Duration of Hypertension Blunts Cerebrovascular Reactivity in Treatment-Resistant Hypertensives


**Background:** Chronically elevated hypertension (HTN) is one of the primary risk factors for cerebrovascular damage, including stroke. However, few studies have examined the association between duration of HTN and cerebrovascular reactivity (CVR), a biomarker of cerebrovascular health. Individuals with blunted CVR have been shown to have increased risk of stroke and dementia. We therefore examined the association between HTN duration and CVR among individuals with treatment-resistant hypertension participating in the TRIUMPH randomized trial.

**Methods:** CVR was assessed by examining changes in tissue oxygenation using functional near-infrared spectroscopy during a breath holding test (BHI), a standardized CVR assessment in which a hypercapnic response is elicited by asking participants to hold their breath up to 30 seconds following exhalation. Duration of HTN was assessed during baseline medical screening. We also covaried for stroke risk using the Framingham Stroke Risk Scale and medication burden using the daily defined dose. Linear regression was used to examine the association between CVR and duration of HTN, controlling for age, gender, ethnicity, stroke risk, daily defined dose of cardiovascular medications, and resting tissue oxygenation.

**Results:** Participants included 72 middle-aged and older adults (39 males, 33 females; mean age = 63.2 [SD = 9]) who were primarily African-American (56%). CVR response during the BHI varied widely (mean change = 1.4% [-0.7, 4.4]), as did duration of HTN (mean = 21.8 years [1, 50]). Greater duration of HTN was associated with a blunted CVR, independent of background characteristics, medication burden, and stroke risk (β = -0.27, P = .046) (Figure 1).

**Discussion:** Greater duration of HTN is associated with blunted CVR, suggesting greater cerebrovascular disease burden, among individuals with treatment-resistant hypertension.