

# THE BASCH STUDY (BELGRADE AACHEN STUDY ON CALCIFICATION IN HEMODIALYSIS PATIENTS): 10-YEAR SURVIVAL DATA

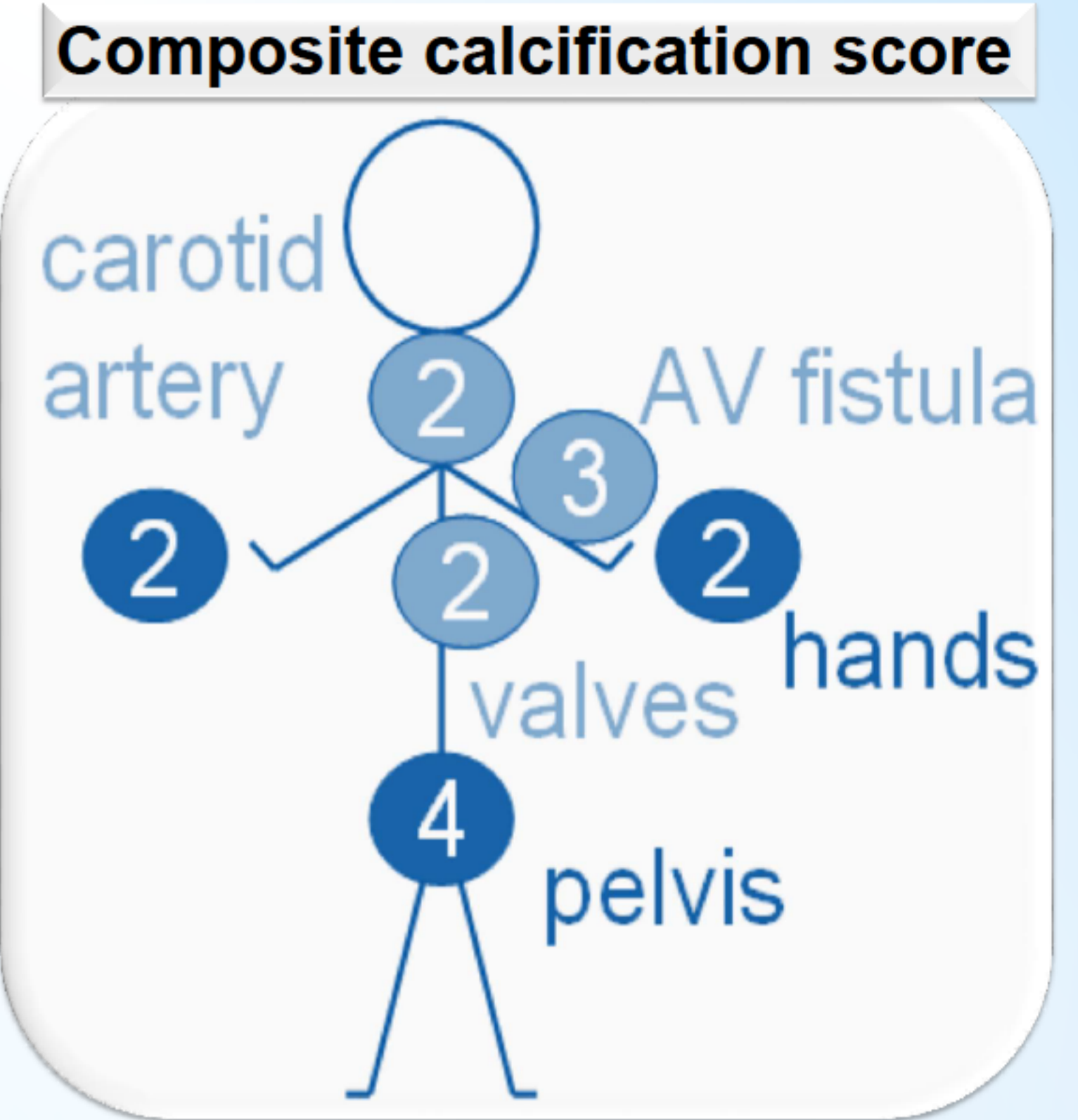
Nada Dimkovic,<sup>\*1</sup> Georg Schlieper,<sup>2</sup> Zivka Djuric,<sup>1</sup> Marcus Ketteler,<sup>3</sup> Tanja Damjanovic,<sup>1</sup> Aleksandar Jankovic,<sup>1</sup> Petar Djuric,<sup>1</sup> Natasa Markovic,<sup>1</sup> Juergen Floege<sup>2</sup>

<sup>\*</sup>School of Medicine, University of Belgrade, <sup>1</sup>Zvezdara University Medical Center, <sup>2</sup>Department of Nephrology and Clinical Immunology, RWTH Aachen University, <sup>3</sup>Klinikum Coburg GmbH, Germany

**INTRODUCTION AND AIMS:** Reports on CVC differ between reference center but can be present in up to 70% of non-diabetic patients. Long-term survival in patients with CVC is rarely described in literature and therefore Belgrade Aachen Study on Calcification in Hemodialysis patients (BASCH study) was aimed to follow the long-term survival of dialysis patients according to the presence of comprehensive cardiovascular calcifications (composite calcification score).

**METHODS:** We prospectively analyzed 220 hemodialysis patients from the Zvezdara University Medical Centre, Belgrade, Serbia. All chronic hemodialysis patients were eligible to enter the study if they agreed to participate and had a two-dimensional X-ray of the vascular system and ultrasound of carotid artery and heart. They were followed from 2003 to 2013, mean 63±37 months.

**RESULTS:** 100 CV deaths occurred and data were compared between survivors and deceased patients.



**Table 1. General data and history of survivors and deceased patients**

|                       | CV deaths (100 )<br>No, % | Alive (120 )<br>No, % | P                |
|-----------------------|---------------------------|-----------------------|------------------|
| Gender M/F,           | 54 /46 (54/ 46)           | 64/ 56 (53/ 47)       | ns               |
| <b>AGE, years</b>     | <b>63.42 ± 9.8</b>        | <b>55.08 ± 10.42</b>  | <b>p = 0.000</b> |
| HD Vintage, y         | 4 ± 6                     | 6 ± 5                 | ns               |
| <b>Hypertension +</b> | <b>97 (44)</b>            | <b>93 (42)</b>        | <b>p = 0.009</b> |
| Diabetes +            | 11 (5)                    | 15 (7)                | ns               |
| CVD, family data      | 17 (8)                    | 27 (12)               | ns               |
| Smoking +             | 29 (13)                   | 36 (16)               | ns               |

**Table 2. Clinical data on survivors and deceased patients**

|                           | CV Deaths (100 )<br>No, % | Alive (120)<br>No, % | P                |
|---------------------------|---------------------------|----------------------|------------------|
| BMI, kg/m <sup>2</sup>    | 23.46 ± 4.19              | 23.44 ± 3.39         | NS               |
| MAP, mmHg                 | 102.98 ± 14.77            | 100.88 ± 18.22       | NS               |
| <b>HD, hours/week</b>     | <b>12.02 ± 1.44</b>       | <b>12.55 ± 1.22</b>  | <b>p = 0.004</b> |
| <b>Kt/V</b>               | <b>1.24 ± 0.15</b>        | <b>1.31 ± 0.20</b>   | <b>p = 0.006</b> |
| HBV positive              | 8 (4)                     | 13 (6)               | NS               |
| HCV positive              | 23 (11)                   | 42 (19)              | NS               |
| <b>Composite VC score</b> | <b>5 ± 7</b>              | <b>3 ± 5</b>         | <b>p = 0.000</b> |
| <b>Adragao score</b>      | <b>2 ± 6</b>              | <b>1 ± 3</b>         | <b>p = 0.003</b> |
| <b>PWV, m/s</b>           | <b>10.2 ± 1.89</b>        | <b>9.26 ± 2.21</b>   | <b>p = 0.002</b> |

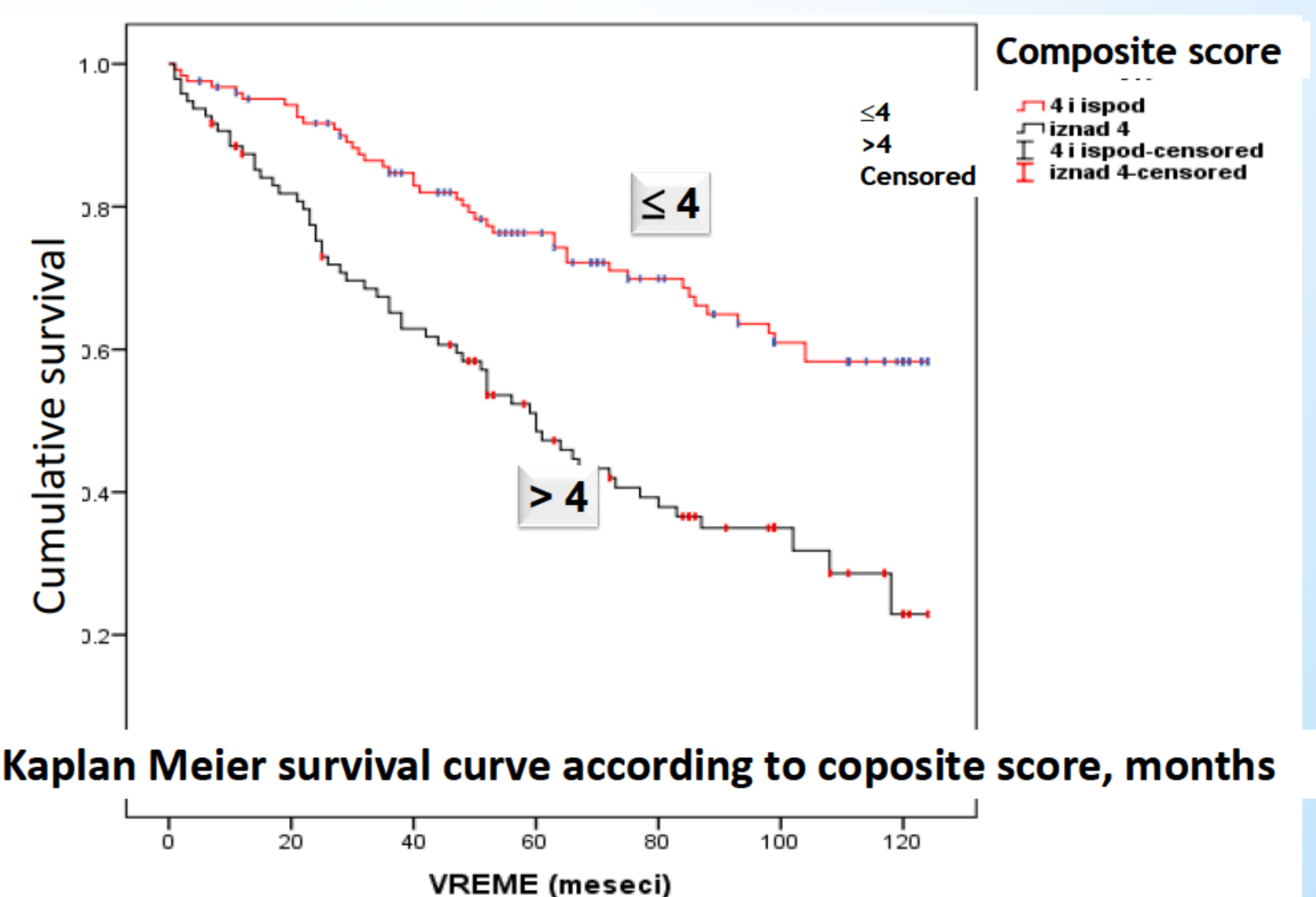
**Table 3. Laboratory data on survivors and deceased patients**

|                           | CV Deaths (100 )<br>No, % | Alive (120 )<br>No, % | P                |
|---------------------------|---------------------------|-----------------------|------------------|
| <b>CRP, mg/L</b>          | <b>3.99 ± 10.05</b>       | <b>2.88 ± 7.10</b>    | <b>p = 0.011</b> |
| <b>Fetuin A, g/L</b>      | <b>0.51 ± 0.13</b>        | <b>0.58 ± 0.14</b>    | <b>p = 0.000</b> |
| Osteoprotegerin, pmol/L   | 11.68 ± 9.71              | 10.67 ± 6.69          | ns               |
| uc MGP, nmol/L            | 197.29 ± 139.32           | 208.43 ± 124.21       | ns               |
| S-Calcium, mmol/L         | 2.30 ± 0.17               | 2.29 ± 0.19           | ns               |
| S-P, mmol/L               | 1.59 ± 0.41               | 1.63 ± 0.42           | ns               |
| iPTH, pg/ml               | 198.0 ± 351.0             | 169.0 ± 365.0         | ns               |
| S-Protein, g/L            | 67.3 ± 4.58               | 67.19 ± 5.39          | ns               |
| Hemoglobin, g/dL          | 9.22 ± 1.55               | 9.57 ± 1.52           | ns               |
| HCO <sub>3</sub> , mmol/L | 21.14 ± 2.65              | 21.31 ± 2.73          | ns               |
| Cholest. , mmol/L         | 5.21 ± 1.29               | 5.10 ± 1.10           | ns               |
| TG, mmol/L                | 2.0 ± 1.25                | 2.0 ± 1.41            | ns               |
| Dial. Ca, mmol/L          | 1.59 ± 0.20               | 1.61 ± 0.20           | ns               |

**Table 4. Predictors of cardiovascular mortality**

| PREDICTOR                 | HR           | Confidence interval  | P            |
|---------------------------|--------------|----------------------|--------------|
| Age                       | 22.61        | 8.012 – 63.821       | 0.000        |
| Family data about CVD     | 8.289        | 1.929 – 35.622       | 0.040        |
| HEPATITIS C               | 3.397        | 1.219 – 9.465        | 0.019        |
| BMI                       | 1.178        | 1.029-1.356          | 0.018        |
| <b>COMPOSITE SCORE VC</b> | <b>2.279</b> | <b>1.490 – 3.484</b> | <b>0.000</b> |
| <b>PWV</b>                | <b>1.490</b> | <b>1.217 -1.824</b>  | <b>0.000</b> |
| <b>TRIGLYCERIDIES</b>     | <b>1.379</b> | <b>1.063 - 1.787</b> | <b>0.015</b> |
| iPTH                      | 1.001        | 1.000-1.001          | 0.018        |

ROC Curve: cut-off: 4, Sensitivity 69.2 % , Specificity 60.0%, AUC: 0.662 (0.59 - 0.734) OR = 3.228 (1.852 - 5.628) p = 0.000; RR = 1.91 (1.40 – 2.61 )



**CONCLUSION:** 10-year survival of hemodialysis patients is age dependent. Composite score of vascular calcification and pulse wave velocity were significant predictors of patient survival. Decreased BMI and hepatitis C positivity (probably infection-related inflammation) are also risk factors to survival while the role of calcification inhibitors (Fetuin A, ucMGP and osteoprotegerin) need further analysis