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Cardiovascular autonomic nervous system function can be assessed by using an orthostatic challenge to induce arterial wave reflection. While arterial reflection is typically estimated using central augmentation index, a superior estimation can be obtained using pulse wave separation analysis to estimate the aortic backward pressure wave (Pb). However, to be of value in a clinical or research setting, an assessment tool must be precise (reliable). Therefore, this study sought to determine the measurement precision of Pb responses to a modified tilt-table test. Twenty healthy adults (26.4 y (SD 5.2), 24.7 kg/m² (SD 3.8), 55% Female) were tested on three different mornings in a fasted state, separated by a maximum of seven days. Pressure waveforms were recorded on the left arm, and aortic waveforms were generated using a generalized transfer function. Subsequently, a physiologic flow waveform was assumed to separate the aortic pressure wave into its *forward* and timing-independent *backward* (Pb) components. The criterion intra-class correlation coefficient of ≥ 0.75 was exceeded at baseline (0.79), following 5 min tilt (0.75), and following 5 min recovery from tilt (0.75). The standard error of measurement was 7%. These findings indicate that, in a healthy cohort, the Pb response to an orthostatic challenge can be assessed with acceptable precision. The next step is to determine the sensitivity (validity) of this technique in identifying cardiovascular autonomic dysfunction in patient groups.