

# Personalized Treatment Regimen Following Pulse Wave Analysis

## 45-Year-Old Male With Uncontrolled Hypertension\*

### Patient Medical History

- 45-year-old male with diabetes and obesity
- Current Rx regimen
  - Metformin 1 g twice daily
  - Perindopril 5 mg daily
  - Indapamide 1.25 mg daily

### Initial Digital Vascular Biomarker Assessment

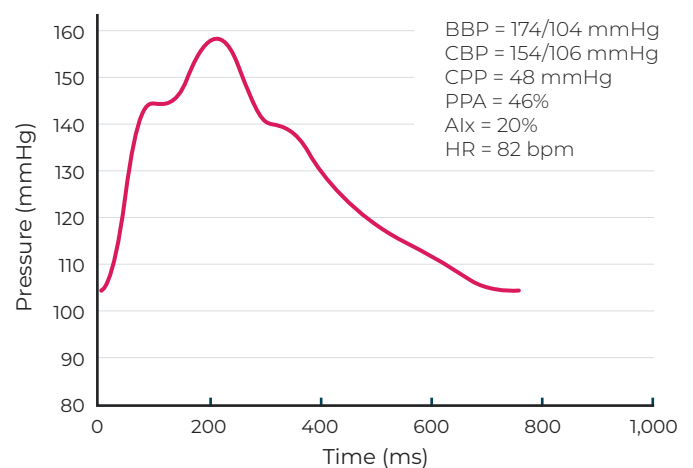
Brachial Blood Pressure	<b>170/104 mmHg</b>
Central Systolic Pressure	<b>154 mmHg</b>
Central Pulse Pressure Amplification	<b>46%</b>
Augmentation Index	<b>20%</b>

### Initial Assessment Interpretation

The central pressure profile indicates a pulse pressure amplification of 46%. The central systolic pressure of 154 mmHg is more than the desired value of 124 mmHg. The Augmentation Index (AIx) is 20%.

The first step is treatment for the elevated brachial blood pressure. Given the heart rate of 82 beats per minute, atenolol of 50 mg daily is prescribed.

**Figure 10.** Central Pressure Waveform



### Follow up Digital Vascular Biomarker Assessment

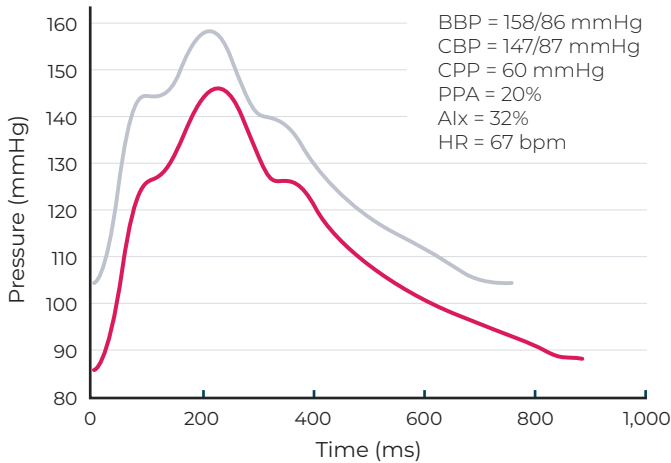
Brachial Blood Pressure	<b>158/86 mmHg</b>
Central Systolic Pressure	<b>147 mmHg</b>
Central Pulse Pressure Amplification	<b>20%</b>
Augmentation Index	<b>32%</b>

### Follow up Assessment Interpretation

The patient returns 3 weeks later taking atenolol, perindopril, and indapamide. The pulse waveform analysis is shown in Figure 11. Predictably (see Table 1), although the brachial blood pressure improved, the pulse pressure amplification fell from 46% to 20%. Improvement in the brachial pressure is attended by

less desirable changes in the central pressure profile. The central systolic pressure of 147 mmHg continues to be more than the desired value of 124 mmHg. The Alx increased from 20% to 32%. Amlodipine is added to further reduce brachial pressure and to offset the changes in central pressure from atenolol treatment.

**Figure 11.** Central Pressure Waveform



**Table 1.** General Effects of Antihypertensive Drugs on Central Pressures

	CSP	Alx
Angiotensin receptor blockers	▼▼	▼▼
Angiotensin-converting enzyme inhibitors	▼▼	▼▼
β-Blockers	▼◀▶	▲
Calcium channel blockers	▼▼	▼▼
Diuretics	▼	▼
Organic nitrates	▼▼	▼▼▼▼

CSP indicates Central systolic pressure; Alx, Augmentation Index

\*Townsend RR et al. Journal of Clinical Hypertension. 2015; 17:7, 503–513. DOI: 10.1111/jch.12574 <http://bit.ly/2gc5mdD>

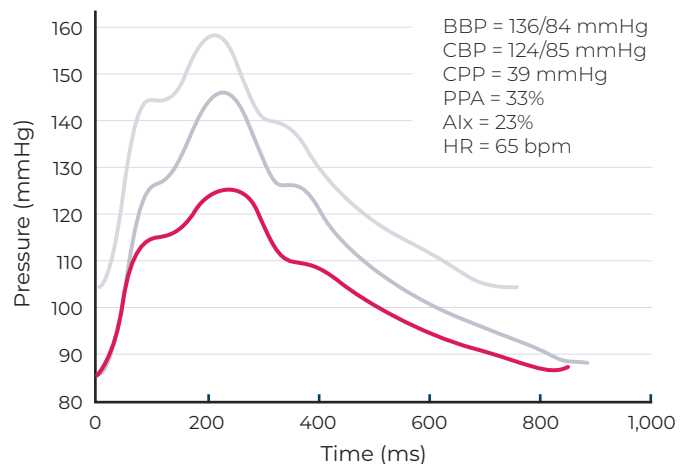
### Final Digital Vascular Biomarker Assessment

Brachial Blood Pressure	<b>136/84 mmHg</b>
Central Systolic Pressure	<b>124 mmHg</b>
Central Pulse Pressure Amplification	<b>33%</b>
Augmentation Index	<b>23%</b>

### Final Assessment Interpretation

After some time, the patient’s brachial blood pressure shows improvement, while the central systolic pressure of 124 mmHg is near the desired value of 124 mmHg. The central pulse pressure amplification is 33%. The Alx fell from 32% to 23%. No further changes were made to this patient’s Rx medication regimen. This example shows the added value of central pressure measurements in a scenario where improvement in brachial pressure is not attended by a parallel improvement in central pressures.

**Figure 12.** Central Pressure Waveform



BBP indicates brachial blood pressure systolic/diastolic; CBP, central blood pressure systolic/diastolic; CPP, central pulse pressure; Alx, augmentation index; HR, heart rate; bpm, beats per minute.