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The First Word: Memory for Speech in Neonates' Brain

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Abstract: In this work we report brain responses associated with memory for words in newborns using near infrared spectroscopy (NIRS).

We presented 40 healthy neonates with a single word repeated for approximately 6 minutes. After 2 minutes of silence, the second phase (test) began: the same word was presented for around 3 minutes to half of the infants whereas the other half heard a novel word.

In the test we found significant differences in Oxy-hemoglobin concentration changes between the groups. Neonates that listen to a novel word showed greater responses than neonates who heard the same word before and after the pause ($p < 0.05$). The difference was found in a distributed cortical network that involved temporal, parietal and some frontal regions.

The results provide neural evidence of memory for speech stimuli over brief periods. Such capacity at birth suggests that building vocabulary might be facilitated by first storing a familiar sound pattern that will be associated to meanings in later stages of language development.