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Neural Correlates of Family Love: Gene vs Environment

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Abstract

In humans, neural mechanisms underling family love has been hardly understood. In order to explore possible roles of the prefrontal cortex (PFC) in these love, the PFC activity of mother and father while viewing their own child's smiling was compared with the activity while they were viewing other child's smiling. We also examined the PFC response to grandchild smiling in grandmother, and the PFC response to mother smiling in boys before, during and after puberty in similar ways. The PFC activity was measured using near-infrared spectroscopy (NIRS).

We found that mother and father showed anterior PFC (aPFC) activation in the right and left hemisphere, respectively. However, these activation patterns were modulated by genetic polymorphisms of oxytocine receptor and vasopressin receptor, respectively. In grandmother, both hemispheres of the aPFC were activated. Boys showed aPFC activity in the right hemisphere before puberty and in the left hemisphere during puberty, but no activation was observed in aPFC after puberty.

These lines of our study showed differences in laterality of aPFC activation among family members, which may explain psychological difference in love among family members because aPFC is involved in the reward system of the brain.