Elevated levels of CRP are associated with increased long term risk for chronic kidney disease

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OBJECTIVES

There is an overlap between the risk factors for cardiovascular disease and CKD. Elevated C-reactive protein (CRP) levels are associated with increased risk of future CV events, however the role of CRP in predicting the long-term risk for CKD is not well established.

AIM

To examine the role of CRP in predicting the long term risk for developing kidney injury in healthy subjects without an apparent kidney disease.

METHODS

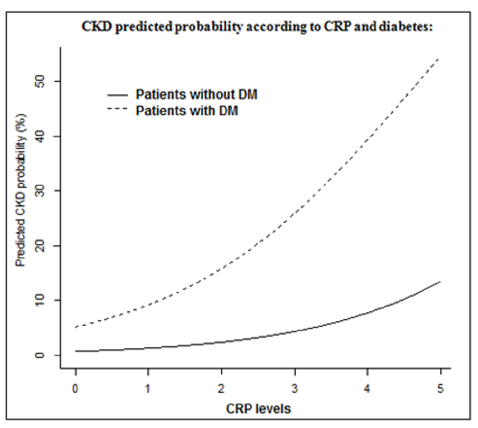
We conducted a retrospective analysis on a prospectively collected data from a large screening center in Israel. All participants who had a follow up interval of more than 5 years, and presented with an estimated glomerular filtration rate (eGFR) above 60 ml/min/1.73 m^2 at baseline were included. High sensitive mean CRP levels of all visits were calculated for each subject. Two groups of CRP levels were defined as low and high (below and above 1mg/dl respectively). Risk for CKD at the end of follow up (defined as eGFR<60 ml\min) was assessed in relation to mean CRP levels. In addition, the confounding effects of other predictors of CKD as age, gender, hypertension (HTN), diabetes mellitus (DM), total cholesterol, HDL cholesterol, BMI and smoking were examined in a multivariate analysis using multiple logistic regressions. In order to better understand how CRP affects CKD we applied an additional logistic regression model treating CRP as a continuous variable.

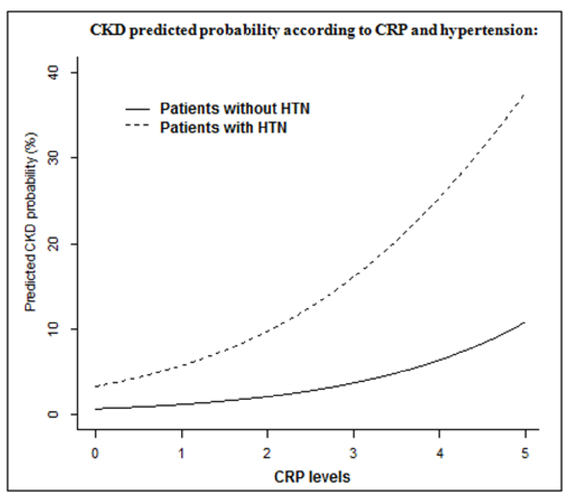
Baseline characteristics according to CRP groups:

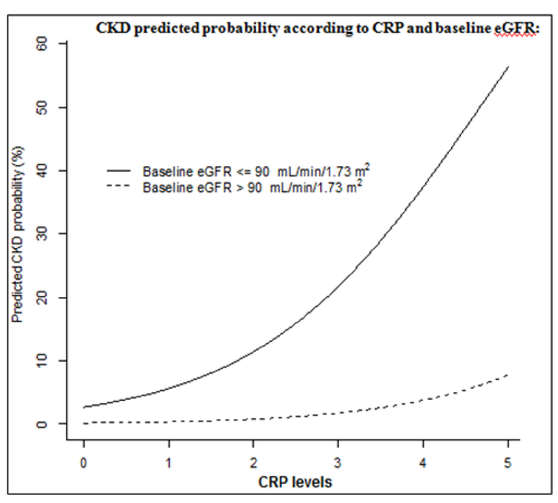
Baseline characteristic	0<CRP<1 mg/L (N=4235)	CRP>1 mg/L (N=110)	P value
Follow up time (years)	7.6±2	7.2±1.9	0.038
Age (mean, years)	43.5±8.8	42±9.3	NS
Gender (Male, percentage)	74.1	63.4	0.018
Baseline eGFR (mean)	100±13.6	103±13.6	0.012
Diabetes mellitus (percentage)	2.2	1.8	NS
Hypertension (percentage)	4.4	7	NS
Total cholesterol (mg/dl, mean)	199.8±35.8	205.7±38.4	NS
HDL cholesterol (mg/dl, mean)	49.6±12.5	48.4±13.8	NS
BMI(kg/m^2, mean)	26.2±4.2	28.9±6.1	<0.001
Smoking (percentage)	12.4	16.4	NS

Odds ratios for chronic kidney disease according to CRP groups:

Type of adjustment model	0<CRP<1 mg/dl*	CRP>1 mg/dl
Crude	1	4.2 (95% CI 1.5-12)
Age-gender	1	5.28 (95% CI 1.71-16.26)
Multivariable	1	5.54 (95% CI 1.81-17)







RESULTS

Out of 4,345 patients, 42 (1%) developed CKD in a mean follow up of 7.6 ±2 years. Subjects characteristics are presented in Table 1.

Elevated levels of CRP were associated with greater risk for CKD (crude OR 4.2, 95% CI 1.5-12.0) (Table 2). The OR for the association of CRP with CKD when controlling for age and gender simultaneously was 5.28 (95% CI 1.71-16.26). In a multivariate analysis using multiple logistic regressions for the following variables: age, gender, HTN, DM, total cholesterol, HDL cholesterol, BMI and smoking, elevated CRP levels remained significantly associated with a greater risk for CKD (OR 5.54, 95% CI 1.81-17.0).

In addition, when applying logistic regression models treating CRP as a continuous variable, it appears that for patients with DM, HTN or for those presenting with eGFR<90ml\min\1.73 m^2, the predictive role of CRP for CKD is highly significant (Figures 1-3).

CONCLUSIONS

- In this large-scaled longitudinal study, CRP in subjects without substantial kidney disease was independently associated with increased long-term risk for CKD.
- The predictive role of CRP might is enhanced in patients with DM, HTN and in patients presenting with eGFR<90ml\min\1.73 m^2 .

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H) Clinical Nephrology, CKD. H1) Lab methods, progression & risk factors for CKD 1-5, nutrition in CKD, renal diseases (except GNs and cystic diseases).
Ilan Krause
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