Auditory Breast Milk: Effects of Mother’s Voice and Heartbeat Sounds on Brain Development of Preterm Infants

Amir Lahav ScD
Assistant Professor of Pediatrics
Harvard Medical School
Boston, MA
Visiting Professor/Scientist
Women & Infants Hospital
Providence, RI

Amir Lahav is an Assistant Professor of Pediatrics at Harvard Medical School with faculty appointments at Mass General Hospital for Children and Harvard School of Public Health. He is currently a Visiting Professor in the Department of Pediatrics at Women & Infants Hospital at Brown University. Dr. Lahav received his Doctor of Science degree in Health & Rehabilitation Sciences from Boston University. Dr. Lahav’s work is focused on the effects of hospital noise and womb-like sounds on the developing brain, with a special interest in the acoustic design of the neonatal intensive care unit. Dr. Lahav’s research aims to determine the impact of early exposure to mother’s voice on brain mechanisms that support stress, language, cognition, and attention.

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Objectives: Review the scientific evidence for the impact of maternal sound exposure on growth velocity, cardio-respiratory regulation, apnea, and auditory brain development in preterm newborns.
Background on preterm births

- ~12.3% of births in the US.
- Survival: 25wks(40%), 26(80%), 30(90%), 32(95%).
- Major risk for life-long morbidities and disabilities.
- Born <32 wks with even normal brain u/s still have an increased risk for developmental disabilities.
- Most typical disabilities: ADHD, auditory processing disorder, cognitive and language disabilities.
- Estimates medical cost in the US > $30 billion.

Brain development is shaped by sensory experience

- Early sensory experience
- Brain plasticity
- Developmental outcomes

Because brain development is shaped by sensory experience we should not only treat the patient but also treat the patient's sensory environment.
Can we give preterm babies a better NICU environment to grow and develop?

The Maternal Sounds Study: RCT in infants 25-33 wks

The Maternal Sounds study: how does it work?

Measuring the HR response to maternal sounds

Soothing response: maternal sounds elicit lower HR in the first month of life
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Soothing response: maternal sounds elicit lower HR in the first month of life

Maternal sounds improve weight gain in the first 28 days of life in VLBW infants

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Brain u/s at 1 month: study design (N=40)

Added exposure to low-frequency maternal sounds increased size of the Auditory Cortex (AC)

Long-term developmental outcomes

Can early exposure to maternal sounds improve cognitive, language, and communication skills at school age?
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Summary

1. Preterm infants are born during a critical time period for sensory development.
2. Early experience does matter.
3. Exposure to maternal sounds may improve physiological stability, growth velocity, and structural maturation of the auditory cortex.
4. More longitudinal research and follow-up studies are needed!

Thank you!