



## clinical validation of PWV measurement are the Withings scale

Withings' PWV-capable smart scales (e.g., Body Cardio, Body Scan) have been clinically validated against gold-standard carotid-femoral PWV systems like SphygmoCor, and their PWV readings fall within accepted accuracy standards for noninvasive devices. <sup>[1]</sup> <sup>[2]</sup> <sup>[3]</sup>

### What "clinical validation" exists?

- A 2020 validation study compared the Withings Body Cardio scale against SphygmoCor in healthy adults and found the mean difference in PWV was <1 m/s, with standard deviation <1.5 m/s, which meets ARTERY Society accuracy criteria. <sup>[3]</sup> <sup>[1]</sup>
- An additional validation project ("Initial Validation Of Withings Pulse Wave Velocity And Body Composition Scale") also concluded that PWV values from the Withings scale were not clinically different from SphygmoCor measurements, supporting daily home use for cardiovascular monitoring. <sup>[4]</sup>

### How Withings frames the validation

- Withings states that PWV on Body Cardio was introduced after calibration and validation against the gold standard PWV method, allowing the scale to estimate vascular age and arterial stiffness from heart-foot pulse transit time. <sup>[5]</sup> <sup>[2]</sup> <sup>[6]</sup>
- Company research pages list PWV among "medical-grade" metrics and cite multiple publications using Withings scales for longitudinal home PWV monitoring, including COVID-era arterial stiffness studies. <sup>[7]</sup> <sup>[8]</sup> <sup>[9]</sup>

### Practical takeaways for using PWV on the scale

- The validation data suggest the scales are **reliable** for tracking trends in arterial stiffness and for rough risk stratification, but they are not a replacement for full clinical vascular assessment in complex cases. <sup>[10]</sup> <sup>[11]</sup> <sup>[1]</sup>
- Single readings can be noisy; using consistent measurement conditions (same time of day, fasting/voided bladder, feet well positioned) and looking at multi-week trends improves interpretability, similar to home BP monitoring. <sup>[12]</sup> <sup>[13]</sup>



# are there any other consumer devices that have clinically validated PWV measurements

Yes. A few other consumer-grade or near-consumer devices have had their PWV (or closely related arterial stiffness metrics) clinically validated against reference systems, though availability can be region-specific. <sup>[19]</sup> <sup>[20]</sup>

## Examples beyond Withings scales

- **Huawei smartwatch (ECG+PPG models):** A study using a Huawei watch to estimate carotid–femoral PWV (cfPWV) compared it to the Complior arteriosclerosis analyzer and found high agreement (concordance correlation coefficient  $\approx 0.9$ , mean absolute error  $\approx 0.66$  m/s), meeting international accuracy criteria for noninvasive PWV devices. <sup>[21]</sup> <sup>[19]</sup>
- **Finger-based devices (e.g., pOpmètre/ft-PWV):** A finger-tonometry device marketed for office and routine clinical use showed that finger-to-toe PWV (ft-PWV) correlated well with standard carotid–femoral PWV and was feasible, fast, and simple, though it is more of a low-end clinical tool than a mass consumer gadget. <sup>[22]</sup>

## Other emerging or semi-consumer options

- **Optical oximeter-type devices:** Clinical trials are ongoing to validate oximeter-style devices that estimate aortic PWV from optical signals, positioning them as stand-alone home instruments rather than traditional hospital systems. <sup>[23]</sup>
- **General smartwatch/PPG-based approaches:** Reviews of wearable BP/PWV estimation note multiple experimental or pre-commercial devices using PPG (finger, wrist) plus algorithms; some reach PWV errors around 0.7–1.1 m/s against reference methods, but many are still research-grade and not clearly marketed with formal regulatory-style PWV validation claims. <sup>[24]</sup> <sup>[25]</sup>

## How this compares to Withings

- Current consensus documents on PWV validation emphasize that relatively few devices (of any type) fully satisfy the latest ARTERY/International guidelines, and that consumer wearables/scales with published, guideline-compliant validation are still the exception rather than the rule. <sup>[26]</sup> <sup>[20]</sup>
- Withings scales and selected Huawei watch models are among the more prominent “consumer-reachable” devices with peer-reviewed cfPWV validation against accepted noninvasive gold standards, whereas many other wearables report “vascular age” or “arterial stiffness index” without transparent clinical validation data. <sup>[27]</sup> <sup>[28]</sup> <sup>[19]</sup>

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