PHYSIOLOGICAL RESPONSES TO REPEATED INHALATIONS OF TREE ODORS IN INFANTS

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We investigated the physiological responses to inhalations of odorous components of coniferous trees in infants. The participants were 57 infants of 1-3 months old whose parents gave a written informed consent. Each infant was exposed for two or three minutes to three different odors of α-pinene, limonene and a control (air). Two or three minutes of rest were taken before and after the exposure to odors. During this rest-inhalation-rest course, cerebral activity (NIRO200, Hamamatsu Photonics KK.) and an electrocardiogram (Polymate II AP-216, TEAC) were continuously measured. Heart rate and heart rate variability were calculated from the electrocardiogram. The measurements were repeated with a 2-week interval until the infants became 3.5 months old. The data was analyzed excluding the cases where the infants fell asleep or cried. The cerebral activity was enhanced in response to all three odors including the control. The heart rate significantly decreased in response to α-pinene ($p<0.05$), but not to limonene and the control. The heart rate during the inhalations of the odors decreased as the number of repetition increased ($p<0.01$). The sympathetic and parasympathetic nervous activities, which were assessed by heart rate variability analysis, did not show significant changes. We consider that the measurement system we have built for assessing infants' physiological responses to odors is useful, but further investigations are still necessary as there were many missing data accompanying infants' crying or sleeping.

Key words: *near infrared spectroscopy, heart rate, heart rate variability, olfactory stimulation*

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EFFECT OF SINUSOIDAL LOWER-BODY NEGATIVE PRESSURE ON CEREBRAL BLOOD FLOW AND EVENT-RELATED POTENSIALS

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A decrease in central venous pressure caused by orthostatic stress reduces the cerebral blood flow. Lower-body negative pressure is used as a perturbation to the cardiovascular system and has been applied to simulate the gravitational stress of orthostatic blood shift in humans. However, little is known about how dynamic changes in the cerebral blood flow affect brain activity. Using sinusoidal lower-body negative pressure (SLBNP) as a postural blood shift simulation and event-related potentials (ERPs) extracted from electroencephalograms (EEGs) of subjects engaged in an oddball task, we assessed whether mild blood pressure fluctuations disturbed brain activity. The middle cerebral arterial blood flow velocity (MCAv) and cerebral blood oxygenation (OxyHb) were measured in 11 healthy male adults. Two different periodical changes (18- and 90-sec of 0 to −40 mmHg) of SLBNP were provided. We observed that the fluctuations of MCAv and OxyHb coincided with the SLBNP. We found that the N100 amplitude evoked by standard stimuli at 18-sec was significantly decreased compared to the 90-sec SLBNP and to the one without-SLBNP condition, but there was no significant effect of SLBNP on the P300 amplitude. These results indicate that SLBNP affected the cerebral blood flow, whose fluctuations affected brain activity. Our findings suggest that there is a relationship between mild fluctuations of cerebral blood flow and brain activity.

Key words: *cerebral blood flow, event-related potentials, lower-body negative pressure*

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