



# THE INSTITUTE FOR MUSIC & BRAIN SCIENCE

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### PRESS RELEASE

## Effect of auditory stimulation with vocal music on neurophysiological responses to acute pain in premature infants

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Of the 4 million babies born in the USA each year, about 500,000 (12.5%) arrive prematurely. Many require days, weeks or even months of care in hospitals and intensive care units. Premature infants now account for two-thirds of infant deaths. The brains and peripheral sensorimotor systems of those lucky enough to survive develop in abnormal sensory and social environments during the first hours-to-months of postnatal life. Their daily routines are punctuated by acute recurrent pain and filled with emotional distress and chronic pain. The latter “nurture complications” of their medical illnesses interact with the pathologies nature has dealt them to cause abnormal brain development and a high prevalence of cognitive and emotional disorders later in life that the No Child Left Behind Act is ill-equipped to deal with. With a 30% increase in the incidence of premature births in the USA over the past 25 years, the annual cost to Americans is now \$26 billion. Obviously, our youngest patients form a needy “silent minority” that are part of a growing, under-appreciated public health crisis and economic crisis in our homeland. We physicians and scientists have a responsibility to secure their future. Indeed, many investigators have been working hard to help these babies, and some are presenting their work here at the SFN meeting.

As part of the interdisciplinary research programs and clinical trials being conducted and planned by the Health & Medicine Program of The Institute for Music & Brain Science, we are studying the effects of auditory stimulation with a variety of different sounds on:

- Neurophysiological and behavioral responses to acute pain caused by medically-necessary procedures
- Neurophysiological, neuroanatomical, and behavioral measures of auditory nervous system development, including auditory functions supporting humans' universal competence in language and music

In addition to the above medical goals, *neuroscientific and musicological goals* can also be addressed in our study design by determining *what types of sound are effective*. The results will bear relevance to understanding the evolution of music and whether humans are born with *innate preferences* for certain aspects of music – e.g., for harmonic intervals and rhythms whose ratios of simultaneous notes and successive beats, respectively, form simple integer ratios (Pythagoras c. 550 BCE).

The preliminary results of our initial study on the effects of auditory stimulation with vocal music after a painful procedure – a blood test in which the infant has her/his heel stabbed by a needle and squeezed to get blood into a test tube for serologic analyses – supported our working hypothesis:

- Compared to the control condition (no overt auditory stimulation), the test condition – *auditory stimulation with vocal music – caused a significant drop in heart rate, a neurophysiological index of acute pain and emotional distress.*

Plans for clinical trials investigating numerous patient, stimulus, and response variables are underway.

The accompanying copy of our Society for Neuroscience poster provides the details of our Methods and Results.

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