Multisensory Integration of Natural Odors and Sounds in the Auditory Cortex

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Abstract:

Motherhood is associated with different forms of physiological alterations including transient hormonal changes and brain plasticity. The underlying impact of these changes on the emergence of maternal behaviors and sensory processing within the mother's brain are largely unknown. By using in vivo cell-attached recordings in the primary auditory cortex of female mice, we discovered that exposure to pups' body odor reshapes neuronal responses to pure tones and natural auditory stimuli. This olfactory-auditory interaction appeared naturally in lactating mothers shortly after parturition and was long lasting. Naive virgins that had experience with the pups also showed an appearance of olfactory-auditory integration in A1, suggesting that multisensory integration may be experience dependent. Neurons from lactating mothers were more sensitive to sounds as compared to those from experienced mice, independent of the odor effects. These uni- and multisensory cortical changes may facilitate the detection and discrimination of pup distress calls and strengthen the bond between mothers and their neonates.

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