3.6: BLOOD PRESSURE REDUCTION IS THE MAIN DETERMINANT OF THE DE-STIFFENING EFFECT OF ANTIHYPERTENSIVE TREATMENT: A META-REGRESSION ANALYSIS AND COMPARISON WITH ACUTE MODULATION OF TRANSMURAL PRESSURE

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overestimated invasive aortic SBP in those aged 40
pressure, heart rate and catheter type did not alter the findings, and no in-
creasingly with age. Thus, there was a progressively higher error (underes-
all people receive appropriate diagnosis and management of hypertension.

Abstracts

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3.6 BLOOD PRESSURE REDUCTION IS THE MAIN DETERMINANT OF THE DE-STIFFENING EFFECT OF ANTIHYPERTENSIVE TREATMENT: A META-REGRESSION ANALYSIS AND COMPARISON WITH ACUTE MODULATION OF TRANSMURAL PRESSURE

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Background: Pulse wave velocity (PWV) is independent predictor of cardio-
vascular outcomes. Antihypertensive treatment reduces PWV, but it is un-
known whether this results from an unloading of stiffer elements in the
arterial wall or a structural change in the wall.

Methods: To distinguish between these effects we performed a systematic
review and meta-regression analysis of effects of different drug classes and
durations of antihypertensive treatment on the relationship between
 reduction in PWV and that in mean arterial pressure (MAP). We compared
this to the variation in PWV during an acute modulation of aortic transmural
pressure (TMP) by respiratory manoeuvres, simulating a change in MAP
in patients with essential hypertension.

Results: We identified 99 trials on 6,703 hypertensive individuals in total
(average age and treatment duration were 56 ± 9.4 years and 21.6 ± 17.9
weeks, respectively). Reduction in PWV was strongly associated with that in
MAP, PWV falling by 0.7 m/s per 10 mmHg fall in MAP (95% CI 0.5 – 0.86 m/s,
p < 0.001). However, reduction in PWV was independent of drug class or dura-
tion of treatment. Change in PWV during respiratory manoeuvres was related to
TMP with a similar relation to that observed in the meta-regression analysis:
0.94 m/s per 10 mmHg change in TMP (95% CI 0.34 – 1.54 m/s, p < 0.001).

Conclusion: Antihypertensive treatment reduces PWV mainly by an unload-
ing effect on the arterial wall, at least over the short term. There is little
evidence for a treatment-specific effect. It may be possible to predict
effects of antihypertensive treatment on reduction of PWV and pulse pres-
sure by modulating transmural pressure.

3.7 PULSE WAVE VELOCITY IS AN INDEPENDENT RISK FACTOR FOR CARDIOVASCULAR EVENTS, MORTALITY AND DECLINE IN RENAL FUNCTION IN PATIENTS WITH TYPE 1 DIABETES

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Purpose: The prognostic significance of carotid-femoral pulse wave velocity
(cfPWV) remains to be determined in patients with type 1 diabetes (T1D).

We investigated the predictive value of cfPWV for various endpoints in T1D.

Methods: At baseline, cfPWV was measured using the Sphygmocor device in
652 patients with T1D and various degrees of albuminuria. Endpoints were
traced through National Registers and patient records and comprised: com-
posite CVE, mortality, progression in albuminuria, and decline in estimated
glomerular filtration rate (eGFR) >30%. Median follow-up ranged from 5.2 to
6.2 years. Slope estimates of eGFR and urinary albumin creatinine rate
(UACR) were calculated for a median of 5.5 years. Adjustment included
sex, age, mean arterial pressure, LDL cholesterol, smoking, HbA1c, UACR
and eGFR at baseline. Hazard ratios (HR) were calculated per 1 standard
derivation (SD) increase in cfPWV.

Results: Of the 652 participants (56% male); mean ± SD age was 54 ± 13 years
and cfPWV 10.5 ± 3.38 m/s². After adjustment, higher cfPWV was signifi-
cantly associated with all endpoints: composite CVE (n = 81; HR:1.31; p = 0.045); mortality (n = 48; HR:1.39; p = 0.033); progression in albuminuria
(n = 31; HR:1.16; p = 0.012); and decline in eGFR > 30% (n = 90; HR: 1.39; p = 0.015). Higher cfPWV was associated with a steeper decline in
eGFR and a steeper increase in UACR after adjustments (p < 0.009).

Conclusions: In patients with T1D, higher arterial stiffness was consistently
associated with a higher risk of CVE, mortality and decline in renal function,
independent of other risk factors. Measurement of cfPWV may have a prom-
sing role in risk stratification in T1D.

Table

<table>
<thead>
<tr>
<th>Age category</th>
<th>Age</th>
<th>Cuff – invasive systolic BP</th>
<th>Cuff – invasive diastolic BP</th>
<th>Cuff – invasive pulse</th>
<th>Cuff – invasive pulse</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-49 years</td>
<td>170</td>
<td>5.3 (0.5 to 6.6)</td>
<td>4.5 (2.5 to 5.3)</td>
<td>0.9 (0.5 to 2.4)</td>
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</tr>
<tr>
<td>50-59 years</td>
<td>406</td>
<td>5.9 (1.2 to 2.9)</td>
<td>5.4 (2.7 to 4.3)</td>
<td>0.4 (0.2 to 0.7)</td>
<td></td>
</tr>
<tr>
<td>60-69 years</td>
<td>556</td>
<td>6.0 (3.0 to 3.3)</td>
<td>6.1 (3.1 to 5.3)</td>
<td>0.7 (0.3 to 1.0)</td>
<td></td>
</tr>
<tr>
<td>70-79 years</td>
<td>455</td>
<td>5.3 (0.5 to 4.3)</td>
<td>5.2 (0.8 to 5.5)</td>
<td>1.0 (0.3 to 5.2)</td>
<td></td>
</tr>
<tr>
<td>80+ years</td>
<td>106</td>
<td>4.5 (0.5 to 0.6)</td>
<td>5.0 (1.5 to 1.9)</td>
<td>0.2 (0.0 to 0.5)</td>
<td></td>
</tr>
</tbody>
</table>

Note: mean ± SD age was 54 ± 13 years and cfPWV 10.5 ± 3.38 m/s². After adjustment, higher cfPWV was significantly associated with all endpoints: composite CVE (n=81; HR:1.31; p=0.045); mortality (n=48; HR:1.39; p=0.033); progression in albuminuria (n=31; HR:1.16; p=0.012); and decline in eGFR > 30% (n=90; HR:1.39; p=0.015). Higher cfPWV was associated with a steeper decline in eGFR and a steeper increase in UACR after adjustments (p < 0.009).