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IS THERE AN EVOKED VASCULAR-RESPONSE

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Sandman, C.A., O'Halloran, J., & Isenhardt, R. (University of California, Irvine, and Fairview Hospital) **Is there an evoked vascular response?** Stimuli synchronized with diastolic phase of carotid or cephalic pulse pressure waves have been reported to elicit augmented event-related potentials (ERPs) of the brain. The present study was designed to investigate the possibility that these influences of the cardiovascular system on the ERP might be paralleled by changes in blood volume. Using a procedure which was identical to the ERP studies, auditory stimuli were synchronized with either systolic or diastolic phases of a cephalic pulse pressure wave (measured with a photoplethysmograph). Pulse pressure waves were measured from the cortex (N = 10) and the arm (N = 8) using impedance plethysmography (Minnesota Impedance Cardiograph). The waveforms were averaged for 40 stimulus presentations and compared with 40 waveforms just preceding the stimulus. The waves were collected with a sampling rate of 1 KHz for 1000 msec and the smoothed (250 Hz resolution) waves were subjected to factor analysis and stepwise discriminant functions. A varimax rotation identified four major components (300–540 msec; 40–100 msec; 100–200 msec; 200–300 msec). Responses during stimulation were distinguished from prestimulus from the head, but not the arm, during diastole but not systole. The results suggest that rapid changes in blood volume can be evoked by auditory stimulation only if it is synchronized with diastole. The temporal parameters of this response defy the time course of metabolic demand and may reflect preparatory responses of the brain.