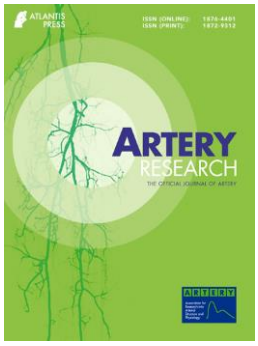

Artery Research

ISSN (Online): 1876-4401 **ISSN (Print): 1872-9312**
Journal Home Page: https://www.atlantis-press.com/journals/artres

1.3: PROGNOSTIC VALUE OF CAROTID-FEMORAL PULSE WAVE VELOCITY FOR CARDIOVASCULAR EVENTS: AN IPD META-ANALYSIS OF PROSPECTIVE OBSERVATIONAL DATA FROM 14 STUDIES INCLUDING 16,358 SUBJECTS

Y. Ben-Shlomo, M. Spears, C. Boustred, M. May, S. Anderson, P. Boutouyrie, J. Cameron, C.H. Chen, J.R. Cockcroft, K. Cruickshank, S.J. Hwang, E. Lakatta, S. Laurent, J. Maldonado, C.M. McEniery, G. Mitchell, S. Najjar, A. Newman, M. Ohishi, B. Pannier, T.

To cite this article: Y. Ben-Shlomo, M. Spears, C. Boustred, M. May, S. Anderson, P. Boutouyrie, J. Cameron, C.H. Chen, J.R. Cockcroft, K. Cruickshank, S.J. Hwang, E. Lakatta, S. Laurent, J. Maldonado, C.M. McEniery, G. Mitchell, S. Najjar, A. Newman, M. Ohishi, B. Pannier, T. (2011) 1.3: PROGNOSTIC VALUE OF CAROTID-FEMORAL PULSE WAVE VELOCITY FOR CARDIOVASCULAR EVENTS: AN IPD META-ANALYSIS OF PROSPECTIVE OBSERVATIONAL DATA FROM 14 STUDIES INCLUDING 16,358 SUBJECTS, Artery Research 5:4, 138–139, DOI: https://doi.org/10.1016/j.artres.2011.10.209

To link to this article: https://doi.org/10.1016/j.artres.2011.10.209

Published online: 14 December 2019

Artery Research (2011) 5, 138–148

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/artres

Oral Presentation Abstracts

Oral Session 1
Free Oral Communications
In association with 'North American Artery'

1.1
PROGNOSTIC VALUE OF COMBINED ASSESSMENT OF AORTIC STIFFNESS AND CALCIFICATION IN DIALYSIS PATIENTS: OUTCOME DATA OF THE CALCIFICATION OUTCOME IN RENAL DISEASE (CORD) STUDY

F. Verbeke [1], W. Van Biesen [1], E. Honkanen [2], B. Wikström [3], P. B. Jensen [4], J. M. Krzesinski [5], M. Rasmussen [6], R. Vanholder [1], P. L. Rensma [7]
[1]*Renal Unit, University Hospital Gent, Gent, Belgium*
[2]*Division of Nephrology, Helsinki University Central Hospital, Helsinki, Finland*
[3]*Department of Medicine, Renal Section, Uppsala University Hospital, Uppsala, Uppsala, Sweden*
[4]*Department of Nephrology, Odense University Hospital, Odense, Denmark*
[5]*Department of Nephrology, Liege University Hospital, Liege, Belgium*
[6]*Genzyme A/S, Copenhagen, Copenhagen, Denmark*
[7]*Department of Nephrology, St. Elisabeth Hospital Tilburg, Tilburg, Netherlands*

Radiographic calcification and arterial stiffness each individually have been shown to predict outcome in dialysis patients. However, it remains unknown whether combined assessment of these markers of cardiovascular (CV) damage also provides additional predictive value.
Scoring of abdominal aortic calcification (AAC) using plain lateral abdominal x-ray and measurement of carotid-femoral pulse wave velocity (PWV) were performed in a cohort of 1084 prevalent dialysis patients recruited from 47 European dialysis centers.
After a follow-up of 2 years, 234 deaths and 91 nonfatal CV events were recorded. Compared with the lowest tertile of AAC, the risk of an event was increased by a factor 3.7 in patients with a score of 5 to 15 (middle tertile), and by a factor 8.6 in patients with scores of 16 to 24. Additionally, each 1-m/s increase in PWV was associated with a 15% higher risk. At higher AAC (scores $\geq$5), the effect of PWV was attenuated because of a negative PWV x AAC interaction (hazard ratio [HR]: 0.895 and 0.865 for middle and upper AAC tertiles). In Cox-regression analysis accounting for age, diabetes, and serum albumin, AAC and PWV remained independent predictors of outcome. AAC and PWV are independent predictors of all-cause mortality and nonfatal CV events in dialysis patients. The risk associated with an increased PWV is less pronounced at higher levels of calcification. Assessment of AAC using a lateral abdominal x-ray and PWV is feasible in a clinical setting and both may contribute to an accurate CV risk estimation in this heterogeneous population.

1.2
DIFFERENTIAL IMPACTS OF HYPERTENSION AND TYPE 2 DIABETES MELLITUS ON ARTERIAL DISEASE AND CARDIOVASCULAR OUTCOMES: THE STRONG HEART STUDY

M. Roman [1], B. Howard [2], J. Kizer [1], E. Lee [3], L. Best [4], R. Devereux [1]
[1]*Weill Cornell Medical College, New York, NY, United States of America*
[2]*Medstar Health Research Institute, Washington, DC, United States of America*
[3]*University of Oklahoma Health Sciences Center, Okklahoma City, OK, United States of America*
[4]*Missouri Breaks Industries Research, Inc., Timber Lake, SD, United States of America*

Background: Both hypertension and diabetes mellitus (DM) increase risk for subclinical and clinical cardiovascular disease (CVD). The relative extents to which hypertension and DM induce subclinical CVD have not been examined, but recent Framingham data suggest that clinical CVD risk in DM is largely attributable to coexistent hypertension.
Methods: We examined subclinical arterial disease (carotid artery hypertrophy, atherosclerosis, stiffness) and incident CVD in a population-based cohort with high rates of DM and CVD.
Results: 2887 participants were divided into 4 groups: normal (n=799), hypertension alone (n=647), DM alone (n=494), and both hypertension and DM (n=947). In multivariable models adjusting for other CVD risk factors and creatinine, arterial hypertrophy and atherosclerosis were significantly greater in the two DM groups and not increased by coexistent hypertension. Although hypertension significantly altered arterial structure and function compared to normal, differences were eliminated by consideration of systolic pressure. Among 2441 participants without CVD at baseline, events occurred in 10.1% of normals, 17.8% with hypertension alone, 25.5% with DM alone, and 29.3% with both. Rates were significantly higher in the 2 DM groups and not increased by coexistent hypertension. Adjusted hazards ratios were 1.69 ($p=0.001$) for hypertension alone, 3.16 ($p<0.001$) for DM alone, and 3.85 ($p<0.001$) for both ($p<0.001$ for trend).
Conclusions: Both hypertension and DM cause increased subclinical and clinical CVD. The impact of hypertension on CVD is largely attributable to increased distending pressure. Higher rates of vascular hypertrophy, subclinical atherosclerosis and incident CVD in DM are not attributable to coexistent hypertension in this population.

1.3
PROGNOSTIC VALUE OF CAROTID-FEMORAL PULSE WAVE VELOCITY FOR CARDIOVASCULAR EVENTS: AN IPD META-ANALYSIS OF PROSPECTIVE OBSERVATIONAL DATA FROM 14 STUDIES INCLUDING 16,358 SUBJECTS

Y. Ben-Shlomo [1], M. Spears [1], C. Boustred [1], M. May [1], S. Anderson [2], P. Boutouyrie [3], J. Cameron [4], C. H. Chen [5], J. R. Cockcroft [6], K. Cruickshank [2], S. J. Hwang [7], E. Lakatta [8], S. Laurent [3], J. Maldonado [9], C. M. McEniery [10], G. Mitchell [11], S. Najjar [8], A. Newman [12], M. Ohishi [13], B. Pannier [14], T. Pereira [15], T. Shokawa [16], K. Sutton-Tyrell [11], D. Webb [17], T. Willum-Hansen [18], S. Zoungas [19], I. B. Wilkinson [10]
[1]*School of Social and Community Medicine, Bristol, United Kingdom*
[2]*Manchester Medical School, Manchester, United Kingdom*
[3]*INSERM, Paris, France*
[4]*La Trobe University and Monash Cardiovascular Research Centre, Melbourne, Australia*
[5]*Department of Medicine, Yang-Ming University, Taipei, Taiwan (Province of China)*
[6]*Wales Heart Research Institute, Cardiff, United Kingdom*
[7]*Centre for Population Studies, National Heart, Lung and Blood Institute, Bethesda, United States of America*
[8]*Laboratory of Cardiovascular Science, NIH, Baltimore, United States of America*
[9]*Instituto de Investigação e Formação Cardiovascular, Penacova, Portugal*
[10]*Clinical Pharmacology Unit, Cambridge, United Kingdom*
[11]*Cardiovascular Engineering, Inc, Norwood, Mass, United States of America*

1872-9312/$ – see front matter

[12]Center for Aging and Population Health, Pittsburgh, United States of America
[13]Department of Geriatric Medicine, Osaka, Japan
[14]Centre d'Investigations Preventives et Cliniques, Paris, France
[15]Escola Superior de Tecnologia da Saúde de Coimbra, Coimbra, Portugal
[16]Department of Cardiovascular Medicine, Hiroshima University Graduate School of Biomedical Sciences, Horishima, Japan
[17]Clinical Pharmacology Unit, Edinburgh, United Kingdom
[18]Research Centre for prevention and Health, Copenhagen, Denmark
[19]School of Public Health and Preventive Medicine, Monash University, Australia

We have undertaken an individual participant data (IPD) meta-analysis of carotid-femoral pulse wave velocity (cf-PWV) with all cause mortality, CHD, stroke and combined CVD events using data from 14 studies (2 unpublished). Unlike a previous report, which only used published data, we were able to undertake standardised analyses with and without adjustment for cardiovascular risk factors and test, a priori, for potential interactions between cf-PWV and age group, gender, diabetic or hypertensive status on the various outcomes. We calculated discrimination statistics for models with and without cf-PWV, specifically focussing on individuals at intermediate (25-75th percentile) risk of CVD after adjustment for conventional Framingham risk factors. Fourteen studies provided data on 16,358 subjects with 1700 combined CVD events. We derived within study z-scores of log transformed cf-PWV (pooled SD = 3.3m/s). Risk of all outcomes was associated with increased cf-PWV (Table 1) and was linear across the range of cf-PWV values with no evidence of interaction except for age group (see Figure, p-value for trend = 0.0095). The additional benefit of measuring cf-PWV to reclassify intermediate risk individuals was assessed using the net reclassification index. 18.6% ($p<0.001$) and 22.4% ($p<0.001$) were appropriately reclassified into higher or lower quartiles of risk for CHD and stroke outcomes respectively. These findings highlight the added value of cf-PWV as an independent predictor, over and above existing risk factors, in intermediate risk groups and for younger subjects. Assessment of PWV should better identify high risk populations that may benefit from more aggressive risk factor management.

Table 1: Cox Proportional Hazards Models for cf-PWV as Predictor of an Outcome Event During the Follow-Up Period.

Outcome	Model 1*		Model 2*	
	HR (95% CI)	p-value	HR (95% CI)	p-value
All cause mortality	1.21 (1.16, 1.27)	<0.001	1.16 (1.11, 1.23)	<0.001
CHD	1.33 (1.19, 1.48)	<0.001	1.22 (1.09, 1.36)	<0.001
CVD	1.42 (1.27, 1.59)	<0.001	1.28 (1.16, 1.41)	<0.001
Stroke	1.52 (1.30, 1.78)	<0.001	1.25 (1.14, 1.39)	<0.001

*Hazard ratio per 1 SD of log-transformed cf-PWV adjusted for age and sex
*As model 1, further adjustment for Framingham risk factors (systolic blood pressure, cholesterol, HDL-cholesterol, smoking status, baseline diabetes and baseline hypertension, where available).

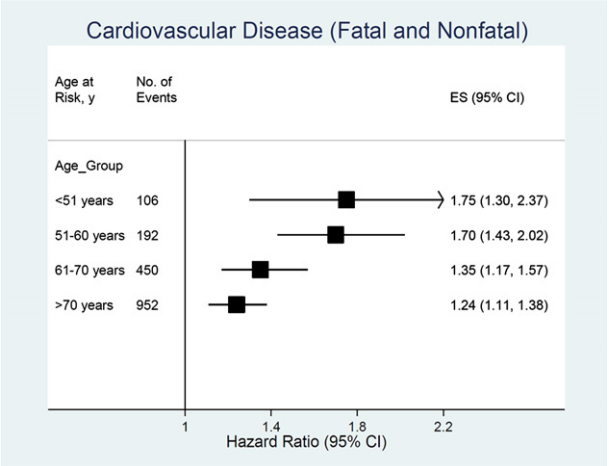

Figure: Pooled hazard ratios for cardiovascular disease for a one standard deviation increase in pulse wave velocity (log transformed) stratified by age group.

1.4
PULSE WAVE VELOCITY AND INCIDENT HEART FAILURE IN CHRONIC KIDNEY DISEASE

R. R. Townsend [1], A. Sheridan [1], J. Strelsin [1], M. J. Duckworth [1], J. A. Chirinos [1], V. Teal [1], A. Khan [1], J. Kusek [2], M. Schreiber [3], N. Bansal [4], A. Ojo [5], J. P. Lash [6], M. M. Joffe [1], C. R. I. C. Investigators [1]
[1]University of Pennsylvania, Philadelphia, United States of America
[2]National Institutes of Health, Bethesda, United States of America
[3]Cleveland Clinic Foundation, Cleveland, United States of America
[4]University of California, San Francisco, United States of America
[5]University of Michigan, Ann Arbor, United States of America
[6]Univeristy of Illinois, Chicago, United States of America

Heart failure (HF) complicates chronic kidney disease (CKD) despite improving medical therapy for co-morbidities like hypertension. We hypothesized that vascular stiffness, (aortic pulse wave velocity [PWV]), predicts incident HF in well controlled CKD participants free of HF at enrollment.
We performed aortic (i.e. carotid-femoral) PWV measurements (Sphygmocor) in 1889 participants enrolled in the multicenter Chronic Renal Insufficiency Cohort (CRIC) at their second year follow up visit and followed them prospectively (mean follow-up time of 1.4 years) for incident hospitalized HF events occurring before December 31, 2007 adjudicated by two independent Investigators. Mean age was 60 years, 44% women, 42% black, 6% Hispanic and 47% were Caucasian with mean(SD) blood pressure of 127(22)/70(13) mmHg (more than half of the participants were prescribed >3 antihypertensives) and a mean estimated glomerular filtration rate of 42.6 mL/min/1.73m2. Mean(SD) BMI was 31(6.6) kg/m2. Mean(SD) aortic PWV (adjusted for waist circumference) was 9.5(3.1) m/sec. There were 54 incident HF events. The unadjusted Cox proportional hazard ratio [95% CI] for incident HF for those with PWV >10m/s was 4.71 (2.59, 8.54; censored for deaths / withdrawals); adjusting for age, race, gender and mean arterial pressure it was 3.82[2.02,7.25]. We observed that for each 1 m/sec increase in aortic PWV there was a 11% (unadjusted) and 9% (after adjustment) increase in the hazard for HF.
In summary, aortic PWV independently predicted incident HF in CKD patients with well-controlled BP. Measures to better understand and improve PWV may compliment standard BP control to prevent HF in CKD.

1.5
AORTIC STIFFNESS IS INDEPENDENTLY ASSOCIATED WITH FATAL AND NON-FATAL CARDIOVASCULAR EVENTS IN CHRONIC KIDNEY DISEASE STAGE 2-5

A. Karras [1], J. P. Haymann [2], S. Laurent [3], E. Bozec [3], B. Stengel [4], C. Jacquot [1], P. Houillier [5], M. Froissart [5], P. Boutouyrie [3], M. Briet [3]
[1]Department of Nephrology, Hôpital Européen Georges Pompidou, Assistance Publique-Hôpitaux de Paris, Université Paris 5, Paris, France
[2]Department of Physiology, Hôpital Tenon, Assistance Publique-Hôpitaux de Paris, Paris, France
[3]Department of Pharmacology and Institut National de la Santé et de la Recherche Médicale U970, Hôpital Européen Georges, Paris, France
[4]Institut National de la Santé et de la Recherche Médicale U780, Université Paris-Sud, IFR 69, Villejuif, France
[5]Department of Physiology and Institut National de la Santé et de la Recherche Médicale U872, Hôpital Européen Georges Po, Paris, France

Objective: Chronic kidney disease (CKD) is characterized by a high cardiovascular risk. Subclinical damage to large arteries has been largely described in CKD and is mostly characterized by an increase in arterial stiffness and an outward remodeling of the carotid artery. However, the predictive value of arterial remodeling and stiffening for cardiovascular events and mortality is still debated in pre-dialysed CKD (stage 2-5).
Methods: 180 patients (mean age 59.6 ± 14 years) with CKD (mean mGFR 32 mL/min/1.73m^2) were included in this longitudinal study. Patients underwent a yearly check-up including arterial evaluation (carotid-femoral pulse wave velocity (SphygmoCor®), carotid thickness, diameter and stiffness (Art-Lab system®) and GFR measurement with the ^{51}Cr-EDTA clearance.
Results: During an average follow-up of 49 ± 16 months, 36 fatal or not fatal cardiovascular events occurred. In COX regression analyses, PWV was significantly associated with fatal and non fatal cardiovascular events (risk ratio for 1 SD 1.46 [1.04-2.04], $P=0.02$) independently of age, body mass index, proteinuria, measured glomerular filtration rate and mean blood pressure. By contrast carotid intima-media thickness and circumferential wall stress were not significantly associated with fatal and non fatal cardiovascular events.