

Raised blood pressure and risk of dementia

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Abell and colleagues¹ reported that elevated systolic blood pressure (SBP) at age 50, even below the conventional threshold for treating hypertension, was associated with increased risk of dementia. This association was not present for diastolic blood pressure (DBP), nor for SBP later in life, and requires cautious interpretation and exploration in other studies.

Accordingly, we analysed data from 730492 people in the Clinical Practice Research Datalink (CPRD). We included patients with a blood pressure measurement aged 45-75 after 1992. To achieve comparability with Abell's analysis reported from the Whitehall study and to minimize bias caused by reverse causation, we excluded the period within 10 years of blood pressure measurement. Analyses were according to age at first blood pressure measurement: 45-54 years (N=317349, of whom 1149 developed dementia), 55-64 years (N=248943, 5499 dementia), 65-74 years (N=164200, 10109 dementia). Mean age at diagnosis of dementia was 79.8 years. We used Poisson regression models adjusting for gender and age-at-risk; although adjustment for several additional factors did not alter our findings.

Like Abell, we did not find a positive association of SBP with dementia in the two older age groups at blood pressure measurement (data not shown). We therefore focussed attention on people aged 45-55 years at blood pressure measurement. Amongst this group, we found a weak association of SBP with risk of dementia: risk ratio for SBP ≥ 140 mmHg 1.12 (95% CI, 1.00-1.26). We found no clear threshold for this positive association of SBP with dementia risk (Figure 1). In contrast to Abell, we also found a similar weak association between DBP and risk of dementia: risk ratio for DBP ≥ 90 mmHg 1.15 (95% CI, 1.02-1.30). Finally, we found that these associations depended on the dementia subtype: SBP was associated with vascular dementia (RR for SBP ≥ 140 mmHg: 1.52, 95% CI 1.18-1.96), but not with Alzheimer's disease (RR for SBP ≥ 140 mmHg: 0.99, 95% CI 0.86-1.14). This lack of a positive association between blood pressure and risk of Alzheimer's disease is consistent with previous genetic studies² and meta-analyses.³

Thus our findings do not support the claim by Abell and colleagues that SBP at age 50 below the conventional ≥ 140 mmHg for hypertension is associated with an increased risk of dementia. We do

find that both systolic and diastolic hypertension at age 50 are associated with an increased risk of vascular dementia (21% of all dementia cases), but not Alzheimer's disease.

1. Abell JG, Kivimä M, Dugravot A, Tabak AG, Fayosse A, Shipley M. Association between systolic blood pressure and dementia in the Whitehall II cohort study: role of age, duration, and threshold used to define hypertension. *Eur Heart J* 2018;**39**:3119–3125.
2. Østergaard SD, Mukherjee S, Sharp SJ, Proitsi P, Lotta LA, Day F, Perry JRB, Boehme KL, Walter S, Kauwe JS, Gibbons LE, Alzheimer's Disease Genetics Consortium, The GERAD1 Consortium, EPIC-Interact Consortium, Larson EB, Powell JF, Langenberg C, Crane PK, Wareham NJ, Scott RA. Associations between Potentially Modifiable Risk Factors and Alzheimer Disease: A Mendelian Randomization Study. *PLoS Med* 2015;**12**:e1001841; discussion e1001841.
3. Power MC, Weuve J, Gagne JJ, McQueen MB, Viswanathan A, Blacker D. The association between blood pressure and incident Alzheimer disease: a systematic review and meta-analysis. *Epidemiology* 2011;**22**:646–659.

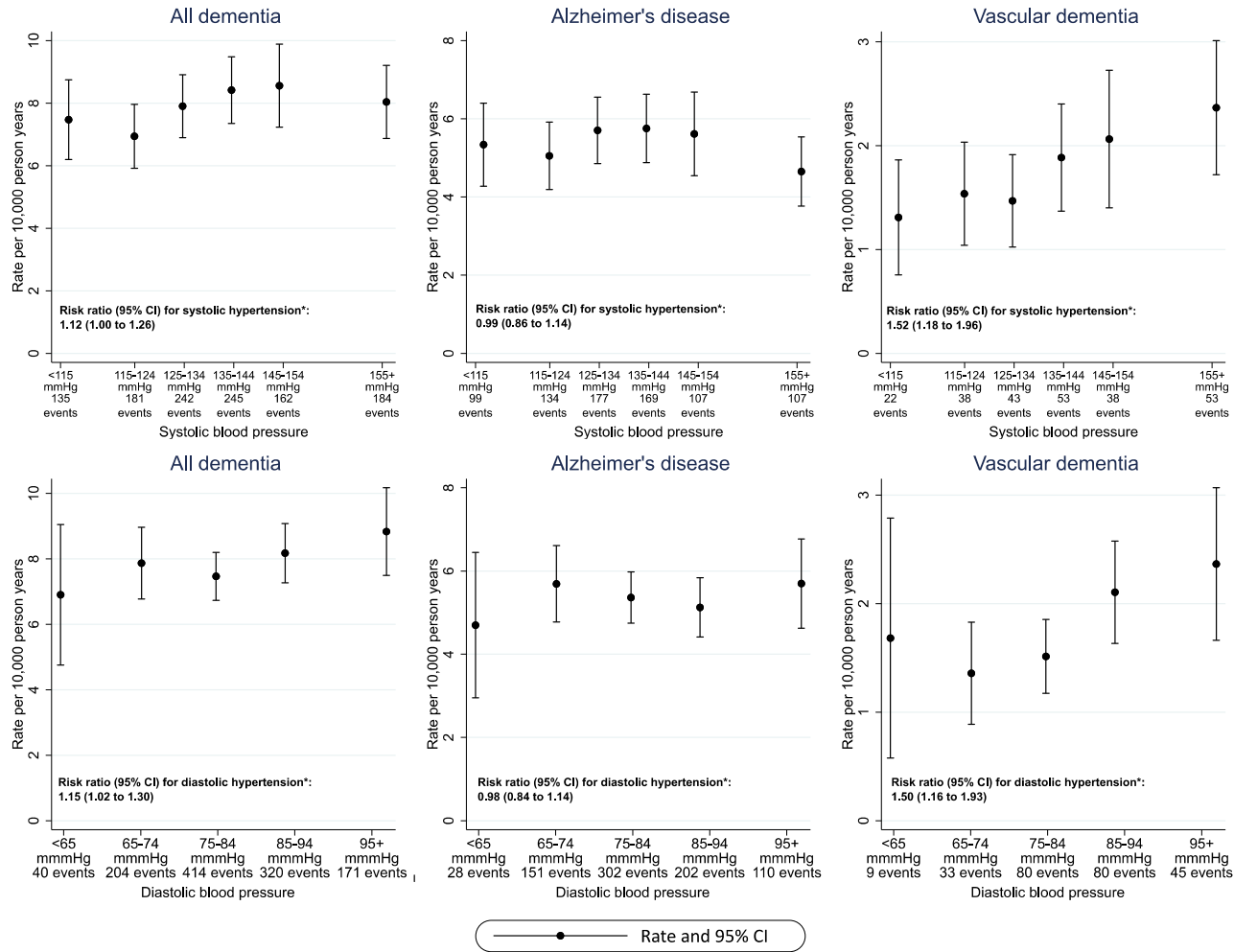
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Figure 1: Risk of all dementia, Alzheimer’s disease and vascular dementia according to systolic and diastolic blood pressure at age 45-54 years



*We define systolic hypertension as ≥ 140 mmHg and diastolic hypertension as ≥ 90 mmHg

