LOW DIASTOLIC BP & CARDIOVASCULAR EVENTS IN THE VASCULAR FRAIL

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CONFLICT OF INTEREST DISCLOSURE

I have no potential conflict of interest to report
BLOOD PRESSURE AND MORTALITY IN THE (VERY) OLD

Blood pressure trends and mortality: the Leiden 85-plus Study

Systolic Blood Pressure (mmHg)

Age (years)

0,0
0,2
0,4
0,6
0,8

Cumulative mortality

systole < 140 mmHg
systole >= 140 mmHg <160 mmHg
systole >= 160 mmHg

Systolic BP

log rank p<0.001

All causes

SBP < 140mmHg
SBP >=160mmHg

log rank p<0.001

Explanation?
ROLE OF BIOLOGICAL AGE/FRAILTY

**Hypertension**

**Brief Review**

**Treatment of Hypertension in the Oldest Old**

**A Critical Role for Frailty?**

Majon Muller, Yvo M. Smulders, Peter W. de Leeuw, Coen D.A. Stehouwer
BIOLOGICAL AGE VS. CHRONOLOGICAL AGE

Relation between blood pressure and mortality risk in an older population: role of chronological and biological age

Original Article
Journal of INTERNAL MEDICINE

doi: 10.1111/jpm.12284

G. Post Hospers¹, Y. M. Smulders¹, A. B. Maier¹, D. J. Deeg² & M. Muller³
J-CURVE: DIASTOLIC BP AND EVENTS in CV PATIENTS

Relation Between Blood Pressure and Vascular Events and Mortality in Patients With Manifest Vascular Disease
J-Curve Revisited

Johannes A.N. Dorresteijn, Yolanda van der Graaf, Wilko Spiering, Diederick E. Grobbee, Michiel L. Bots, Frank L.J. Visseren, on behalf of the Secondary Manifestations of Arterial Disease Study Group

Annals of Internal Medicine

Dogma Disputed: Can Aggressively Lowering Blood Pressure in Hypertensive Patients with Coronary Artery Disease Be Dangerous?

Franz H. Messerli, MD; Giuseppe Mancia, MD; C. Richard Conti, MD; Ann C. Hewkin, MSc; Stuart Kupfer, MD; Annette Champion, MBA; Rainer Kolloch, MD; Athanase Benetos, MD; and Carl J. Pepine, MD

Low DBP → more CVD events
BIOLOGICAL AGE <-> VASCULAR AGE

“A man is as old as his arteries”

Thomas Sydenham 1624-1689

Cumulative exposure to endogenous and exogenous risk factors
Low BP is associated with a high risk of cardiovascular events in people with a previous history of cardiovascular disease, as a proxy of vascular frailty.
## METHODS

### DESIGN
- **PROSPER STUDY**
- MULTICENTER TRIAL (PRAVASTINE VS PLACEBO)
- MEAN F-UP=3.2YRS

### POPULATION
- N=5804
- AGE 70-82YRS, AT BASELINE: 50% HISTORY CVD

### DATA-ANALYSIS
- COX PROPORTIONAL HAZARD ANALYSIS
- ADJUSTED FOR AGE, SEX, COUNTRY, TRIAL TREATMENT
- + CV RISK FACTORS, BP TREATMENT

### CV EVENTS (N=977)
- death from CVD,
- myocardial infarction,
- stroke / TIA,
- coronary interventions

### DIASTOLIC BP
- NO HISTORY CVD
- HISTORY CVD
# Baseline Data

<table>
<thead>
<tr>
<th>Diastolic Blood Pressure</th>
<th>&lt;70 mmHg</th>
<th>70-90 mmHg</th>
<th>≥90 mmHg</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=698</td>
<td>75.6 (0.1)</td>
<td>75.4 (0.1)</td>
<td>75.1 (0.1)</td>
<td>0.024</td>
</tr>
<tr>
<td>N=3701</td>
<td>70-90 mmHg</td>
<td>81.7 (0.1)</td>
<td>98.3 (0.2)</td>
<td>0.023</td>
</tr>
<tr>
<td>N=1405</td>
<td>≥90 mmHg</td>
<td>71.3 (0.5)</td>
<td>71.3 (0.5)</td>
<td>0.023</td>
</tr>
</tbody>
</table>

## Demographics

| Age (years) | 75.6 (0.1) | 75.4 (0.1) | 75.1 (0.1) | 0.024 |
| Female, n (%) | 344 (49.3%) | 1958 (52.9%) | 698 (49.7%) | 0.048 |

## Blood Pressure (mmHg)

<table>
<thead>
<tr>
<th>Blood Pressure (mmHg)</th>
<th>133.2 (0.7)</th>
<th>153.0 (0.3)</th>
<th>169.6 (0.5)</th>
<th>&lt;0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure</td>
<td>65.5 (0.2)</td>
<td>81.7 (0.1)</td>
<td>98.3 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>67.7 (0.7)</td>
<td>71.3 (0.3)</td>
<td>71.3 (0.5)</td>
<td>0.023</td>
</tr>
</tbody>
</table>

## BP Lowering Medication, n (%)

<table>
<thead>
<tr>
<th>BP Lowering Medication</th>
<th>251 (36.0%)</th>
<th>1517 (41.0%)</th>
<th>590 (42.0%)</th>
<th>0.022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>105 (15.0%)</td>
<td>562 (15.2%)</td>
<td>284 (20.2%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ace-inhibitors</td>
<td>218 (31.2%)</td>
<td>947 (25.6%)</td>
<td>293 (20.9%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>199 (28.5%)</td>
<td>947 (25.6%)</td>
<td>356 (25.3%)</td>
<td>0.235</td>
</tr>
</tbody>
</table>
### BASELINE DATA

<table>
<thead>
<tr>
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<th>Diastolic blood pressure</th>
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<tr>
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</tr>
<tr>
<td></td>
<td>N=698</td>
<td>N=3701</td>
</tr>
<tr>
<td>Vascular risk factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of hypertension, n (%)</td>
<td>292 (41.8%)</td>
<td>2275 (61.5%)</td>
</tr>
<tr>
<td>History of diabetes, n (%)</td>
<td>73 (10.5%)</td>
<td>375 (10.1%)</td>
</tr>
<tr>
<td>History of stroke or TIA, n (%)</td>
<td>69 (9.9%)</td>
<td>428 (11.6%)</td>
</tr>
<tr>
<td>History of MI, n (%)</td>
<td>150 (21.5%)</td>
<td>491 (13.3%)</td>
</tr>
<tr>
<td>History of vascular disease, n (%)</td>
<td>412 (59.0%)</td>
<td>1647 (44.5%)</td>
</tr>
<tr>
<td>Current smoker, n (%)</td>
<td>221 (31.7%)</td>
<td>1001 (27.0%)</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>25.7 (0.2)</td>
<td>26.8 (0.1)</td>
</tr>
</tbody>
</table>
### BASELINE DATA

<table>
<thead>
<tr>
<th></th>
<th>Diastolic blood pressure (per 10mmHg increase)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Total group (N=5804)</strong></td>
<td>0.95 (0.90; 1.01)</td>
<td>0.07</td>
</tr>
</tbody>
</table>

*Adjusted for sociodemographic factors, cardiovascular risk factors*
STRATIFIED FOR HISTORY OF CVD

OR (95%CI) per 10mmHg DBP
0.92 (0.85-0.99)

OR (95%CI) per 10mmHg DBP
1.08 (0.99-1.18)

P-interaction DBP * history of CVD = 0.008
CONCLUSION

IN PATIENTS WITH HISTORY OF CARDIOVASCULAR DISEASE
LOW DBP IS ASSOCIATED WITH
AN INCREASED RISK OF EVENTS
IN PATIENTS WITH HISTORY OF CARDIOVASCULAR DISEASE
LOW DBP IS ASSOCIATED WITH
AN INCREASED RISK OF EVENTS

Low DBP → Reduced perfusion → CV event

Co-morbid condition
Drugs
IN PATIENTS WITH HISTORY OF CARDIOVASCULAR DISEASE
LOW DBP IS ASSOCIATED WITH
AN INCREASED RISK OF EVENTS

CLINICAL CONSEQUENCE:
BE CAREFUL WITH LOWERING DBP BELOW <70mmHG
IN OLDER PATIENTS WITH CVD