A simple way to measure health of the autonomic nervous system

The autonomic nervous system (ANS) unconsciously regulates the function of internal organs, including the heart. A poorly functioning ANS has been linked to a number of cardiovascular complications, including hypertension and stroke. Thus, simple tests of ANS function may aid in the prevention and management of cardiovascular diseases.

One way of assessing the ANS is an ‘orthostatic stress test’. This test is conducted by changing the posture of a patient from supine (lying down) to upright. When a person changes posture, blood pools in the veins of the lower body and arterial blood pressure rapidly drops - unless the ANS constricts (makes smaller) the resistance blood vessels. The resistance blood vessels are primarily responsible for maintaining blood pressure. A rapid drop in blood pressure prevents the internal organs, including the brain and the heart, from receiving an adequate blood supply.

Therefore, the orthostatic tolerance test can an important, and readily available test of ANS function. In most cases, arterial blood pressure is typically measured on the brachial (upper arm) artery. However, brachial blood pressure may not accurately reflect blood pressure around the internal organs (e.g., the heart). Fortunately, a device has been recently developed which can assess ‘central blood pressure’ through brachial blood pressure recordings, with a process called pulse wave analysis (PWA). Indeed, this device can make accurate and reliable central blood pressure recordings under resting conditions; however, when coupled with an orthostatic tolerance test, may provide a superior indication of ANS function. While this device is valid, to be of clinical value, it must also be reliable. That is, the test must provide similar numbers if conducted over a number of days.

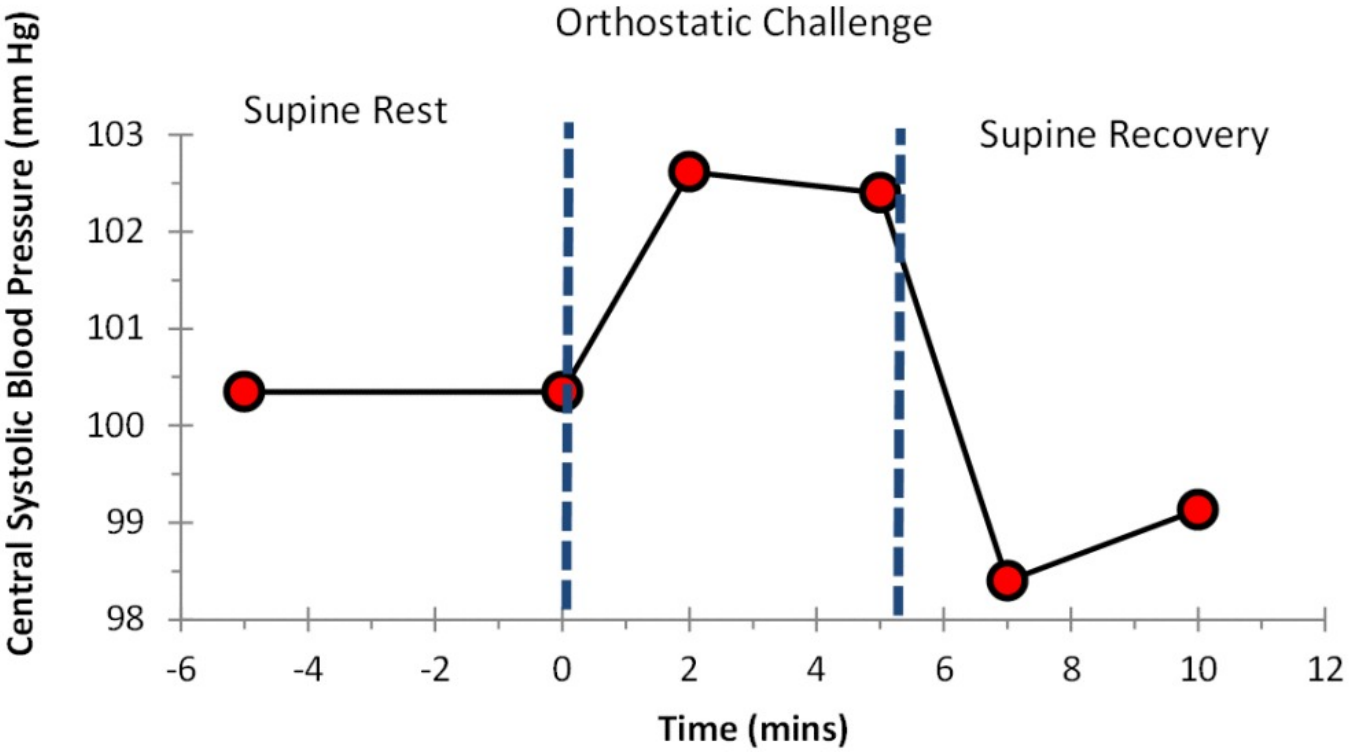

Fig. 1. Average central systolic blood pressure responses to an orthostatic tolerance test.

Recently, we tested a group of 20 young people on 3 different days. On each day, the central blood pressure responses to an orthostatic tolerance test were measured. The orthostatic stress was induced by lying each person on a table, measuring their resting blood central pressure values, then passively tilting the table to change posture (Fig. 1). The blood pressure values were re-measured following 5 minutes of the change in posture. Importantly, these central blood pressure responses were found to be highly reliable.

Using PWA to monitor central blood pressure responses to an orthostatic challenge presents an exciting opportunity for providing clinicians with a superior test of ANS function. This measurement is accurate, reliable, and quick (~1 min per recording) and simple to use.

Publication

Reliability of oscillometric central hemodynamic responses to an orthostatic challenge.
Stoner L, Bonner C, Credeur D, Lambrick D, Faulkner J, Wadsworth D, Williams MA
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