

## SERUM C-REACTIVE PROTEIN IS ASSOCIATED WITH STORAGE BUT NOT WITH EMPTY SYMPTOMS IN MEN WITH LOWER URINARY TRACT SYMPTOMS

### Hypothesis / aims of study

Chronic prostatic Inflammation had been hypothesized to be associated with the pathogenesis of benign prostatic hyperplasia (BPH). However, the association between histological prostatic inflammation and lower urinary tract symptoms (LUTS) were relatively weak. Serum C-reactive protein (CRP) level is a nonspecific biomarker of systemic inflammation, but there were few reports discussing the association between serum CRP levels and BPH/LUTS. This study investigated the association between serum CRP and storage or empty scores of the International Prostate Symptom Score (IPSS) in men with LUTS.

### Study design, materials and methods

We prospectively enrolled 446 consecutive male patients with LUTS. The LUTS were assessed by IPSS, which was further categorized as storage (IPSS-S) and empty (IPSS-E) subscore. The prostate volume was estimated by transrectal ultrasound of prostate (TRUS-P). Serum prostate specific antigen (PSA), serum C-reactive protein (CRP), voided volume, peak uroflow rate (Qmax) and postvoid residual (PVR) were also recorded. These objective findings of symptoms, prostate and uroflow measurements and serum level of CRP were analyzed.

### Results

The mean patient age was 65.6 years (range 37 to 90). The mean CRP levels were significantly higher in patients with total IPSS  $\geq 20$  ( $0.66 \pm 1.36$ ) than those with IPSS 8-19 ( $0.32 \pm 0.68$ ,  $p=0.012$ ) or IPSS  $< 8$  ( $0.34 \pm 0.68$ ,  $p=0.03$ ). Mean serum CRP was positively associated with age (Pearson 0.190,  $p=0.000$ ) (Fig.1), total IPSS ( $p=0.004$ ), IPSS-S ( $p<0.001$ ) but not IPSS-E ( $p=0.250$ ). Serum CRP level was also negatively associated with voided volume ( $p<0.001$ ) and Qmax ( $p=0.005$ ). However, there was no significant association between serum CRP and PSA ( $p=0.163$ ), total prostate volume ( $p=0.379$ ), or PVR ( $p=0.279$ ). (Table 1) Among 129 patients with LUTS, the serum CRP was significantly decreased after medical treatment for 3 months ( $p=0.037$ ). (Table 2)

### Interpretation of results

Serum CRP levels increased with age, associated with higher total IPSS, storage IPSS, small voided volume and lower Qmax. These findings suggest chronic inflammation might be a causing factor for the storage symptoms in the elderly. This finding is compatible with previous epidemiological study that a higher CRP levels can be found in the elderly, which implies that chronic inflammation might contribute to increased LUTS. However, the CRP was not associated with PSA, total prostate volume and empty IPSS, indicating that elevated serum CRP in men with LUTS is not associated with prostatic enlargement or bladder outlet obstruction.

### Concluding message

Based on these findings, the elevated serum CRP in men with LUTS should be attributed to the bladder dysfunction and storage failure not bladder outlet obstruction.

Table 1. The correlation between serum CRP and prostate and urflow parameters

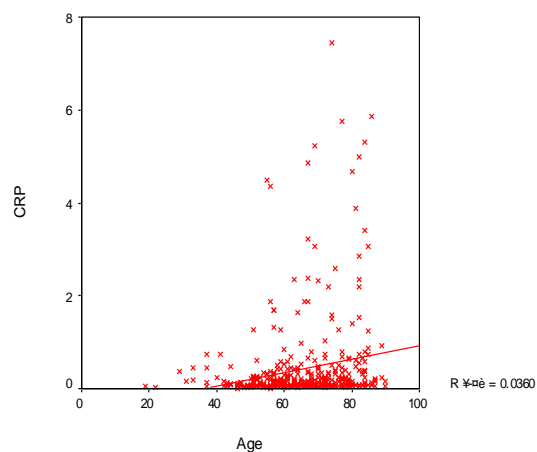
	N	mean $\pm$ SD	Pearson	P-value
CRP	446	0.42 $\pm$ 0.92	1.000	
TPV	440	42.9 $\pm$ 26.2	-0.043	0.379
TZI	438	0.33 $\pm$ 0.13	-0.047	0.332
Qmax	430	12.2 $\pm$ 7.00	-0.136	0.005
Volume	429	225.2 $\pm$ 156.4	-0.173	0.000
PVR	439	45.7 $\pm$ 55.2	0.052	0.279

Table 2. The serum CRP and other parameters at baseline and 3 months after medical treatment for male LUTS

	Baseline	3 month	P-value
IPSS-Total	14.58 $\pm$ 6.41	8.05 $\pm$ 5.22	0.000
IPSS-E	8.81 $\pm$ 5.33	4.27 $\pm$ 4.28	0.000
IPSS-S	5.78 $\pm$ 3.39	3.78 $\pm$ 2.11	0.000
Qmax	10.68 $\pm$ 5.77	13.82 $\pm$ 6.06	0.000
PVR	60.23 $\pm$ 65.45	54.12 $\pm$ 62.48	0.295
Volume	219.83 $\pm$ 143.78	284.20 $\pm$ 148.14	0.000
TPV	48.22 $\pm$ 25.81	47.04 $\pm$ 25.59	0.181
TZI	0.36 $\pm$ 0.12	0.36 $\pm$ 0.12	0.691
PSA	4.41 $\pm$ 5.11	3.54 $\pm$ 4.53	0.000
CRP	0.44 $\pm$ 0.97	0.24 $\pm$ 0.41	0.037

(N=129)

Fig.1. Positive correlation between serum CRP levels and age.



References

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<i>Is this a clinical trial?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	Yes
<i>Specify Name of Ethics Committee</i>	IRB of Buddhist Tzu-Chi Hospital
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	Yes