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Hemodynamic Responses to the Mother's Face in Infants by Near-Infrared Spectroscopy

A Japanese research group led by Prof. Ryusuke Kakigi and Dr. Emi Nakato (National Institute for Physiological Sciences: NIPS) and Prof. Masami K Yamaguchi (Chuo University) found that there was the different hemodynamic response in the temporal cortex between infants' perceptions of their own mother and of female strangers. The presentation of mother's face elicited increased hemodynamic responses in the bilateral temporal cortex. This finding was reported in Early Human Development.

Recognition of the mother's face is important in the development of an infant's social communication. In this study, the research group investigated 7- and 8-month-old infants' brain activity during the perception of the mother's face and strangers' faces by Near-infrared Spectroscopy (NIRS). NIRS is a non-invasive technique which estimates cerebral blood flow in the human brain and can assess changes in the concentration of oxyhemoglobin (oxy-Hb), deoxyhemoglobin (deoxy-Hb), and total hemoglobin (total-Hb) as an index of neural activity.

The finding was that the oxy- and the total-Hb concentrations in both the right and left temporal cortices were significantly increased for the mother's face. By contrast, significant increases in the oxy- and the total-Hb concentration were observed in the right temporal cortex for strangers' faces. The great activity in the right temporal cortex for faces irrespective of familiarity was consistent with our previous NIRS data which showed the right

temporal cortex were involved in perception of faces in infants. It is noteworthy that the greater hemodynamic response in the left temporal cortex was observed only for mother's face. This increased hemodynamic response implies the specific mechanism for the processing of the mother's face in infants' brain.

The research group said, "Our findings imply that the probable presence of cortical specialization for the mother's face in infants may be firmly established by the age of 7 to 8 months. This is the first study to clarify the location of brain activity in infants related to the perception of their mother's face."

Emi Nakato, Yumiko Otsuka, So Kanazawa, Masami K. Yamaguchi, Yukiko Honda, Ryusuke Kakigi. I know this face: Neural activity during mother's face perception in 7- to 8-month-old infants as investigated by near-infrared spectroscopy. *Early Human Development*, 2011; 87 (1): 1 DOI: 10.1016/j.earlhumdev.2010.08.030