Modeling of heart rate and blood pressure in response to the Valsalva Maneuver in healthy and endotoxin-administered patients

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Modeling of heart rate and blood pressure in response to the Valsalva Maneuver in healthy and endotoxin-administered subjects.

The Valsalva Maneuver (VM) is the process of forceful exhalation against a closed airway. The VM is one of the most commonly used physiological tests to study a patient's control of their heart rate (HR) and blood pressure (BP). Deviations in HR and BP modulation in response to passive (breath-holding) and active (baroreflex control) effects characterizes potentially compromised autonomic nervous system control, such as in orthostatic intolerance. This study aims to (a) intrinsically understand the influence of the sympathetic and parasympathetic autonomic nervous system control of HR and BP, (b) model a patient's response to the VM for both a healthy subject and a subject administered a dose of endotoxin (data measured by Mehlsen, Denmark), and (c) fit the generated predictions to data to obtain patient-specific models. This study proposes a pulsatile cardiovascular model with a baroreflex control component to study variations in the VM between healthy and endotoxin-administered patients.