1.4: CAN AIX PREDICT ALL-CAUSE MORTALITY IN A GENERAL POPULATION?

J.H. Janner, J. Vestbo, E. Prescott

1 - Forward Wave Progression
2 - Backward Wave Progression
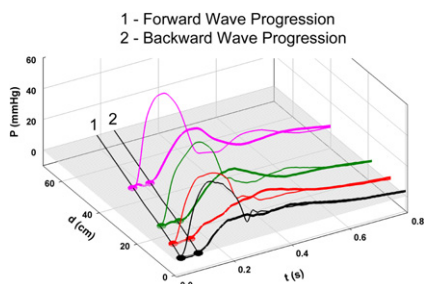
These profoundly paradoxical results above seem to undermine the fundamental presuppositions of the frequency-domain analysis.

1.4

CAN AIX PREDICT ALL-CAUSE MORTALITY IN A GENERAL POPULATION?

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Background: Aortic augmentation Index (AIx) is a measurement of pulse wave reflections and an indirect measure of arterial stiffness. AIx predicts all-cause mortality and CV-mortality in selected patient group with end-stage renal failure and in patients undergoing percutaneous coronary intervention (PCI). The objective of this study was to analyse AIx as an independent predictor of all-cause mortality in a population without known cardiovascular disease (CVD).
Methods: This study is based on 3,432 subjects from the 4th survey of the Copenhagen City Heart Study with AIx measured non-invasively. During follow-up (mean 6.5 years) 334 persons died. AIx was divided in tertiles with the lowest tertile as reference. Mortality risk was analyzed by Cox proportional hazard models with age as the underlying time scale adjusting
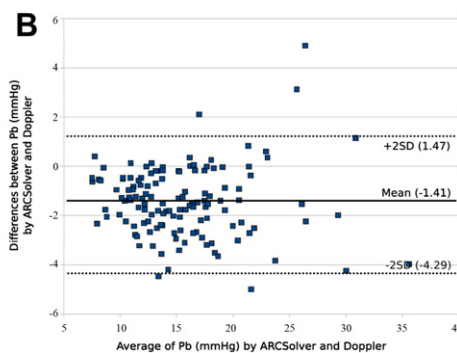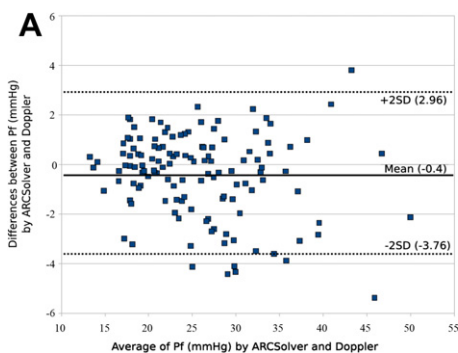
for heart rate, height, weight, blood pressure, total-cholesterol, smoking, alcohol, diabetes, education, physical activity and predisposition to CVD.
Results: AIx significantly predicted all-cause mortality but in opposite direction for men and women.

	Men		Women	
	HR	95 % CI	HR	95 % CI
AIx − intermediate vs. low tertile	1.86	1.06−3.27	0.66	0.44−0.99
AIx − high vs. low tertile	2.30	1.24−4.24	0.53	0.34−0.82

Conclusion: High AIx was associated with increased mortality in men but decreased in women. The surprising finding in women may be related to gender related difference in the arterial properties measured by AIx as also

reflected by AIx reaching a plateau in women approximately ten years earlier than men.
Conclusion: High AIx increased the risk of mortality in men but the opposite was seen in women. This can be explained by a curvilinear AIx/age relationship more pronounced in women where old women may have decreased pulse wave reflections in accordance with findings in the Framingham studies.

1.5

NOVEL NON-INVASIVE METHOD TO ASSESS WAVE REFLECTION FROM THE PRESSURE WAVEFORM ALONE

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Background/Objectives: Within the last decade the quantification of pulse wave reflections focused on aortic systolic pressure and its augmentation based on analysis of pressure waves alone. A different approach is wave separation analysis (WSA), which quantifies the total amount of arterial wave reflection considering both aortic pulse and flow waves. The aim of this work is the development of an accurate ventricular blood flow model based on central blood pressure waveform for proper WSA and its validation against Doppler ultrasound.
Methods: The introduced ARCSolver method, which grounds on higher order mathematical flow models, describes and implements the outflow of the left ventricle during systole based on a non invasive estimated central pressure waveform. To evaluate the performance of the proposed approach, comparisons against reference Doppler measurements and triangular flow models are made for 131 patients.
Results: Against Doppler the mean difference and standard deviation of the amplitudes of the decomposed forward and backward pressure waves are −0.4 (1.68) mmHg (Fig A) and −1.41 (1.44) mmHg (Fig B). The corresponding mean RMSE for the separated pressure curves is 0.93 (0.51). The results indicate that the ARCSolver method provides accurate estimates of investigated parameters.
Conclusion: The comparison with Doppler ultrasound flow waves as well as recently proposed simple triangular flow waves showed that our approach reduces variability and provides accurate results.

1.6

ON-LINE VISUAL FEEDBACK OF PARALLEL DIAMETER WAVEFORMS IMPROVES QUALITY OF LOCAL CAROTID ARTERY PULSE WAVE VELOCITY MEASUREMENT

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Background: We previously demonstrated that local carotid artery pulse wave velocity (locPWV) can be obtained by high frame-rate multiple M-line ultrasonography. In this study we tested whether on-line display of diameter waveforms improves measurement acceptance rate and reproducibility.
Methods and Results: In 10 volunteers (age 31 ± 14 yrs) we obtained with and without visual feedback multiple M-line scans of the right common carotid artery. Using the dicrotic notch as fiducial point, locPWV was