRP: C-reactive protein; TPV: total prostate volume; TZI: transition zone index; Q<sub>max</sub>: maximum flow rate; PVR: postvoid residual

Table 2 Logistic regression for risk of urgency after adjusting age and serum PSA

	Total patients (N = 205)			Non-antimuscarinics users (N = 189)		
	OR	95% CI	P value	OR	95% CI	P value
CRP $\geq 0.30$ mg/dL	7.64	3.13–18.6	<0.001	8.04	3.25–19.9	<0.001
CRP Quartile Q1 (referent)	1.00			1.00		

Q2	2.00	0.81–4.93	0.130	2.53	0.99–6.45	0.053
Q3	4.29	1.97–10.7	<0.001	4.44	1.79–10.9	0.001
Q4	11.4	4.50–28.8	<0.001	12.4	4.69–32.9	<0.001
Trend test			<0.001			<0.001

Figure 1 ROC curve for predicting urgency in benign prostatic hyperplasia patients on the basis of serum CRP level. The area under the ROC curve using serum CRP level for predicting residual urgency was 0.80 (CI, 0.70–0.89)



<b>Specify source of funding or grant</b>	<b>Nil</b>
<b>Is this a clinical trial?</b>	<b>No</b>
<b>What were the subjects in the study?</b>	<b>HUMAN</b>
<b>Was this study approved by an ethics committee?</b>	<b>Yes</b>
<b>Specify Name of Ethics Committee</b>	<b>Research Ethics Committee of Buddhist Tzu Chi General Hospital</b>
<b>Was the Declaration of Helsinki followed?</b>	<b>Yes</b>
<b>Was informed consent obtained from the patients?</b>	<b>Yes</b>