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Assessment of Peripheral Versus Central Autonomic Control of Vascular Function in Healthy Subjects

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Current measures of cardiovascular function do not consider the relative importance of autonomic central control of vascular tone with reference to local hypoxic mediated vasodilation. The central augmentation index (cAIX) is a measure of arterial stiffness, with a predominance of the response regulated by major arteries. Alternatively vascular responsiveness can be assessed by peripheral measures such as dichrotic notch height. Peripheral measures are often difficult to observe in the presence of changes in autonomic activity; this is especially difficult in healthy populations. The use of ambulatory blood pressure monitors allows for continuous assessment of both central and peripheral arterial waves, which allows one to assess both central autonomic control and peripheral hypoxia-mediated vasodilation. **PURPOSE:** To examine exercise as a method to evaluate the effect of the autonomic system on peripheral vascular response and improve cardiovascular assessment. We propose that a short-term hypoxic stimulation will lower vascular stiffness (cAIX) while maximal exercise will increase it. Further that these responses will be independent of changes in dichrotic notch height as a measure of peripheral relaxation. **METHODS:** Blood pressure and pulse wave data was collected from young (19-23), healthy subjects (11 M and 4 F) using an Oscar 2 Ambulatory Blood pressure monitor over 2 hrs. After 1 hr, a hyperemia response was elicited using a manual cuff on the forearm. After 2 hr, the subject performed a maximal exercise stress test as per the Bruce Protocol. Subsequently, another hyperemia response was elicited. **RESULTS:** In 15 healthy subjects we observed that cAIX in the presence of hyperemia was greater pre-exercise than post indicating that central sympathetic stimulus reduced increased vascular stiffness. However, height of the dichrotic notch, an indicator of peripheral vessel stiffness, was reduced by hyperemia and increased by exercise. **CONCLUSION:** These studies show that ambulatory blood pressure monitoring can be used to assess vascular responsiveness and have the capacity to monitor both central and peripheral control. Furthermore, we propose an algorithm that can be used to assess the vessel relaxation capacity of peripheral arteries.