4.1 Hypertension is Associated with Adverse Cardiovascular Outcomes only when Both Brachial and Central Blood Pressures are Elevated

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ABSTRACT

Background: The range of central blood pressure (BP) found in individuals with high-normal brachial BP overlaps the one found in hypertension (HTN) and normotension. As central BP is possibly a better predictor of cardiovascular (CV) disease, the aim of this study was to determine the risk associated with different central/brachial BP patterns.

Methods: 13,759 participants from a populational cohort with central BP and prospective data from governmental databases who were not treated for HTN were selected. Major adverse CV events (MACE) comprised myocardial infarction, stroke, heart failure and CV death. Thresholds for brachial and central HTN were identified as 135 and 125 mmHg respectively. Individuals were separated into 4 BP patterns: normal BP; isolated brachial HTN; isolated central HTN; concordant brachial and central HTN. CV risk for each pattern was compared to normal BP with a Cox proportional hazard model adjusted for multiple covariables.

Results: 688 MACE occurred over a median follow-up of 70.0 months. Characteristics of individuals in each BP phenotype are presented in Table 1. Only the concordant brachial and central HTN pattern had higher risk of MACE [HR: 1.37 95% CI: (1.15–1.64), p = 0.001] compared to normal BP. Sensitivity analyses with different definitions of central HTN and after stratification for sex yielded similar results.

Conclusion: In untreated individuals, both central and brachial BP need to be elevated to increase CV risk. These findings provide support for the utility of routine central BP measurements in clinical practice.

Demographic characteristics	Normal BP (n = 10,611)	Isolated brachial HTN (n = 394)	Isolated central HTN (n = 496)	Concordant HTN (n = 2,258)
n	10,611	394	496	2,258
Age	51 (46–57)	53 (47–60)	54 (49–62)	56 (51–63)
Male sex	43%	88%	38%	58%
Caucasian race	89%	88%	91%	89%
Cardiovascular disease	2%	2%	4%	2%
Diabetes	4%	8%	3%	6%
Active smoking	19%	22%	16%	21%
BMI (kg/m²)	26 ± 5	28 ± 3	28 ± 5	28 ± 5
eGFR (ml/min/1.73 m²)	90 ± 14	87 ± 15	89 ± 14	88 ± 14
10-year Framingham risk score (%)	8 ± 7	17 ± 10	11 ± 7	18 ± 12
LDL-c (mmol/L)	3.1 ± 0.8	3.1 ± 0.9	3.3 ± 0.9	3.3 ± 0.9
Heart rate (bpm)	70 ± 10	77 ± 11	65 ± 9	71 ± 11
Aspirin	6%	8%	11%	9%
Statin	10%	16%	16%	13%