

# I | Hypertension Backgrounder

## What is Hypertension and How is it Diagnosed?

- Hypertension, also known as high blood pressure, is a condition in which blood vessels have persistently raised pressure, causing the heart to work harder when pumping blood through these vessels.<sup>1</sup>
- More than one billion people worldwide live with hypertension and, in the U.S., approximately 50 percent of adults live with the disease.<sup>1,2</sup>
  - It is the leading cause of cardiovascular disease worldwide, including heart attack, stroke and chronic kidney disease (CKD), and carries a substantial risk of morbidity and mortality.<sup>3</sup>
  - Additional cardiovascular risk factors found commonly in people with hypertension include diabetes, lipid disorders, obesity, and unhealthy lifestyle habits such as alcohol consumption and smoking.<sup>4</sup>
- Early effects of hypertension can include subtle target organ damage such as left-ventricular hypertrophy, microalbuminuria and cognitive dysfunction.<sup>5</sup>
- Over time, uncontrolled hypertension can lead to heart failure, atrial fibrillation, valvular heart disease, peripheral arterial disease and aortic syndromes, CKD and end stage renal disease, dementia, and Alzheimer's disease.<sup>6,7,8</sup>
- A person is diagnosed with hypertension when they present with a systolic blood pressure (SBP) reading of above 140 mm Hg or a diastolic blood pressure (DBP) reading greater than 90 mm Hg. Some professional guidelines have a lower threshold of a SBP above 130 mm Hg or a DBP greater than 80 mm Hg.<sup>4,9</sup>

## Symptoms of Hypertension

- Hypertension can be asymptomatic, so people may be unaware they have it. The only way to detect hypertension is to have a health care professional measure blood pressure.<sup>1</sup>
- When symptoms do present, they may include:<sup>1</sup>
  - Early morning headaches
  - Nosebleeds
  - Irregular heart rhythms
  - Vision changes
  - Buzzing in the ears
- Severe hypertension may present with symptoms, including:
  - Fatigue
  - Nausea
  - Vomiting
  - Confusion
  - Anxiety
  - Chest pain
  - Muscle tremors

## Hypertension in the Body

- The renin-angiotensin-aldosterone system (RAAS) is a hormone system within the body that is critical for the regulation of blood pressure, acting primarily through the peptide hormone angiotensin (Ang) II, a potent vasoconstrictor.<sup>10</sup>
- Angiotensinogen (AGT) is the most upstream precursor of subsequent angiotensin peptides and its cleavage represents the initial, rate-limiting step in the eventual formation of Ang II.<sup>10</sup>

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## Unmet Need in Hypertension

- Despite well-established management strategies, such as lifestyle modifications and several classes of available anti-hypertensive treatments, up to 80 percent of people with hypertension remain uncontrolled.<sup>2</sup>
- Poor adherence, including failure to take medication as often as prescribed or persist on therapy, is common in people on daily oral anti-hypertensive medications and is a major cause of inadequate blood pressure control, including blood pressure fluctuations and variability between doses.<sup>4,11,12,13</sup>
  - It has been estimated that 50 to 80 percent of people are nonadherent or suboptimally adherent to their anti-hypertensive treatment.<sup>14</sup>
- Blood pressure variability consists of fluctuations in short-, mid-, and long-term blood pressure patterns and correlates closely with target organ damage and an increased risk of cardiovascular events, independent of mean blood pressure.<sup>13,15</sup>

<sup>1</sup> Hypertension. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/hypertension>. Published September 2019. Accessed February 2024.

<sup>2</sup> Million Hearts. Estimated Hypertension Prevalence, Treatment, and Control Among U.S. Adults. Available from: <https://millionhearts.hhs.gov/data-reports/hypertension-prevalence.html>. Accessed February 2024.

<sup>3</sup> Mills, K. et al. *Nature Reviews Nephrology*. 2020;16:223-237.

<sup>4</sup> Unger, T. et al. *Hypertension*. 2020;75:1334-1357.

<sup>5</sup> Mennuni, S. et al. *Nature Journal of Human Hypertension*. 2014;28:74-79.

<sup>6</sup> Oparil, S. et al. *Nature Reviews Disease Primers*. 2018;18014.

<sup>7</sup> Nazarzadeh, M. et al. *JAMA Cardiology*. 2019;4(8):788-795.

<sup>8</sup> Thorin, E. *Hypertension*. 2015;65:36-38.

<sup>9</sup> Flack, J. and Adekola, B. *Trends in Cardiovascular Medicine*. 2020;30(3):160-164.

<sup>10</sup> Benigni, A. et al. *EMBO Molecular Medicine*. 2010;2(7):247-257.

<sup>11</sup> Burnier, M. and Egan, B. *Circulation Research*. 2019;124:1124-1140.

<sup>12</sup> Jackson, RE and Bellamy, MC. *BJA Education*. 2015;15(6):280-285.

<sup>13</sup> Chadachan, VM. et al. *International Journal of General Medicine*. 2018;11:241-254.

<sup>14</sup> Carey, R. et al. *Hypertension*. 2018;72(5):e53-e90.

<sup>15</sup> Choi, H.J. *Korean Journal of Family Medicine*. 2012;33(6):330-335.