

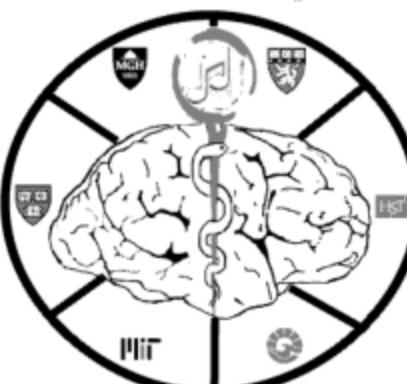
THE INSTITUTE FOR MUSIC & BRAIN SCIENCE

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Mark Jude Tramo, MD, PhD, Director
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Hearing, Hearing & Helping Through Music

Executive Summary

Statement of Need

There is no institution in the world conducting integrated neuroscience, clinical, education, and technology research programs that are devoted to establishing:

- Neuroanatomical, Neurochemical, Neurophysiological, Neuroethological, and Genetic bases of humans' innate, universal competence for music.
- The benefits of music and other forms of controlled auditory stimulation in the treatment of:
Surgical Pain, Cancer Pain, Chronic Pain Syndrome, and other types of pain
Hypertension, Arrhythmias after Heart Surgery, and other autonomic problems
Parkinson's Disease, Paralysis after Stroke, and other movement disorders
Attention Deficit Disorder, Alzheimer's Disease, and other cognitive disorders
Post-Traumatic Stress Disorder, General Anxiety Disorder, and other emotional disorders
Adverse effects of medically-necessary treatments (e.g., Chemotherapy, Radiation Therapy)
- The utility of music and other forms of paralinguistic communication for:
Education of school children who are in the early stages of language and math acquisition
The large proportion of children with developmental language and math disorders who
can benefit from paralinguistic cues during learning beyond the early years of language
acquisition.

Solution

Assemble an interdisciplinary team with expertise in cognitive neuroscience, adult and child neurology, early education, music, computer science, and product development from academia, the health care industry, and the private sector in order to:

- Form a 4942(j)(3) Private Operating Foundation whose Board members are affiliated with a major university, major medical center, and venture capitalists/entrepreneurs

- Conduct basic neuroscience research on neuroanatomical, neurochemical, neurophysiological, neuroethological, and genetic bases of humans' innate, universal competence for music using space and some resources provided by the affiliated university and major medical center and approved by their Institutional Review Boards, and other resources, related overhead, and all research salary and fringe paid by our Foundation
- Conduct rigorous, prospective, longitudinal, randomized-controlled clinical trials of infants, children, and adults who are patients being diagnosed and treated at the affiliated major medical center for pain, movement disorders, high blood pressure, emotional disorders, cognitive disorders, chemotherapy, radiation therapy, and other disorders.
- Develop and patent treatment protocols and devices in the course of doing the above clinical trials.
- Conduct rigorous, prospective, longitudinal, randomized-controlled trials of novel educational tools for teaching reading and math to elementary school children, beginning with reading programs for 1st grade urban schoolchildren that incorporate paralinguistic devices — e.g., prosodic cueing with rhythm, rhyme, and assonance — to enhance word recognition, reading speed, and reading comprehension.
- Develop and patient education protocols and tools in the course of doing the above educational trials.
- Build the world's first MusicMindBrain Database of behavioral, neural, and genetic data from all healthy and sick infants, children, and adults studied during the course of the above basic neuroscience research, clinical trials, and educational trials.

Organization and Expertise

The following individuals are committed to participating in the research, clinical, and education activities of the proposed Private Operating Foundation. All that is needed for their participation is salary support for their efforts. A few individuals already have their salary guaranteed and are willing to participate pro bono, though typically their percent effort would be less than 10% because of other commitments.

Program in Neuroscience

Mark Jude Tramo, MD, PhD

Director, The Institute for Music & Brain Science

Associate Professor of Neurology, Harvard Medical School & Attending Neurologist, Massachusetts General Hospital
Steering Committee, Harvard University Mind/Brain/Behavior Initiative

Research Affiliate, Research Laboratory of Electronics, Dept of Electrical Engineering & Computer Science, M.I.T.
Research Associate, Eaton-Peabody Laboratory of Auditory Physiology, Massachusetts Eye & Ear Infirmary

Songwriter Member, ASCAP

Best Doctors in America®/America's Top Physicians®

David H. Hubel, MD

Founding Board Member, The Institute for Music & Brain Science

Nobel Laureate in Physiology or Medicine

John Franklin Enders University Professor, Harvard University

Founding Member, Harvard Department of Neurobiology

Anne Young, MD, PhD

Founding Board Member, The Institute for Music & Brain Science
Chief, Department of Neurology, Massachusetts General Hospital
Julianne Dorn Professor of Neurology, Harvard Medical School

Louis D. Braida, PhD

Faculty, The Institute for Music & Brain Science
Co-Director, Harvard-M.I.T. Speech & Hearing Biosciences & Technology Graduate Studies Program
Co-Director, Research Laboratory of Electronics, Dept of Electrical Engineering & Computer Science, M.I.T.
Henry Ellis Warren Professor, Division of Health Sciences & Technology, Harvard Medical School – M.I.T.

Jennifer R. Melcher, PhD

Faculty, The Institute for Music & Brain Science
Asst Professor of Otolaryngology, Harvard Medical School & Massachusetts Eye & Ear Infirmary
Founding Director, Auditory Neurology Section, Eaton-Peabody Laboratory of Auditory Physiology, Massachusetts Eye & Ear Infirmary
Research Associate, Martinos Center for Biomedical Imaging, Massachusetts General Hospital
Research Scientist, Auditory Neuroscience Program, The Institute for Music & Brain Science

David Kennedy, PhD

Faculty, The Institute for Music & Brain Science
Director of Programmatic Development, Center for Morphometric Analysis, Massachusetts General Hospital
Assoc Professor of Neurology and of Radiology, Harvard Medical School

Nikos Makris, MD, PhD

Faculty, The Institute for Music & Brain Science
Co-Director, Center for Morphometric Analysis, Massachusetts General Hospital
Asst Professor of Neurology, Harvard Medical School & Massachusetts General Hospital

Katherine B. Sims, MD

Director, Neurogenetics Laboratory, Massachusetts General Hospital
Assoc Professor of Neurology, Harvard Medical School & Massachusetts General Hospital

Winnie Xin, PhD

Neurogenetics Laboratory, Massachusetts General Hospital

Sarthak Misra, MD

Research Associate, The Institute for Music & Brain Science

Andrew Dykstra, BS, MS

Graduate Student, The Institute for Music & Brain Science
Graduate Student, Harvard-M.I.T. Speech & Hearing Biosciences & Technology Graduate Studies Program

Matthew Serna

Undergraduate Student, The Institute for Music & Brain Science
Undergraduate Student, M.I.T. Dept of Brain & Cognitive Sciences

James Symons

Undergraduate Student, The Institute for Music & Brain Science
Undergraduate Student, Berklee College of Music

Alexis Dale

Undergraduate Student, The Institute for Music & Brain Science
Undergraduate Student, Undergraduate Student, M.I.T. Dept of Brain & Cognitive Sciences

Program in Health & Medicine

Nicholas Zervas, MD, PhD

Founding Board Member, The Institute for Music & Brain Science
Higgins Distinguished Professor of Neurosurgery, Harvard Medical School
Whilom Chief of Neurosurgery, Massachusetts General Hospital
President *ex officio*, Boston Symphony Orchestra

Verne S. Caviness, MD, PhD

Executive Board, The Institute for Music & Brain Science
Joseph & Rose Kennedy Professor of Neurology, Harvard Medical School
Chief, Division of Pediatric Neurology, Dept of Neurology, Massachusetts General Hospital
Director, Center for Morphometric Analysis, Massachusetts General Hospital
Steering Committee, Harvard University Mind/Brain/Behavior Initiative

Jonathan H. Cronin, MD

Faculty, The Institute for Music & Brain Science
Chief, Division of Perinatology, Massachusetts General Hospital for Children
Director, Newborn Intensive Care Unit
Associate Professor of Perinatology, Harvard Medical School

Margaret Settle, RN, MS

Faculty, The Institute for Music & Brain Science
Nurse Manager, Newborn Intensive Care Unit
Massachusetts General Hospital for Children

Fred H. Hochberg, MD

Advisory Board, The Institute for Music & Brain Science
Founding Director, Music & Medicine Clinic, Massachusetts General Hospital
Professor of Neurology, Harvard Medical School
Attending Neurologist, Massachusetts Hospital Cancer Center

Donald K. Eddington, PhD

Faculty, The Institute for Music & Brain Science
Director, Cochlear Implant Research Laboratory, Massachusetts Eye & Ear Infirmary
Assoc Professor of Otolaryngology, Harvard Medical School
Principal Scientist, Research Laboratory of Electronics, Dept of Electrical Engineering & Computer Science, M.I.T.

Sydney S. Cash, MD, PhD

Faculty, The Institute for Music & Brain Science
Instructor in Neurology, Harvard Medical School
Asst Attending Neurologist, Epilepsy Unit, Massachusetts General Hospital

Leigh R. Hochberg, MD, PhD

Instructor in Neurology, Harvard Medical School & Attending Neurologist, Stroke Unit, Massachusetts General Hospital
Neurology Consultant, Spaulding Rehabilitation Hospital

Karen Furie, MD

Associate Professor of Neurology, Harvard Medical School
Attending Neurologist, Stroke Unit, Massachusetts General Hospital

Emad Eskandar, MD, PhD

Associate Professor of Neurosurgery, Harvard Medical School
Attending Neurosurgeon, Massachusetts General Hospital

Tamara Chuprina

Research Assistant, The Institute for Music & Brain Science

Program in Education

Peter B. Rosenberger, MD

Faculty, The Institute for Music & Brain Science

Associate Professor of Neurology, Harvard Medical School

Director *ex officio*, Learning Disorders Program, Massachusetts General Hospital

David Gow, PhD

Faculty, The Institute for Music & Brain Science

Asst Professor of Neurology, Harvard Medical School & Massachusetts General Hospital

Research Affiliate, Speech Communication Group, Research Laboratory of Electronics, Dept of Electrical Engineering & Computer Science, M.I.T.

Karen Littman

Consultant, The Institute for Music & Brain Science

CEO, Morphonix, Inc, Sausalito, CA

Jeanne Bamberger, PhD

Consultant, The Institute for Music & Brain Science

Professor Emeritus of Music & Urban Education, University California at Berkeley

Caitlin Van Ness, BA

Consultant, The Institute for Music & Brain Science

Teach America, Bronx, NY

Program in Technology R & D

Jeffrey Epstein

Advisory Board, The Institute for Music & Brain Science

President, Florida Science Foundation

Jack M. Gill, PhD

Advisory Board, The Institute for Music & Brain Science

Senior Partner, Vanguard Ventures, Palo Alto, CA

President, The Gill Foundation

James L. Singleton, MBA

Advisory Board, The Institute for Music & Brain Science

Managing Director, Pillar Capital, LP

Brandon Fradd, MD

Managing Partner, Apollo Medical Partners

Advisory Board, The Institute for Music & Brain Science

Program in Music

Robert S. Freeman, PhD

Board Chairman, The Institute for Music & Brain Science

Regents Professor and Whilom Dean of Fine Arts, University of Texas at Austin

Director *ex officio*, Eastman School of Music, Rochester University

President *ex officio*, New England Conservatory of Music

Sir George Martin, CBE
Advisory Board, The Institute for Music & Brain Science
Founding President, AIR Studios
Producer, The Beatles
Trustee, National Academy of Recording Arts & Sciences

Caroline Bienstock, JD MBA
Advisory Board, The Institute for Music & Brain Science
COO, CarlinAmerica Music

Bernie Krause, PhD
Advisory Board, The Institute for Music & Brain Science
President, Wild Sanctuary, Inc., Glen Ellen, California
Producer

Funding Requirements

Funding requirements are calculated on the basis of 1) annual operating costs provided by an endowment yielding 4% annually; and 2) start-up funds that cover the first year of operating costs plus equipment and supplies needed for the first year. No "cost-of-living" or inflation increases were included in these estimates, nor do they include projected costs for equipment repairs, upgrades, new software etc. This reflects, in part, the fact that we will continue to apply for funding to federal and private sources for funding and that we will continue to try to increase the size of our Board, particularly the number of members from the business community who can help us to grow our annual giving fund.

1. Endowment = \$9.625M

At 4% per year, this would provide for an Annual Operating Budget of \$385k, to be distributed as follows:

Personnel =	\$250,000
Equipment =	25,000
Supplies =	25,000
Travel =	10,000
Overhead =	<u>75,000</u>
	\$385,000

2. Start-Up = \$785k

Year 1 Operating Cost = \$385k
Electroacoustics (ERP) = \$200k
Psychoacoustics = \$25k
Auditory fMRI = \$25k
Microelectrode = \$25k
Neurochemistry = \$25k
Quantitative Morphometry = \$25k

Genetics = \$25k
Autonomic electrophysiology = \$25k
Immunochem/Endocrin = \$25k
\$785k

3. TOTAL = \$10.41 M