

# DETERMINANTS OF INCREASED ARTERIAL STIFFNESS IN CHRONIC KIDNEY DISEASE PATIENTS

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## OBJECTIVES

- ✓ Cardiovascular disease is the most common cause of death among Chronic kidney disease (CKD) patients.
- ✓ CKD per se represents a major risk factor for progressive atherosclerotic vascular disease.
- ✓ Besides the increased prevalence of classical risk factors in CKD patients, inflammation, oxidative stress and impaired mineral and hormonal metabolism have been implicated in increased atherosclerotic risk.

**Aim** of the study was to determine predictors of increased arterial stiffness in non-dialysis CKD patients.

## PATIENTS - METHODS

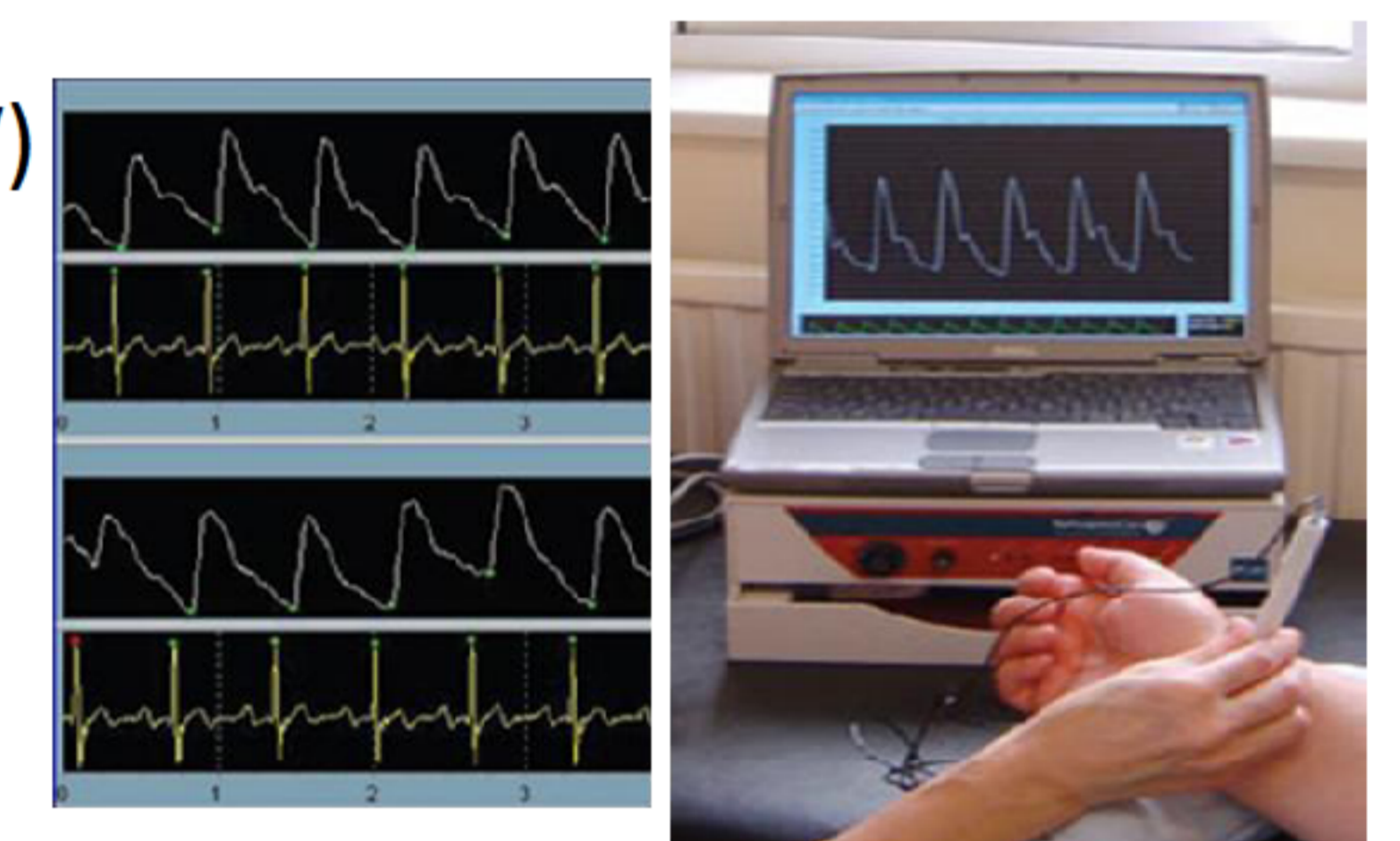
### PATIENTS

- 80 consecutive patients** with previously diagnosed CKD of stages 2-5
- ✓ Mean age 61 years, 59% males
- ✓ Mean estimated GFR 45 ml/min/1.73 m<sup>2</sup> (eGFR-MDRD)
- ✓ Median 24h urine protein content 445 mg
- ✓ 11 patients (14%) had known cardiovascular disease (CVD)

### METHODS

- **Bone mineral disease markers** [parathyroid hormone (PTH), serum calcium and phosphate]
- **Inflammatory markers** [CRP, Interleukin-6 (IL-6), Fibrinogen, TNFa]
- **Carotid femoral pulse wave velocity (PWV)**  
**Central augmentation index (AIx)**

*Sphygmocor System,  
Atcor Medical*



## RESULTS

In patients with eGFR <60 vs ≥60 ml/min/1.73 m<sup>2</sup> no differences in age, gender, risk factors and medications used were observed

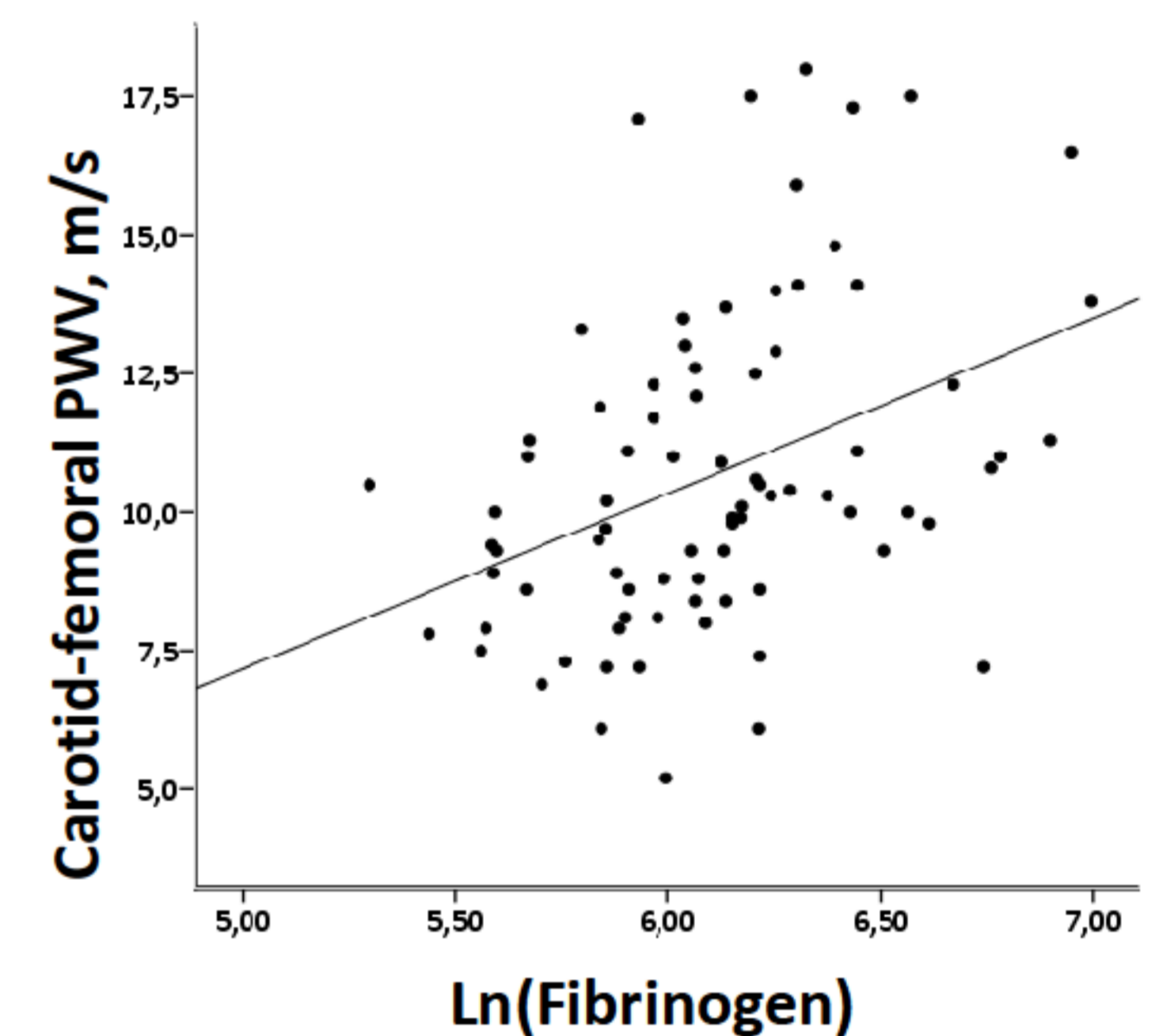
	eGFR ≥ 60 ml/min/1.73m <sup>2</sup> (n=25)	eGFR < 60 ml/min/1.73m <sup>2</sup> (n=55)	P value
Body mass index, kg/m <sup>2</sup>	28.9±4.5	26.6±4.4	<b>0.039</b>
Systolic BP, mmHg	144±13	145±19	0.687
Diastolic BP, mmHg	84±9	80±12	0.136
Hemoglobin, g/dl	14.2±1.4	13.1±1.6	<b>0.005</b>
Glucose, mg/dl	104 (73, 273)	103 (73, 208)	0.868
Uric acid, mg/dl	5.4±1.7	7.6±1.6	<b>&lt;0.001</b>
Urine protein, mg	150 (45, 8280)	520 (70, 6120)	<b>&lt;0.001</b>
Total cholesterol, mg/dl	226±56	218±51	0.535
Triglycerides, mg/dl	125 (47, 474)	154 (39, 422)	0.127
HDL-cholesterol, mg/dl	53±12	52±12	0.651
Calcium, mg/dl	9.4±0.3	9.4±0.5	0.478
Phosphate, mg/dl	3.1±0.6	3.5±0.7	<b>0.030</b>
CaXPO <sup>4</sup> product	29.3±5.8	32.9±6.6	<b>0.020</b>
Parathormone, pg/ml	59 (28, 173)	109 (18, 662)	<b>0.001</b>
C-reactive protein, mg/l	3 (1, 15)	3 (1, 14)	0.658
IL-6, pg/ml	2.17 (0.80, 4.85)	3.03 (1.19, 12.40)	<b>0.011</b>
TNFa, pg/ml	1.37 (0.71, 4.10)	2.26 (0.88, 7.50)	<b>&lt;0.001</b>
Fibrinogen, mg/dl	377 (230, 990)	480 (200, 1092)	<b>0.003</b>
<b>Augmentation Index, %</b>	<b>24.7±7.9</b>	<b>25.5±9.7</b>	0.733
<b>Carotid-femoral PWV, m/s</b>	<b>9.3 (7.2, 18.0)</b>	<b>10.6 (5.2, 17.5)</b>	<b>0.021</b>

### Association analysis

#### ➤ Carotid femoral PWV

Independent predictors of increased PWV (R<sup>2</sup> 0.42, p<0.001) were

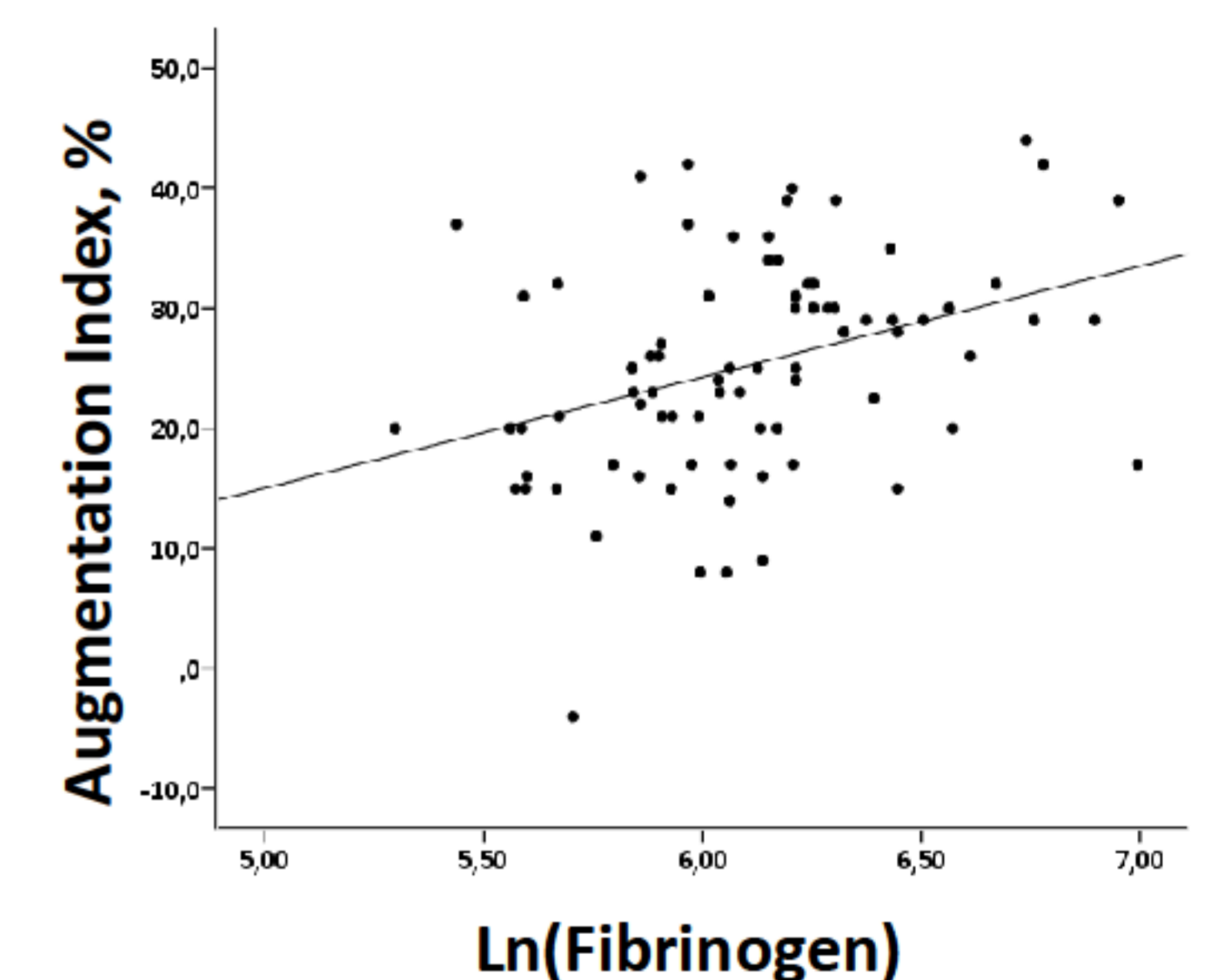
- ✓ Age (B 0.08, p=0.001)
- ✓ Diabetes (B 1.93, p=0.002)
- ✓ Known CVD (B 1.75, p=0.024)
- ✓ Ln(Fibrinogen) (B 1.66, p=0.036)



#### ➤ Augmentation index (AIx)

Independent predictors of increased AIx (R<sup>2</sup> 0.25, p<0.001) were

- ✓ Ln(Fibrinogen) (B 7.55, p=0.005)
- ✓ Systolic BP (B 0.15, p=0.007)
- ✓ Female gender (B 4.39, p=0.021)



## CONCLUSIONS

### In our population of non-dialysis CKD patients

- Higher PWV (but not AIx) was associated with increasing severity of CKD
- Arterial stiffness indices were dependent mainly
  - ✓ on classical risk factors (age, diabetes, increasing blood pressure) and inflammation (fibrinogen levels)
  - ✓ rather than renal dysfunction per se or uremic related risk factors

